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4K laparoscopic right hepatectomy

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Background
Safety and efficacy of laparoscopic approach have allowed its widespread diffusion in recent years. Despite this, the number of major hepatectomies among literature series still remains relatively limited, due both to technical challenges of procedures and to the reduced pool of candidates suitable for this type of surgery. The video shows a step by step approach to laparoscopic right hepatectomy using the 4K technology.

Methods
Laparoscopic right hepatectomy using 4K technology at the Hepatobiliary Surgery Unit of San Raffaele Hospital is reported. The video focuses on surgical technique and employed devices.

Results
Right hepatic artery and right portal vein are isolated and dissected. Right liver is mobilized. Right hepatectomy is performed through anterior approach, so both IVC and right hepatic vein dissection are performed at the end of parenchymal transection.

Conclusion
Laparoscopic approach is feasible, safe and effective for laparoscopic right hepatectomy thanks both to evolution of surgical technique and technology and to a correct selection of candidates. 4K technology allows to improve surgical results thanks to images magnification and improved definition.
521 Cases of Blunt Hepatic & Splenic Injury - Multidisciplinary, Non-operative Management (NOM) in a Large Western-Europe Trauma Centre

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Background
Despite widespread use of NOM for blunt injury to liver and spleen, data from European centres are scarce. We aimed to investigate the outcome of these patients at a large trauma referral centre in Austria and develop a clinical algorithm to detect the risk factors for failure of non-operative management.

Methods
Retrospective review based on all emergency patients with admission to Medical University Innsbruck 2006-2016. Injury severity details, clinical, operative and non-operative treatment parameters, morbidity and mortality were evaluated. On these factors a systematic, therapeutic algorithm was created.

Results
521 patients were treated with splenic and/or hepatic injury, 227 had splenic injury, 238 hepatic injury and 56 cases splenic + hepatic trauma. 84.1% underwent initial NOM, of which 2.1% received embolization and/or ERCP. All other NOM cases were managed with bed-rest. The secondary failure rate of NOM was 3.2%. Reasons for failure were: persisting haemorrhage (72%), haematoma (14%) and infections (14%). The rate of patients per year with NOM did not significantly change during the study-period. In-hospital mortality rate was 1.7%. Risk factors for failure of NOM will be presented, as well as a proposed algorithm for management of traumatic liver and spleen injury.

Conclusion
NOM is the standard of care for blunt hepatic and splenic injury and successful in >80% of patients. The presented clinical algorithm is primarily guided by clinical parameters and is safe with a low mortality rate <2%.
A case of ruptured Hepatocellular carcinoma (HCC) accompanied with Dubin-Johnson syndrome (DJS).

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Background
We present a case of ruptured HCC of the lateral segment of the liver with DJS.

Methods
The patient was 78-year-old female. Because of sudden loss of consciousness, she hospitalized to another hospital for the emergency hepatic artery embolization (TAE) against the ruptured HCC. After the TAE, she was transferred to our hospital for further surgical treatment. The laboratory data on admission were within normal limits except increasing bilirubin level. The retention rate of ICG at 15min was within almost normal range. Abdominal CT revealed ruptured HCC with the bloody ascites around the liver. Angiography showed that the feeding artery was the branches of the left hepatic artery. TAE was performed and tumor stain was disappeared. One month later of TAE, MRI revealed most area of HCC necrotized and tiny area of the lesion was viable. No HCC was detected in the remnant liver. In terms of evaluation for the remnant liver with DJS, 99mTc-galactosyl human serum albumin liver scintigraphy was performed. The liver function was almost normal in spite of hyperbilirubinemia.

Results
Finally we planned the operation which was the partial liver resection of the lateral segment. Histological diagnosis was hepatocellular carcinoma arising from the liver with DJS.

Conclusion
We experienced extremely rare case of ruptured HCC with DJS. Although hyperbilirubinemia has seen before surgery, she did not develop hepatic failure and well tolerated surgical procedure except prolonged jaundice after surgery.
A Comparative Analysis Of Stapler Versus Harmonic Scalpel In Major Liver Resections

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Background
Many techniques have been used for liver parenchymal transection. It remains unknown which technique is superior with regards to perioperative outcomes. Vascular staplers have been used to perform liver parenchymal transection; however, evidence of their performance is still lacking.

Methods
This is a single center, retrospective, comparative analysis of surgical outcomes of utilizing the stapler technique versus the harmonic scalpel for parenchymal transection during major hepatectomy.

Results
Between 2011 and 2016, 176 patients with an otherwise healthy liver underwent right hepatectomy. A vascular stapler was used for parenchymal transection in 82 patients and the harmonic scalpel in 94 patients (control group). Morbidity, relaparotomy rate, and mortality were similar between groups. Median parenchymal transection time was shorter for patients undergoing stapled hepatectomy (7 vs 39 minutes, p<0.001). Median total operative time was also shorter (205 vs 255 minutes, p<0.001)

Conclusion
Stapled parenchymal transection during major hepatectomy is feasible and safe. Transection and total operative times are significantly shorter when the stapler technique is employed. Morbidity and mortality rate are comparable between the two group. The stapler technique should be considered a standard method for liver parenchymal transection.
A dorsal transverse hepatectomy for large hepatocellular carcinoma located in liver segment 9 with cava infiltration

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Background
The resectability of hepatocellular carcinoma (HCC) is multifactorial including the tumor location and the liver function. HCC located in segment 9 is rare and often has signs of inferior vena cava (IVC) infiltration. A combined right trisectionectomy with vascular resection is the choice of treatment that might be contraindicated in patients with limited liver function.

Methods
Here we demonstrate in video a new technique for parenchymal sparing resection of large HCC located in segment 9 in patient with limited liver function (minimal fibrosis, 40% macrovesicular steatosis, ICG R15: 18.4%). A dorsal transverse resection of the liver (segments 6,7,9 and 1 ) combined with the partial resection of IVC was performed.

Results
There are no signs of liver dysfunction according to 50-50 criteria. Patient was discharged at day 21. There are no signs of tumor recurrence at 6 months after the surgery.

Conclusion
This challenging technique preserves maximally the liver parenchyma and increases the resectability of large tumor in liver segment 9, which can be done safely in selected patients.
A liver trauma many years ago - today peritoneal hydatidosis - a case report

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Background
We present the case of a 63 years old man who suffered a liver trauma seven years ago.

Methods
He presents last year in our department with pelvic pain due to giant pelvic hydatid cysts. Further abdominal Ct found a also a liver cyst in segment 8 with multiple adhesive between the cyst and the diaphragm.

Results
A laparoscopic cyst fenestration (after inactivation) was performed and an open evacuation and partial excision of the pelvic cysts was performed.

Conclusion
The peritoneal hydatidosis was most probably to a partial rupture many years ago of the liver hidatic cyst.
A Longitudinal Study of Hepatocellular Adenoma Behavior After Oral Contraceptive Pill Cessation

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Background
Hepatocellular adenoma (HCA) is regarded as a rare complication of long term use of oral contraceptive pills (OCP). Our aim was to study the epidemiology and behavior of HCA after OCP cessation as longitudinal data are scarce.

Methods
Retrospective single center cohort study of patients with HCA in whom repeated imaging was available between 2004-2016.

Results
Out of 219 HCA patients, 214 (98%) were females. All of them had abdominal imaging available. Pathology was available for 109 patients (50%). HCA subtypes were 68 type III (62%), 10 type I (9%) and 4 type IV (4%). Two cases of β-catenin positive mutation were found (1%), 98 (87%) were negative and 13 (12%) were inconclusive. Median age of presentation was 35 (range 13-73) years. Out of 214 females, 148 (68%) had a documented history of OCP use. Median time of OCP use at time of HCA diagnosis was 16 years (range 1-34) years. After cessation 58 HCA went into regression (39%), 42 (28%) were stable and a growth was seen in 3 (2%). HCA regression was seen in 2 non OCP users (3%). A lack of follow-up was found in 16 (11%), whereas 27 (18%) HCA were resected before a change in tumor size could be observed. Three patients continued OCP use after diagnosis. In 85 patients (39%) a surgical intervention was performed, of which pathology demonstrated carcinoma in 2 patients.

Conclusion
In our cohort the incidence of OCP use in patients with HCA was 68%, of which 39% went into regression after OCP cessation. Advancement to carcinoma is a rarity.
A method for the transection of the liver parenchyma using ultrasound-based energy devices: do we still need the CUSA?

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Background
Laparoscopic liver resection is generally accepted for the treatment of patients with primary or secondary liver tumors. CUSA is one of the techniques for the parenchymal dissection of the liver and has been adopted in laparoscopic setting for precise preparation of intrahepatic structure. However this technique requires sophisticated instruments and the learning curve is long.

Methods
Here we demonstrate a method by using the ultrasound-based energy device and taking the advantages of ultrasound-mediated cavitation for the dissection of the liver parenchyma. The intrahepatic structure could be dissected precisely by the transducer of the device under the continuously dripping of saline to the surface of transection plane. The tissue debris would be flushed away by the saline. The vessels could be sealed and divided directly by using the same device with or without clipping. The technique achieves the similar effect as by using CUSA. The advantages of the technique consists of the less instrument demand, the simplicity in the handling and less frequently in the changing of instruments during the transection of the liver.

Results
A parallel demonstration of a laparoscopic right hepatectomy using anterior approach and a left hepatectomy in patients with malignant liver tumors will be showed in the videos.

Conclusion
The method might replace CUSA as a simple, efficient and cost-effective surgical technique for laparoscopic liver resection.
A Novel Clinical Score Including Future Liver Remnant Volume and Indocyanine Green Retention Test to Predict Post-hepatectomy Liver Failure

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Background
Post-hepatectomy liver failure (PHLF), one of the most common complications after liver surgery, is associated with an increased risk of in-hospital mortality. We aimed to develop a clinical tool to predict the occurrence of PHLF.

Methods
A total of 347 patients who underwent hepatic resection at two tertiary hepatobiliary centers were identified. A Bayesian logistic regression model was used to predict PHLF. Cross validation was performed using a different group of patients in order to externally validate the model.

Results
According to the ISGLS criteria, 46 (13%) patients had a grade A PHLF, 7 (2%) a grade B, and 15 (4%) a grade C PHLF. The presence of PHLF was associated with in-hospital mortality (AUC:0.72). In the training set including 186 patients used to develop the model we aimed to identify factors associated with PHLF. Cirrhosis (OR 2.56), indocyanine green test (ICG; OR 1.07) and future remnant liver volume (FRLV; OR 0.97) were independent predictors of PHLF in the Bayesian logistic regression model. Using the training set our model AUC was 0.695 and, when tested in different cross validation set including 161 patients, the AUC was 0.693.

Conclusion
We developed a new clinical model to predict PHLF based on pre-operative variables. ICG and FRLV should be used to estimate the risk of PHLF and our new clinical tool might be considered in the decision-making process to select those patients referred to liver resection.
Liver surgery: Clinical
FP8.02

A randomized controlled trial for enhanced recovery in liver surgery: Improved perioperative management using the LiMAx test

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Background
The LiMAx test can validly determine liver maximal capacity and has been successfully integrated in clinical management in liver surgery. However, no prospective randomized trials have been available to judge its actual clinical impact.

Methods
A randomized controlled trial (RCT) was conducted from January 2013 to September 2015 in six recruiting hospitals. Patients prior open liver resection of at least one segment were included. Patients were randomly assigned to LiMAx group (pre-, and postoperative LiMAx test) or control group (standard-of-care). Stable patients with sufficient residual liver function (LiMAx >150 µg/kg/h) were directly transferred to general ward after surgery.

Results
A total of 148 patients were randomized. Patients in LiMAx group were more frequently directly transferred to general ward after surgery (62.1% vs. 1.7%; p<0.0001), the risk of severe postoperative complications was lower (grade IIIa; 14% vs. 28%; p<0.02) and the length of post-operative stay was shorter (10 vs. 13 days; p=0.01). No patient in LiMAx group was admitted to intensive care after primary transfer to general ward.

Conclusion
The LiMAx test distinctively improves perioperative management in liver surgery. The valid identification of low risk patients skipping intensive care enables enhanced recovery.
A risk score to predict severe posthepatectomy biliary leakage after elective liver resection: A prospective multicenter observational study


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Background
Posthepatectomy biliary leakage (PHBL) remains a major cause of morbidity after elective liver resection. Former prognostic studies on PHBL lacked power, population homogeneity, and model validation. The present study aimed to develop and validate a risk-score for predicting severe PHBL after hepatectomy.

Methods
A prospective multicenter observational study included 2218 hepatectomies without hepatico-jejunostomy between 2012 and 2015. Procedures were randomly assigned with a 2:1 ratio to a training (n=1475) or validation cohort (n=743). A model predicting severe PHBL (defined as ISGLS grade B/C) was built in the training cohort and tested in the validation cohort.

Results
Overall and severe PHBL occurred in 141 (6.4%) and 92 (4.1%) patients, respectively. In the training cohort, multivariate analysis identified blood loss >500ml, remnant ischemia >45min, anatomical resection including segment 8, transection along right aspect of left portal fissure, and ALPPS as predictors of severe PHBL. A risk-score (0-5 points) was built in the training cohort (c-statistic: 0.79, 95% CI: 0.74-0.85) and successfully tested upon the validation cohort (c-statistic: 0.70, 95% CI: 0.60-0.80). A score ≥3 predicted an increase of severe PHBL (19.4% versus 2.6%, p<0.001 in the training cohort; 15.1% versus 3.1%, p<0.001 in the validation cohort).

Conclusion
The risk-score represents a multi-institutionally validated prognostic tool, allowing to identify patients at high-risk for severe PHBL after elective hepatectomy.
A Single Center Analysis of Evolving Experience with ALPPS procedure: Towards Better Patient and Graft Selection

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Background
Associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) has recently been developed to induce rapid liver hypertrophy in patients with insufficient future liver remnant (FLR). The main criticisms of ALPPS are centered on its high morbidity and mortality rates. We aimed to review our evolving experience dividing our cohort into early and late groups.

Methods
Between December 2012 – January 2017, 21 consecutive ALPPS procedure was performed. 1 patient did not complete second stage hence excluded. Outcomes of the Early group (EG), the first 2 years were compared to the Late group (LG); last 2 years.

Results
There were 11 patients in the EG and 9 patients in the LG. The mean operation times and intensive care unit stay after each stage were significantly shorter in the LG. The mean MELD scores before 2nd stage were not different between groups, however interval days between 1st and 2nd stage surgeries were significantly longer in LG than EG. In 1 patient in EG and 2 patients in the LG synchronous major resections were performed. After 1st stage, 1 patient in the EG and 5 patients in the LG were discharged from hospital. Clavien Grade 3 or higher complications were seen in 5 patients in EG vs in 1 patient with LG. There were 2 perioperative mortality in the EG vs none in the LG.

Conclusion
Increased experience with ALPPS procedure with better patient and graft selection yields better results and safer application of this potentially curative procedure.
A systematic review and meta-analysis of ALPPS versus two-stage hepatectomy (TSH)

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Background
The feasibility and safety of associating liver partition and portal vein ligation (ALPPS) remain controversial. In this study, we conduct a meta-analysis comparing ALPPS with two-stage hepatectomy (TSH) on the aspects of the clinical outcomes.

Methods
A comprehensive search strategy was adopted in this Meta-analysis. We searched Pubmed, Embase, Cochrane library and China Biology Medicine disc, and broadened our search by looking up to the references of the above literature. Meta-analysis was performed using the statistical software RevMan (Cochrane Collaboration).

Results
A total of 7 studies consisting of 561 patients were included in the present study, all of which were observational studies. Compared with THS, ALPPS was associated with high completion rates of both stages [RD = 14.70; 95% CI = 4.70 ~ 45.98; P < 0.00001]. There were no significant differences in other aspects such as complications of each stage [RD = 4.04; 95% CI = 0.81 ~ 20.27; P = 0.09] [RD = 1.58; 95% CI = 0.98 ~ 2.56; P = 0.06] and mortality in 90 days [RD = 2.04; 95% CI = 0.96 ~ 4.36; P = 0.06].

Conclusion
The Meta-analysis found that ALPPS did not show obvious deficiencies on the basis of maintaining its own advantages compared with TSH. However, only retrospective observational studies were included, it may only provide limited strength of evidence. High-quality and large-sample studies were needed to further evaluate the outcomes of ALPPS.
A twenty-year experience with fibrin-collagen substance

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Background
We have been using the “TachoComb” fibrin-collagen substance (FCS) since 1995 for the purpose of hemostasis, intestinal suture strengthening and closure of perforations.

Methods
For all the above purposes the experiments were performed and the FCS clinical use included 475 patients.

Results
Use of FCS in experiments for hemostasis demonstrated its superiority over the collagen sponge, tabotamp, gelaspon and thrombin. Morphological studies showed that FCS stimulates angiogenic processes in the underlying tissue.
It was found that FCS increases 3-fold the mechanical strength of the intestinal suture and decreases 16-fold its microbial contamination.
We experimentally justified the method of closure of perforated pyloric ulcer using FCS without prior suturing. In clinical practice the hemostatic effect of FCS was demonstrated in 289 patients receiving both traditional and laparoscopic surgical treatment. Hemostasis was achieved in all of the above cases.
Use of FCS for intestinal suture strengthening involved all parts of the gastrointestinal tract of 181 patients with peritonitis and intestinal obstruction, with the incompetence observed in only 2 cases (1.1%).
We managed to close perforations using FCS without suturing in 5 patients without any complications.

Conclusion
Experimental studies and twenty-year clinical experience with FCS demonstrated its universality and indispensability in different complex intraoperative situations.
A vascular variant allows to resect "en bloc" cholangiocarcinoma Bismuth IV

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Background
Curative hepatectomy with bile duct resection is the treatment for perihilar cholangiocarcinoma. When vessel involvement in imaging preoperative studies is found, the use of more aggressive aproach with bloc resection is the recommendation.

Methods
A video of the surgical approach used in a case of Bismuth type IV Klatskin tumor resected with extended left hepatectomy.

Results
A 67-year-old man who presented with epigastric pain and abnormal liver function was referred to our clinic for further examination. Serial examination resulted in diagnosis of Bismuth IV hilar cholangiocarcinoma, atrophying mainly the left hepatic lobe, and infiltrating right and left hepatic artery branches. Fortunately, the patient presented a SVI-VII artery arising from gastroduodenal artery no invaded, anatomical variant that allows tumor resection, keeping the arterial supply of the liver. The variant anatomical of the vessel was identified preoperatively. He underwent left hepatectomy with the main right hepatic artery, caudate lobectomy and extrahepatic bile duct resection without any complications. Pathological study of specimen showed a 4.9x1.2cms cholangiocarcinoma with free margins. No recurrence 1 year late.

Conclusion
Aggressive approach with "en bloc" and extended liver resections in the treatment of Bismuth IV hilar cholangiocarcinoma could be feasible. It's important a meticulous preoperative evaluation with images in this cases, because we can identify anatomical variations make surgery possible.
Liver surgery: Clinical
P22.07

Abandoning prophylactic abdominal drainage after hepatic surgery: 10 years of no-drain policy in an ERAS environment

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Background
Routine prophylactic abdominal drainage after hepatic surgery is still debated, may be unnecessary, possibly harmful and uncomfortable for patients. This study evaluated the safety of a no-drain policy after liver resection within an ERAS-programme.

Methods
All hepatectomies performed without prophylactic drainage during 2005 – 2014 were included. Primary endpoints were resection-surface-related (RSR) morbidity, defined as the presence of postoperative biloma, haemorrhage or abscess, and reinterventions. Secondary endpoints were length of stay (LOS), total postoperative morbidity, the composite endpoint of liver surgery-specific complications, readmissions and 90-day mortality. Uni- and multivariable analyses were performed to identify independent risk factors for RSR-morbidity. A systematic search was performed to compare the results of this study to literature.

Results
A total of 538 resections were included in the study. The RSR-complication and reintervention rate was 15% and 12%, respectively. Major liver resection (≥3 segments) was an independent risk factor for the development of RSR-morbidity (OR=3.01, 95% CI 1.61–5.62; P=0.001) and need for RSR-reintervention (OR=3.02, 95% CI 1.59–5.73; P=0.001).

Conclusion
RSR-morbidity, mortality and reintervention rates after liver surgery without prophylactic drainage in patients, treated within an ERAS programme, were comparable to previously published data. A no-drain policy after partial hepatectomy seems safe and feasible.
Liver surgery: Clinical
Sym28.07

AJCC 8th edition staging system for intrahepatic cholangiocarcinoma: an analysis of 1,154 patients undergoing hepatectomy with curative intent

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Background

We sought to analyze the performance of the AJCC 8th ed. classification using a multi-institutional cohort of patients with intrahepatic cholangiocarcinoma (ICC).

Methods

Patients undergoing hepatectomy for ICC between 1990 and 2015 at 14 hepatobiliary centers were included and staged using AJCC 8th ed. criteria.

Results

A total of 1,154 patients underwent hepatectomy for ICC. Comparing AJCC 7th and 8th ed. T classifications, 616 (53%) patients changed stage. AJCC 8th ed. T classification (c-index: 0.61) performed slightly better than AJCC 7th ed. (c-index: 0.59). AJCC 8th ed. T3 patients had a higher risk of death compared with T1 patients (Hazard ratio, HR 1.65) however T3 patients had a lower risk of death than T1b (HR 1.91) and T2 (HR 2.29) patients. Only 317 (27%) patients fulfilled the criteria of nodal staging according to the AJCC 8th ed. (≥6 harvested nodes [HLN]); N1 patients had a 3-fold increased risk of death vs. N0 patients (HR 3.03). N0 patients with <6HLN had an increased risk of death vs. N0 patients who had ≥6HLN (HR 1.39).

Conclusion

AJCC 8th T classification failed to correctly stratify patients with tumor invading the liver visceral peritoneum (T3). In addition, the ≥6HLN recommendation resulted in only a minority of patients being fully staged by the AJCC 8th ed. Further visions of ICC staging will be warranted in future editions of the AJCC.
Liver surgery: Clinical  
P25.04  

ALLPS For a Central Cholangiocarcinoma: A Case Report from the Middle East  

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Background  
Despite advances in multimodality and multidisciplinary treatment of cholangiocarcinoma, many patients suffer from extensive disease, which prevents the performance of a single procedure due to an insufficient future liver remnant. We present a case of a central cholangiocarcinoma treated with associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) procedure.  

Methods  
A 44-year-old lady was referred to our center with a huge central cholangiocarcinoma. Imaging of the liver revealed a 9.4 x 9.7 x 8.9 cm peripherally enhancing mass with mild progressive enhancement in the central liver. The lesion extends in the right lobe more than the left. The mass mainly involves segments IVa, IVb, V, VII and segment VII. The multidisciplinary tumor board decision was to assess for resectability.  

Results  
Patient underwent a laparoscopic evaluation followed by exploration, dissection of the porta hepatis was performed with isolation of the left and right structures. The left lateral segment was too small so decision was to proceed with ALPPS. The next step will be within 7 to 15 days after the first, the diseased part of the liver is removed by simply sectioning the remaining biliary, hepatic arterial and systemic venous pedicles.  

Conclusion  
ALPPS procedure effectively increased the resectability of otherwise inoperable liver tumors.
ALPPS for bleeding HCC in HBV cirrhosis: a safety strategy

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Background
One of the most fatal complications of hepatocellular carcinoma (HCC) is spontaneous tumor rupture, the incidence varies between 3% to 26%.

Methods
We report a multimodal therapy including TAE, ALPPS and immunoglobuline infusion for a huge bleeding HCC with PVTT in Hepatitis B Virus cirrhosis.

Results
A 35 years old Chinese man was admitted with a 7 cm nodule at segment VII was described with multiple necrotic nodules in the right liver. A Vp4 PVTT and a free intra-abdominal hemorrhage was described too. Hepatitis markers were negative for HCV and positive for HBV (4352.00 UI). Patient was a Child A, Meld 14. In order to secure the left portal flow an ALPPS procedure was proposed to the patient two days after TAE. ALPPS first step began with an abdominal toilette due to the massive hemoperitoneum. A vessel loop was passed around both left, right and portal vein trunk. A portal vein incision at the bifurcation of the right and left portal veins was performed. A freely floating left part of the thrombus was extracted from the left portal vein in order to restore the left portal vein. Entecavir therapy was started since the first postoperative day with an intention to reduce the HBV DNA between the two surgical step. The second step of ALPPS was performed 4 days after the first one. Surgery was uneventful.

Conclusion
A multimodal therapy including TAE, ALPPS and immunoglobuline is a good option for a life treatment in case of huge bleeding hepatocellular carcinoma with PVTT in HBV cirrhosis.
ALPPS for primary and metastatic liver cancer: the results of single-center study

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Background
The main goal was to assess safety and outcomes of ALPPS procedure and find the optimal compromise between dropout and mortality risk, using our initial single-center experience.

Methods
20 patients who have underwent ALPPS resection at the Abdominal Oncology Department from Jan 2012 to Jun 2016 were retrospectively analyzed. Multivariate logistic regression analysis was performed to identify independent risk factors for severe complications, mortality and volume growth of the FLR.

Results
Mean age was 59.1±6.3 (49-72) years. Indications for surgical resection were CRLM in 80% and HCC in 20% cases. 1 patient had salvage ALPPS after failed PVL. Patients were operated for 2.8±1.6 metastases, the largest was 64.6±18.8 mm. The increase in FLR between the 2 steps was 95.3±53.6% (range: 13-164%, p<0.001). The average time between steps of the procedure was 9.4±1.4 days. Severe complications including mortalities (Clavien-Dindo≥IIIb) occurred in 6.7 and 9.1% of patients after ALPPS-1 and 2 resp. Follow-up median was 20 mo. Mean OS rate was 26.1 [22.5-29.6] mo. Mean DFS rate 24.1 [19.6-28.5] mo. Primary liver cancer, age, histologic changes of liver parenchyma, led to morbidity and mortality rate.

Conclusion
ALPPS should be reserved to a small proportion of patients, the young ones with very small future liver remnant, with the low rate of liver function reserve or experiencing inadequate hypertrophy after portal vein occlusion. For these patients ALPPS could still offer a benefit, being the only chance of resectability.
ALPPS procedure for extended liver resections: a single centre experience in Algeria.

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Background
Hepatic resection is the only potentially curative treatment for patients with liver malignancies. Associated liver partition and portal vein ligation for staged hepatectomy (ALPPS) has been proposed to increase the resectability rate in patients with insufficient future liver remnant (FLR). The aim of this study is to evaluate the feasibility, safety and oncological outcomes after ALPPS procedure.

Methods
Between September 2012 and December 2016, eight patients with extended primary or secondary liver tumors underwent ALPPS procedure for unresectable tumors due to insufficient FLR were retrospectively assessed.

Results
The median preoperative FLR was 256ml (range, 241-363ml) for a ratio of 0.44 % (range, 0.35-0.7). The mean interval between the two stages was 22 days (range, 14-53) leading to a gain volume of 351ml (range, 100-702ml). Seven patients (87.5%) completed the second stage. Four patients (50%) had severe operative complications (> grade IIIb) according to Clavien and Dindo classification and two patients (25%) died during the perioperative course. The resection was considered R0 for 85.7% of the patients. The overall and disease free survival at 1 year was 66% and 50%, at 2 years 50% and 16% respectively.

Conclusion
This procedure is feasible with satisfactory short-term results for patients considered previously unresectable. However, a better patient’s selection is required to decrease the incidence of complications.
ALPPS procedure for hepatocellular carcinoma with macrovascular tumoral thrombosis: the San Camillo Experience

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Background
The main limiting factor to major hepatic resections is the amount of the future liver remnant (FLR). Associating Liver Partition with Portal Vein Ligation for Staged Hepatectomy (ALPPS) is a procedure which induces a rapid hypertrophy of the FLR in patients with non-resectable liver tumours.

Methods
Since 2012 we performed 23 ALPPS, 18 of them for HCC, 3 for colorectal metastasis, 1 cholangiocarcinoma and 1 for non colorectal metastasis.

Results
17 patients were male. In 12 cases a preoperative portal vein tumoral thrombosis was present. In one case a biliary thrombosis (PVTT) was observed. During the first step we always treat the thrombosis to have the security of the controlateral portal vein before the second step. Nonetheless, in case of bleeding HCC with HBV cirrhosis an immunoglobulin therapy is archived before the second step. Medium FLR increasing was 20%. At the second step median operating time was 180 min, median blood loss was 50 cc, none of the patients required intra-operative blood.

We had no mortality at 90 day post operative.

Conclusion
ALPPS for HCC with PVTT is a safety procedure with good results.
ALPPS procedure in patients with locally advanced liver malignancy- single center experience

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Background
ALPPS has been described as an effective strategy to induce a rapid increase in future liver remnant volume (FLRV) and widely used in patients with colo-rectal liver metastases. There is few research about the result of hepatocellular carcinoma group. This study will review our experience with ALPPS procedure dominantly in hepatocellular carcinoma patients with chronic liver fibrosis.

Methods
This series is a retrospective study in patients with liver malignancies to receive the ALPPS surgery and analyze the pre-op survey, operative findings and survival outcomes.

Results
Thirteen patients were enrolled (Ten with HCC, Two with colorectal cancer and liver mets, One with cholangiocarcinoma) with mean follow-up was 15.7 months. The mean hypertrophy rate of the FLRV was 48.0% (range = 14.2–82.8) in a mean of 11.6 days interval (range =8–14), which represented a mean difference between stage I and II FLRV of 170cc (P < 0.001). The mean kinetic growth rate was 15.4cc/day. Among the HCC group, 7 are BCLC A and 3 are BCLC B and the median Metavir scoring of liver fibrosis was 2. Post-operative major complication rate (Clavien-Dindo ≥ 3b) was 15.4% (2/13) and there was no 90-days mortality. The mean disease free interval was 9.3 months (range = 2-31).

Conclusion
The ALPPS is feasible and safe in patients with locally advanced liver malignancy. Besides, in patients with HCC and early stage of chronic liver fibrosis can also achieve significant hypertrophy result and not inducing further liver failure.
ALPPS vs PVL two stage liver resections: matching surgical and oncological outcomes

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Background
The aim of this study was to compare the clinical changes associated with ALPPS and PVL and assess the oncological outcomes.

Methods
Retrospective analysis of 30 patients with CRLM and HCC operated with TSH technique (ALPPS or PVL) at the abdominal oncology department P. HERZEN MORI. After analysis of the whole cohort, both groups were matched and analyzed.

Results
Fifteen patients age 57±11.6 yr were operated by PVL techniques for 5±3 (2-10) metastases of which the largest was 58±27mm. ALPPS was initiated for 2.8±1.6 metastases of which the largest was 64.6±18.8mm in 15 patients whose mean age was 59±6.3yr. One patient had salvage ALPPS after failed PVL. The time between 2 steps was 72.3±32.8 days for PVL and 9.4±1.4 days for ALPPS, FLR increased by 59.5±65.9% vs 95.1±53.6 resp. (p<0.001). The second stage of PVL was performed in 73.3% patients, ALPPS-2 in 86.7%. Major complication (Clavien ≥IIIb) rates were 0% vs. 9.1% in the PVL and ALPPS group, resp. There was 2 (15%) postop death after ALPPS-1 due to hepatic failure in the patients who had a HCC and liver cirrhosis. The overall survival of the ALPPS group was significantly lower than of the PVL (26.1mo vs. 44.0mo, p = 0.021), as well as disease-free survival (24.1mo vs. 39.4mo, p=0.011).

Conclusion
The ALPPS technique can be associated with a hypertrophic stimulus on the future liver remnant (FLR) stronger than other techniques—such as portal vein ligation at early terms. Meanwhile, ALPPS in patients with HCC associated with a high risk of fatal complications.
An Externally Validated Risk Score for Intrahepatic Cholangiocarcinoma following Surgical Resection: A SEER Database Analysis

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Background
Surgery in the form of hepatectomy remains the only curative option for patients with intrahepatic cholangiocarcinoma (iCCA). However the long-term survival for iCCA patients following hepatectomy remains poor. We sought to develop a post-operative score to predict the patient survival following liver resection for iCCA and validate the score on a local population.

Methods
The Surveillance, Epidemiology, and End Results (SEER) database identified patients with histologically confirmed iCCA between 1998 - 2013 as the derivation cohort. Prognostic factors were evaluated using Kaplan-Meier curves and Cox proportional hazards models. Primary end-points assessed in the study was overall survival (OS). The score was externally validated upon a patient cohort from the United Kingdom.

Results
The derivation cohort included 809 patients undergoing surgical resection for iCCA. Multivariate Cox regression model identified male (p=0.013), multifocal tumours (p<0.001), local invasion (p=0.027), vascular invasion (p=0.002), poor/anaplastic differentiation (p< 0.001), tumour size >5cm (p=0.013) and N classification (p<0.001) as prognostic factors. The corresponding c-statistic for the derived score was 0.71 (CI95: 0.67 - 0.76) for the derivation cohort and 0.80 (CI95%: 0.65 - 0.92) for the validation cohort (p=0.001).

Conclusion
This novel risk score derived from a large national database, with external validation, may be useful in guiding post-operative management of patients following surgical resection for iCCA.
An initial experience with Partial ALPPS vs palliative chemotherapy in advanced Colorectal Liver Metastases

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Background
Associating liver partition and portal vein ligation (ALPPS) is a novel 2-stage accelerated procedure to treat bilobar colorectal liver metastases with a curative intent. Partial ALPPS (p-ALPPS) is a modified technique whereby 50-80% liver is transected during stage 1. Data comparing survival outcome of p-ALPPS with palliative treatment is still limited. We aim to compare long-term survival of patients who underwent p-ALPPS with patients who received either palliative chemotherapy or best supportive care (BSC).

Methods
We retrospectively reviewed 409 patients in our institution with colorectal liver metastases from January 2014 to December 2016. Patients with advanced colorectal liver metastases as defined by >6 metastases and/or > 6 involved segments were identified. These were grouped into 3 main categories: p-ALPPS, palliative chemotherapy and BSC. The median survival in each arm is calculated and compared.

Results
48 patients had advanced bilobar disease. 4 underwent p-ALPPS, 28 received palliative chemotherapy and 16 had BSC. In the p-ALPPS group, 3 have survived more than 365 days (range 366-457) and are still alive. However, 1 demised at 85 days due to chemotherapy related sepsis. Median survival for palliative chemotherapy and BSC are 315 and 97 days respectively.

Conclusion
Early data suggests there is a role for p-ALPPS and palliative systemic chemotherapy compared to BSC alone. A more robust study of p-ALPPS outcomes is needed to draw meaningful comparison with palliative chemotherapy.
Analysis of Cost Savings Associated with an Enhanced Recovery Program in Liver Surgery

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Background
Previous studies have demonstrated reduced complications, improved postoperative quality of life and faster recovery in patients treated on an Enhanced Recovery in Liver Surgery (ERLS) pathway as compared to a traditional recovery (TR) pathway.

Methods
72 ERLS patients were matched to 41 patients undergoing TR. The ERLS protocol included patient education, narcotic-sparing anesthesia and analgesia, diet advancement, restrictive fluid administration, early ambulation, and avoidance of drains and tubes. Clinical outcomes and 30-day perioperative costs were compared between the two groups using Mann-Whitney U tests.

Results
77 and 36 patients had minor and major hepatectomy (63.6%, 63.9% ERLS), respectively. Morbidity rates were 37% vs 61% (p=0.015) in ERLS vs TR patients with no 30-day mortalities. No cost difference was seen between ERLS and TR in major hepatectomy (p=0.922) or with epidural analgesia (p=0.834). In minor hepatectomy, costs were 14% lower in ERLS compared to TR patients (p=0.043). In patients without epidural (n=47), costs were 26% lower in ERLS vs TR patients (p=0.013).

Conclusion
In addition to the previously demonstrated benefits in complications, quality of life and recovery, the ERLS pathway demonstrates cost savings and lower resource utilization, most pronounced in patients undergoing minor hepatectomy and in those without epidural analgesia.
Liver surgery: Clinical
P5.05

Analysis of the International Study Group of Hepatic Surgery definitions of typical complications after liver surgery

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Background
The International Study Group of Liver Surgery (ISGLS) established the first internationally standardized definitions and grading for posthepatectomy hemorrhage (PHH), posthepatic liver failure (PHLF) and bile leakage. We aimed to evaluate and validate these new definitions in a center.

Methods
415 patients underwent hepatic surgery between 2004 and 2014. Uni- and multivariate analyses were made for correlations of PHH, PHLF and bile leakage with perioperative parameters and mortality.

Results
25 (6.1%) patients developed a PHH Grade A, 3 (0.7%) patients a PHH Grade B and one (0.2%) patient a PHH Grade C. 23 (5.5%) patients had a PHLF Grade A, 24 (5.8%) patients a PHLF Grade B and 7 patients (1.6%) a PHLF Grade C. Bile leakage Grade A occurred in 10 (2.4%) patients, bile leakage Grade B occurred in 24 (5.8%) patients, and bile leakage Grade C occurred in 7 (1.6%) patients. Mortality was significantly increased in patients with PPH Grades B and C and in patients with PHLF Grades A, B, and C. Three (42.9%) patients with bile leakage Grade C died.

Conclusion
Our data indicate that the new definitions correlate well with mortality and duration of hospital stay.
Anatomical challenges during laparoscopic right hepatectomy after Right Portal Vein embolisation

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Background
Right Portal Vein Embolisation (RPVE) is widely implemented prior to major right hepatectomy for liver volume manipulation when the future liver remnant (FLR) is deemed inadequate. However, liver volume manipulation may result in anatomical distortion of the hilar structures, which may pose difficulties during laparoscopic right hepatectomy.

Methods
We present a video case from a 21-year-old female patient who underwent laparoscopic right hepatectomy for a large hepatic adenoma. The patient underwent RPVE for augmenting FLR prior to surgery.

Results
We present a detailed video of the hilar dissection with extrahepatic dissection of the right hepatic artery and intrahepatic transection of the right portal vein and right main bile duct.

Conclusion
RPVE for volume manipulation of the FLR may pose difficulties during hilar dissection in laparoscopic right hepatectomy due to passive counterclockwise rotation of the hilum. Also, difficulties applying staplers at the portal structures due to the coils in PV should be anticipated. Adherence to meticulous anatomic dissection of the hilum may assist to overcome the above technical difficulties.
Ante-Situ Resection: A Novel approach to minimize vascular exclusion complications.

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Background
Ex-vivo techniques provide excellent accessibility to hepatic tumours located around the inferior vena cava (IVC) that otherwise would be unresectable. These techniques usually require long-duration vascular exclusion or a veno-venous bypass. A novel technique in ante-situ resection to avoid the extracorporeal bypass using an in-vivo veno-venous bypass between the portal vein and the IVC with a cadaveric venous graft in a patient with IVC replacement is described.

Methods
Recurrent colorectal liver metastases in a 27-year-old female with a previous right hepatic trisectionectomy. The lesion compromised the hepatocaval confluence and the only remaining hepatic vein.

Results
A shunt between the infrahepatic IVC and the portal vein, using a bank-preserved cadaveric vein graft was performed, achieving a side-to-side porta-caval shunt. The IVC was replaced by a prosthetic graft. With the liver in an ante-situ position, cooled with ice and with the hypothermic preservation solution, the tumour resection was performed involving retrohepatic IVC and the confluence with the left hepatic vein. After resection and vascular reconstruction were completed (with a cadaveric bank preserved vein placed between the goretex graft and the remaining hepatic vein), the portal cannula was removed, and the portacaval shunt divided using staplers.

Conclusion
With this novel technique we were able to avoid splanchnic congestion or an extracorporeal veno-venous bypass in an ante-situ liver resection.
Assessing the impact and benefits of radiofrequency-assisted parenchymal sparing liver resection on post hepatectomy liver failure

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Background
Post-hepatectomy liver failure is a feared complication of liver surgery. Many devices have help in reducing its occurrence while allowing parenchymal preserving resection. In this study, we reviewed the technical subtleties of radiofrequency (RF) assisted liver resections, analysing perioperative variables focusing on post-hepatectomy liver failure (PHLF) and its impact on morbidity and mortality.

Methods
We retrospectively reviewed 857 cases of RF assisted liver resection (with Habib 4X) for malignant tumours between 2001 and 2015. We evaluated intraoperative blood loss, blood transfusions, and need for vascular inflow control. Postoperative complications, PHLF, 30-days mortality, intensive care unit and hospital stay were also analysed.

Results
857 RF-based liver resections were performed for primary and secondary liver tumours. Median intraoperative blood loss was 130 ml with 9.8% of patients received blood transfusion. Major liver resection was performed in only 34% of the patients. The incidence of post-hepatectomy liver failure was 1.5% (n=13) with single directly related mortality (0.1%).

Conclusion
RF based liver resection is safe and feasible with low incidence of PHLF and related mortality. This may be explained by reducing blood loss, blood transfusion, minimal use of vascular inflow control, and maximum preservation of functional liver parenchyma. Thus, development of Habib 4X and its ease in application has further strengthen the role of RF based devices in liver surgery.
Assessment of colorectal liver metastasis: results of the Dutch Colorectal Cancer Group (DCCG) liver metastases expert panel of the CAIRO5 study

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Background
Data on secondary resections of colorectal liver-only metastases (CRLM) are difficult to interpret due to lack of consensus on resectability criteria. The ongoing fase 3 trial CAIRO5 of the DCCG investigates the optimal systemic induction regimen in patients with unresectable CRLM, with prospective evaluation at baseline and during follow-up by a national expert panel of liver surgeons and radiologists according to uniform criteria.

Methods
CRLM are scored as resectable, potentially resectable or permanently unresectable. Evaluation is performed independently by 3 randomly assigned liver surgeons. In the absence of consensus, 2 additional surgeons are invited for a majority consensus.

Results
282 CT-scans (143 baseline, 139 follow-up) were evaluated. Results were available at a median of 8 days (IQR 4-12). Consensus by 3 surgeons was achieved in 146 evaluations (52%). Nineteen (7%) evaluations consisted of completely opposing views (resectable vs. permanently unresectable). 115/143 patients were assessed after downsizing systemic therapy. 63/115 (55%) were assessed as resectable during follow-up, of which 41 underwent resection.

Conclusion
Prospective evaluation of CRLM patients by an expert panel according to uniform criteria with feedback of surgical outcomes is a unique aspect of CAIRO5. We demonstrate this process is feasible and complex, since consensus was obtained in only 52% of the evaluations. Correlative studies between panel decisions and outcome are being planned after sufficient follow-up.
Assessment of microinvasive patterns of HCC by IOUS: correlation with pathologic resected specimen

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Background
The presence of microinvasion (MI) such as portal venous, hepatic vein, bile duct infiltration or intrahepatic metastasis, is the best indicator of a poor prognosis after hepatic resection (HR) and transplantation (OLT). However, preoperative MI patterns are difficult to detect with the current imaging modality. The primary end-point of the study is to evaluate the ability of Intraoperative ultrasound (IOUS) to depict the same pathological features (PF) of hepatocellular carcinoma (HCC). The secondary end-point is to determine whether IOUS patterns can be used to differentiate histopathologic grade of HCC

Methods
Between January 2005 and March 2016, 179 patients were enrolled in this study: the pathologist (blinded to the IOUS findings) was requested to classify the specimen according the same IOUS features and several correlation analyses and multivariate analysis were accomplished

Results
IOUS features had a high agreement with the PF in terms of MI pattern, diameter of the tumor and presence of satellites. As regards to histologic grade, only the microvascular infiltration (p=0.001) and infiltrative HCC aspect (p=0.038) were independent predictors for HCC grading

Conclusion
During the liver resection, IOUS examination can identify aggressive patterns and anatomic hepatic resection or partial hepatic resection with a wide tumor margin should be accomplished to eradicate MI HCC. Furthermore, IOUS parameters could estimate the post-OLT risk of tumor recurrence, thus improving the patient selection process
Liver surgery: Clinical
P23.04

Assessment of results of a resection of a liver

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Background
The lethality after a resection of a liver remains within 4–6% and is very far from zero.
Objective: to assess the immediate results of liver resection.

Methods
Objective: to assess the immediate results of liver resection.
Material and methods: For the 2012-2015 operated on 72 patients about various diseases of the liver require the removal of 3 or more segments. Men – 43 women – 29. Age from 41 to 79 years. On average, 58±6 years.
Malignant diseases – 55; benign – 17 patients. Performed a right-sided hemihepatectomy – 36 (including, with resection and reconstruction of blood vessels – 2), left hand – 32 (including resection of the vessel – 1, resection of the stomach – 1); Resection of IV-VIII segments – 4 patients. Severe comorbidities were – 17 patients. Two patients were 9 and after 11 courses of chimiotherapie respectively. Severe fibrosis and liver steatosis had 21 patients. Operative intervention – 210 min Occlusion hepatoduodenal ligament in 60 patients. The average blood loss – 200,0±110,0 ml.

Results
Results: Complications after surgery and 23 (31.9 percent). Acute liver failure – 1 (1); postoperative bleeding 1(1), sepsis – 1(1). Non-specific complications had 18 patients and specific five, three of whom died.

Conclusion
Conclusion: the complication and mortality rate after resection remains high. An increasing number of elderly patients requiring liver resection. To prevent severe postoperative complications must be strict adherence to anatomic principles of resection.
Liver surgery: Clinical
P25.07

**Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy (ALPPS) - 3 Years oncology outcome**

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**Background**
The purpose of the study was to define the oncology outcome of associating liver partition and portal vein ligation for staged hepatectomy in patients with liver metastases considered unresectable previously by standard techniques.

**Methods**
18 patients underwent ALPPS in 2013 – 2016: 1 patient with hepatocellular carcinoma, 1 patient with a cancer of the gallbladder with a massive invasion of the parenchyma of the SIV - V, VIII, 16 with metastases of colorectal cancer. Age median - 54 (43-67) years.

**Results**
Seventeen patients (94.4 %) completed both stages. One patient (5.6%) died on the 5th day after the first stage due to the multi-organ failure, the other on the 6 day after second stage due to the portal vein thrombosis. The 90-day mortality rate was 12.5 %.

Hypertrophy of the remnant was observed in 17 cases. The average growth of volume was 78.1% and achieved on the 9 day after ALPPS. All patients on the second stage underwent extended right hepatectomies. All resections were R0. After the first stage 2 patients had subhepatic abscess, 4 - ascites, 5 - bile likage.

3-years overall survival rate was 27.5%.

**Conclusion**
ALPPS is an effective technique to speed up the increase of liver remnant. However, it is necessary to develop patient' selection criteria which decrease morbidity and mortality.
Benefits of laparoscopic liver resection in patients with Hepatocellular carcinoma and portal hypertension: A casematched study

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Background
The advantages of laparoscopy liver resections (LLR) in patients with cirrhosis have been widely demonstrated, but the role of LLR in clinically significant portal hypertension (CSPH) is scarce. The aim of our study was to evaluate the role of LLR in cirrhotic patients with CSPH.

Methods
A retrospective case–control study of cirrhotic patients with hepacarcinoma and CSPH treated with LLR was performed. Fifteen patients were included and matched with 30 patients without CSPH.

Results
Median hepatic vein pressure gradient (HVPG) was 11 mmHg in the CSPH group and 6.8 mmHg in the Non-CSPH group (p=0.001). There was no difference in intraoperative events. No conversion occurred in the CSPH group and 3 patients were converted in the Non-CSPH group (0% vs. 10% P=nss). Morbidity in the CSPH groups was 20% versus 19% in the Non-CSPH (P=nss). Two patients develop transient ascites in the non-CSPH group and one in de CSPH group. Only two major complications (modified Clavien-Dindo classification IIIa and IIIb) occurred and belonged to the Non-CSPH group. The postoperative hospital stay was similar in both groups with a median of 4 days in both groups. There was no hepatic decompensation at 3 months after the intervention in the whole series.

Conclusion
This initial pilot study showed that LLR in patients with CSPH can be performed safely in well-selected patients and will probably expand the current surgical indications although properly conducted randomized controlled trials are necessary.
Benign hepatic lesions, a challenge to the surgeon: indications and outcomes

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Background
Surgical indication in benign hepatic lesions (BHL) remains controversial in our era, which makes its approach a challenge.

Methods
Retrospective analysis through a computerized database and clinical data, of patients diagnosed with BHL who underwent surgery between 2011 and 2015.

Results
We identified 78 patients (61 women and 17 men), with a mean age of 46 years. Most of the lesions were located in the left liver (65), were single (65) and had an average size of 81 mm. The indications for surgery were uncertain diagnosis in 27 patients; symptoms in 25 cases; risk of malignancy in 13 patients; hydatid cyst in 11 and hemorrhage in 2. Surgery was performed laparoscopically in 34 patients. Only 13 patients underwent major liver resections. The histological diagnosis was: hemangioma (n = 26); Focal nodular hyperplasia (n = 17); Hepatocellular adenoma (n = 13); Hydatid cyst (n = 11); Simple biliary cyst (n = 7); Others (n = 3). The average hospital stay was 6 days. There was no mortality, but complications occurred in 10 patients (12%), although only 1 was classified degree III according to the classification of Clavien-Dindo.

Conclusion
The BHL approach should be individualized and in a multidisciplinary context. The surgical option is safe and feasible with low morbidity rate and zero mortality in high volume and referral centers.
Can liver surgeons really rely on today's imaging for CRLM?

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Background
Modern imaging techniques are supposed to have best detection rates if properly performed and combined. Our study aimed at comparing the results of optimal preoperative imaging to state of the art intraoperative ultrasound with contrast media.

Methods
47 patients received CEUS, 3-phasic MDCT, 3 Tesla MRI with Primovist® and intraop Palpation/IOUS/CEIOUS. Histology was gold standard. All lesions were recorded and printed on liver schemes to be comparable between modalities. Diagnostic accuracy was defined as the statistical parameter to resemble a surgeons point of view. Uni- and multivariate as well as ROC analysis of lesion size was conducted to find the lesion size threshold at which accuracy decreased.

Results
47 patients with CRLM (M:F 33:14/ Colon:Rectum 29:18) were analyzed. 30% had been submitted to modern preoperative chemotherapy. Histopathology confirmed 264 lesions (245m:19b). Accuracy for detection:CEUS 63% (κ 9%), CT/MRI 82% (κ 27%) and PALP/IOUS/CEIOUS 99%(κ 88). ROC analysis showed severe impairment of accuracy in lesion detection at 5mm size for preop Imaging. Co-Factors being significant on univariate analysis were excluded in multivariate analysis (MVA). MVA confirmed that preop imaging was much better in detection of lesions >5mm – accuracy of intraop imaging was not impaired.

Conclusion
At 5mm lesion size all preoperative imaging loose accuracy of detection. Therefore CT scans are appropriate to develop a strategy. The only imaging that keeps accuracy is intraoperative imaging.
Liver surgery: Clinical
P52.01

Chemotherapy-associated Liver Injury prior Surgery of Hepatic Colorectal Metastases – Comparison of Functional and Histopathological Damage

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Background
Chemotherapy prior liver resection of colorectal liver metastases (CLM) implies the risk of chemotherapy-associated liver injury (CALI) leading to increased postoperative morbidity and mortality.

Methods
Retrospective analysis of patients with CLM prior resection. Preoperative assessment of liver function by LiMAx test. Histologic staging of resected tumor-free liver tissue. Analysis of 12-month history of chemotherapy prior surgery including the regime, the number of cycles and the therapy-free interval.

Results
A total of 204 patients were analyzed. The majority (n=127; 62 %) had received previous chemotherapy. Impaired LiMAx results were determined in 49% of patients after chemotherapy. The extent of LiMAx impairment was dependent on number of oxaliplatin cycles, therapy-free interval and obesity in multivariate analysis. Patients with impaired LiMAx showed regeneration during chemotherapy cessation. Chemotherapy increased the incidence of steatosis (>33%; 29 vs. 17%) as well as of mild fibrosis (62 vs. 45%). The LiMAx was markedly decreased in steatosis (335 vs. 375 µg/kg/h, P=0.024), steatohepatitis (292 vs. 372 µg/kg/h, P=0.003), and severe fibrosis (318 vs. 395 µg/kg/h, P=0.001). While the degree of steatosis was associated with a short therapy-free interval, the degree of fibrosis was increased by the number of cycles.

Conclusion
The LiMAx test enables preoperative assessment of CALI. Acute injury with steatohepatitis deteriorates LiMAx more severely than chronic injury with fibrosis.
Clipless hepatic parenchyma transection with an energy device with no forward frictional energy.

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Background
Energy devices play a key role in contemporary surgery. This is most true in laparoscopic liver surgery where energy devices offer quicker, bloodless and efficient parenchymal transection

Methods
We present a video case of a 40-year-old female patient who underwent laparoscopic right hepatectomy for a large hepatic adenoma with the use of a zero forward friction energy device.

Results
Hepatic parenchyma transection with the zero forward friction energy device achieves minimal blood loss during transection and effective sealing of the biliary radicles. This device minimises unintentional injuries to major intrahepatic vein branches (i.e. Seg V vein) due to the absence of forward friction beyond the jaws of the device. Hence minimises the need of clips on vessels on the transection line.

Conclusion
This type of energy device is a useful, safe and effective tool in laparoscopic liver surgery.
Colorectal liver metastases and concomitant extrahepatic disease: is resection justified? Single center survival analysis on 84 patients

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Background
Limited extrahepatic disease (EHD) in patients with colorectal liver metastases (CRLM) is no longer considered an absolute contraindication to resection. However the impact of the different sites of EHD on survival remains to be defined.

Methods
Between 2000 and 2015, 702 patients underwent liver resection for CRLM at our Unit. Of these, 84 patients (11.8%) underwent resection of concomitant EHD and they are the object of our study.

Results
Site of EHD was: lung in 27 patients (32.1%), hepatic pedicle lymph nodes (LN) in 38 (44.1%), peritoneum in 18 (19.0%), distant LN (inguinal and aortocaval sites) in 4 (4.8%). Sixty patients (71.4%) underwent preoperative chemotherapy (CT): 5-year overall survival (OS) after resection of CRLM and concomitant EHD was significantly higher in patients with response to CT than that in patients resected with progression (32.4% vs. 14.6%, respectively, p=0.01). Five-year OS of patients resected for liver-only CRLM was not significantly different from that of patients resected for CRLM and concomitant lung metastases (55.3% vs. 39.5%, respectively, p=ns). Resection of concomitant hepatic pedicle LN metastases was associated with a significantly lower 5-year OS (15.0%, p<0.001).

Conclusion
In selected patients resection of concomitant lung metastases can be associated with similar OS to that of patients resected for liver-only disease. Presence of hepatic pedicle LN metastases is a poor prognostic factor and resection should be considered in patients showing response to CT.
Liver surgery: Clinical
FP15.02

Comparative analysis between simultaneous resection and staged resections in patients with synchronous colorectal liver metastases

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Background
In synchronous colorectal liver metastases (SCLMs), simultaneous resection (SR) has not gained similar acceptance as staged resections (SgR).

Methods
This retrospective study compared morbidity, mortality, survival rates and length of hospital stay between patients undergoing SR vs. SgR.

Results
SR was performed in 234 patients, while 66 patients underwent SgR. Comparative morbidity (41\% vs. 31.8\%, respectively, p = 0.1997), mortality (3.8\% vs. 3\%, respectively, p = 1) and survival rates (85.3\%, 50.8\% and 30.1\% vs. 86.8\%, 49.6\% and 22.5\%, at 1-, 3- and 5-years, respectively, p = 0.357) were similar between the SR and SgR group. In patients undergoing SR, total hospital stay was significantly shorter than in SgR group (15.11 vs. 19.42 days, respectively, p < 0.0001). Comparative analysis of morbidity, mortality and survival rates between SR and SgR was performed for subgroups of patients presenting following parameters: rectal primary, positive lymph nodes, multiple metastases, bilobar liver metastases, metastases larger than 5 cm, major hepatectomies, preoperative chemotherapy. In each of these subgroups, SR was associated with similar morbidity, mortality and survival rates compared with SgR (p value > 0.05).

Conclusion
In patients with SCLMs, SR provides similar short-term and long-term outcomes as SgR, with a shorter hospital stay. In most patients with SCLMs, SR might be considered the treatment of choice.
Liver surgery: Clinical
P26.07

Comparison between two-stage hepatectomy (TSH) and tourniquet ALPPS for advanced colorectal liver metastases (CRLM).

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Background
ALPPS technique seems to obtain good results in the context of CRLM. But recently some publications warn about worst survival rate with ALPPS than classic TSH. The aim of this study is to compare the results of tourniquet ALPPS vs TSH in the treatment of CRLM

Methods
For patients with CRLM and the need for two-stage approach, we performed classical TSH from September 2001 until September 2011. From October 2011 until now, we have used our tourniquet ALPPS exclusively. Indications for hepatectomy were the same for both techniques and they didn't change during the entire study period.

Results
During the study period the two-stage hepatectomy was indicated in 75 patients: classic TSH was indicated in 41 cases but three patients didn't reach the second stage. All the 34 patients of tourniquet ALPPS group completed both stages. With a median follow-up of 39.5 months for TSH and 19 for Tourniquet ALPPS, overall survival at one and three years was 84% vs 85% and 57% vs 63% respectively (p= 0.771). Tourniquet ALPPS achieves a greater (72.9% vs 38.2%; p = 0.001) and faster (15.5 vs 37 days; p = 0.00) hypertrophy of the future liver remnant. For TSH and Tourniquet ALPPS mortality were 5.7% and 6.1% respectively (p=1); complications ≥IIIB after first stage were 2.4% y 6.1% respectively (p=0,583) and after the second stage were 15.2% and 12.1% respectively (p=0,720)

Conclusion
Short term results are similar, but tourniquet ALPPS could avoid drop-out between stages thanks to its faster hipertrophy
Comparison of RALLPS, portal vein embolisation (PVE) and portal vein ligation (PVL) in prevention of posthepatectomy liver failure.

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Background
Different surgical strategies are used for prevention of posthepatectomy liver failure. Aim of the study was to compare of radiofrequency ALLPS (RALLPS), PVE and PVL in prevention of posthepatectomy liver failure in single center.

Methods
In Moscow Clinical Scientific Center (between January 2014 and December 2016) 23 PVE, 7 PVL, 8 RALPPS (3 RALLPS + PVL and 5 transcutaneous RALLPS + PVE) patients (pts) were included. Indication for PVE were less than 30% (normal liver), or 40% (cirrhotic liver) preoperative estimated future liver remnant (FLR). Indications for ALPPS / RALPPS were: very small FLR (less than 20%). CT volumetry and 99m Tc Mebrofenin SPECT/CT were performed to estimate FLR volume and function.

Results
Duration after first stage was significantly shorter in RALPPS (10 days) in comparison with two-stage hepatectomy with PVE (29 days) and PVL (35 days). The rate of hypertrophy of FRL was significantly higher after first stage of RALPPS (66.3%) in comparison with PVE (27.2%) and PVL (20%). Tumor progression was revealed in 7 (30%) pts after PVE, in 3 (42%) and in 0 (0%) after RALPPS (p > 0.05). Liver failure according to ISGLS criteria was revealed in 5 (22%) pts after PVE (grade A, B), 1 (12.5%) after PVL (Grade B) and 1 (12.5%) pts after RALPPS (grade B) without significant differences (p > 0.05).

Conclusion
Variants of RALPPS are effective in prevention of posthepatectomy liver failure with lower rate of morbidity and tumor progression comparable with two-stage hepatecomies.
Comparison of standard multiport vs. reduced port left lateral liver resection

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Background
Reduced port laparoscopic liver surgery, applying a single incision (SILS) port, evolves as a new approach for minimal invasive resections of benign and malignant liver tumors. So far, it remains unclear if the technique is safe and which patients can benefit from this approach.

Methods
We retrospectively analyzed the postoperative course of all consecutive patients undergoing minimally invasive left lateral sectionectomy at our center between 2009 and 2016.

Results
In total, 39 minimal-invasive left lateral sectionectomies were performed between July 2009 and September 2016. 31 were performed in standard multiport and 8 in SILS reduced port technique. 5 patients of the multiport group and 3 of the reduced port group were excluded from the analysis due to multivisceral resections. Length of operation was significantly shorter in the reduced port group (206 min. vs. 149 min., p=0.031). The morbidity rate was 19.2% in the multiport group and 0% in the reduced port group, respectively. No mortality was observed in both groups. Length of hospital stay did not significantly differ in both groups (median 7 vs. 5 days, p=0.367).

Conclusion
Single incision left lateral sectionectomy is a safe and effective procedure for both benign and malignant hepatic lesions. Compared to multiport resections it is faster due to the possibility of specimen retrieval through the umbilical incision. In case of intraoperative bleeding the SILS port can easily be converted to a hand-port, allowing for manual compression of the liver.
Liver surgery: Clinical
FP27.05

Curative Intent Treatment of Hepatocellular Carcinoma- 737 Cases in a Surgical Department

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Background
Hepatocellular carcinoma (HCC) is the fifth most common cancer in the world and 5 years survival without treatment is under 10%. The vast majority of HCCs develop on underlying liver cirrhosis.

Methods
737 HCC patients underwent curative intent treatment: 476 liver resections (271 in cirrhotic patients), 146 liver transplantations (LT) and in 115 hyperthermic tumor ablation. Before LT, 54 patients underwent transarterial chemoembolization (TACE) as bridging therapy.

Results
In resected patients 1,3 and 5 years survival rates were 80%, 52% and 35.6% respectively.
In transplanted patients 1,3 and 5 years survival rates were 90%, 70% and 68%, not significantly different to those achieved by liver resection (p>0.05). In ablation group, 1,3 and 5 years survival rates were 76%, 39% and 17% significantly lower than in resected or transplanted patients (p< 0.05). Complete ablation was achieved in 35 patients. In the subgroup of patients with complete ablation, 1,3 and 5 years survival rates were 65%, 38% and 30% respectively, comparable to those achieved after liver resection (p >0.05)

Conclusion
Liver resection and LT offer the best chance of cure, for tumors detected at an early stage in well selected patients. Hyperthermic ablation of HCC could be a curative treatment when complete ablation is achieved.
De Novo Cholangiocarcinoma after Hepatectomy for Hepatolithiasis: A Comparative Review of 124 cases

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Background
Prevalence of hepatolithiasis is common in South-East Asia, which mainly presented as recurrent pyogenic cholangitis, acute cholangitis and accredited a risk factor for cholangiocarcinoma. Hepatectomy is an acknowledged therapeutic option for hepatolithiasis.

Methods
From January 2005 to December 2014, 124 patients, whom received hepatectomy for hepatolithiasis at Kaohsiung Chang Gung Memorial Hospital, had been reviewed and analyzed.

Results
The presentation included left sided stones in 69%, right sided stones in 18% and bilateral in 13% of patients. Immediate stone clearance after operation was 95.2%. Hospital mortality rate was 3.2%, including one patient with post-operative liver failure and 3 with severe sepsis. Stone recurrence rate was 15.3%. Only one patient developed cholangiocarcinoma during the seventh year of follow-up. In comparison with other series of non-operative management, hepatectomy had higher stone clearance and reduced recurrence of stone and cholangitis, and reduced the risk of cholangiocarcinoma. Our incidence of de-novo cholangiocarcinoma was lowest among other hepatectomy series, with comparable rate of stone clearance and recurrent cholangitis.

Conclusion
Hepatectomy for hepatolithiasis has highest stone clearance and lowest recurrent cholangitis rates. Low 5-year risk of cholangiocarcinoma can be achieved by early hepatectomy, including complete resection of the bile duct segment from the bifurcation, complete stone clearance and resection of strictures.
Liver surgery: Clinical
Sym30.05

Delayed ALPPS: a new concept to reduce operative risk

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Background
ALPPS has high perioperative morbidity and mortality primarily because of acute liver failure after the second stage. With the hypothesis that this is due to poor correlation between future liver remnant volume and function, we delayed second stage resection for at least 14 days, designating this as delayed ALPPS (dALPPS).

Methods
dALPPS was performed in 11 patients. Median time between 1st and 2nd operation was 21 days for dALPPS compared to 25 contemporary patients undergoing two-stage (TS) resection (median time between operations 87 days). Outcome data included demographics, operation completion rate, 30-day and 90-day morbidity and mortality.

Results
Demographics were similar between groups. Indications for dALPPS were colorectal liver metastasis (CRLM) (n=10) and hepatocellular carcinoma (HCC, n=1). All TS resections were for CRLM. All dALPPS patients completed 2nd stage resection compared to only 80% in the TS group. Median length of stay was similar in both groups for both 1st (6 vs 6 days) and 2nd (10 vs 9 days) stage resections dALPPS and CTS respectively. Significant complications (Clavien-Dindo grade 2 or 3) occurred in 27% of dALPPs and 32% of TS patients. There was no 90-day mortality in either group. Overall mean survival was 334 days in dALPPS vs 489 days in TS groups respectively (p = 0.24).

Conclusion
dALPPS offers the theoretical regenerative and oncological benefits of ALPPS, but with comparable risk to TS, potentially improving outcomes for borderline resectable disease.
Double thoracoabdominal approach in hepato-pericardial hydatidosis

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**Background**
Cardiac hydatid cyst is rare even in endemic countries, and poses a therapeutic challenge due to varying presentation and unpredictable pre, peri, and postoperative complications. In humans, the most frequent locations of the hydatid cysts are the liver and lungs; pericardial echinococcosis is extremely rare.

**Methods**
41-year-old men was admitted with a diagnosis of liver and pericardial hydatidosis. His laboratory values were only significant for an eosinophilia. Thoraco-abdominal computed tomographic (CT) scan showed a hepatic cyst affecting segments II–III and communicating with the pericardium.

**Results**
Cardiothoracic surgery was considered, and after two weeks of albendazole treatment the patient underwent successful resection of the hepatic cyst, and pericardial clean was done at the same operation. Pathological analysis was positive for scolices of Echinococcus granulosus. The postoperative period was uneventful. Albendazole treatment was completed over a total of eight weeks. After one years of follow up, the patient showed neither clinical nor radiological signs of relapse.

**Conclusion**
Cardiac hydatid cyst is rare and may present with a variety of signs and symptoms. When diagnosed treatment of choice for even asymptomatic patients is surgical ablation due to a high risk of associated complications. During the operation, measures should be taken to prevent perioperative embolization of germinative membrane.
Liver surgery: Clinical

Effect of intrahepatic injecting of cryoprecipitate in patients with cirrhosis

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Background
Stimulation of liver regeneration is a promising method of treatment for patients with cirrhosis; it helps to lengthen their lifetime while they wait to get a transplantation. In our study we stimulated regeneration by using cryoprecipitate and alloplant, which were administrated intrahepatically under ultrasound control.

Methods
The study includes 114 patients. Mean age 48.9±12.14 (range 25-68 years), 67 male (59 %), 47 female (41 %). 30 of 114 – toxic+viral cirrhosis, 33 – viral, 51 – toxic. The patients were divided into 2 groups: 1st group included 72 patients, who were treated with cryoprecipitate, 2nd group – 62 patients treated with alloplant. The injecting of cryoprecipitate/alloplant was made under ultrasound control. Patients were examined before injecting and 3, 6 months and 1 year later.

Results
The improvements in clinical and laboratory parameters were registered after 3,6 months and 1 year in 95 % of patients in 1st group, in 60% in 2nd group. Morphologically decrease of inflammatory infiltration and regeneration signs were found in 74% in 1st group (in patients with Child-Pugh class A,B,C), in 60% in 2nd group (Child-Pugh class A and B). Mortality in 1st group was none, in 2nd – 10% .

Conclusion
Injecting of cryoprecipitate improves clinical and laboratory parameters, morphological condition of liver in patients with Child-Pugh class A,B,C . Injecting of alloplant is effective in patients with Child-Pugh class A and B, the effect is insignificant in patients with class C.
Efficacy and safety of pharmacological venous thromboembolism prophylaxis following liver resection: A systematic review and meta-analysis

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Background
Current guidelines recommend chemical thrombo-prophylaxis for patients undergoing abdominal surgery for malignancy. Liver resection exposes patients to risk factors for venous thrombo-embolism (VTE), but also peri-operative bleeding. This study evaluates the evidence base supporting the use of chemical prophylaxis in liver surgery.

Methods
An electronic search was carried out for studies reporting outcome data for patients undergoing liver resection comparing patients receiving chemical prophylaxis with those who did not. The search resulted in 990 unique citations. Following the application of eligibility criteria 5 studies comprise the final study population.

Results
3675 patients underwent liver resection between 1999 and 2013. 2256 patients received chemical prophylaxis, 1412 had only mechanical prophylaxis and 7 received no prophylaxis. Meta-analysis revealed lower VTE rates in patients receiving chemical prophylaxis (2.6%) compared to without chemical prophylaxis (4.6%) (Odds Ratio: 0.631 [95% CI: 0.416–0.959], Fixed model, p=0.030). Data regarding bleeding could not be pooled for meta-analysis, but chemical prophylaxis was reported as safe in 4 studies.

Conclusion
This meta-analysis indicates that the use of chemical prophylaxis reduces VTE incidence following liver surgery. 4 studies report no increase in bleeding associated with chemical prophylaxis use. Better quality data are required to support guidelines relating to optimum timing and duration of treatment.
Embryonic Origin of Primary Colon Cancer Predicts Pathologic Response and Survival in Patients Undergoing Resection for Colon Cancer Liver Metastases

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Background
To determine the prognostic value of embryonic origin in patients undergoing resection after chemotherapy for colon cancer liver metastases (CCLM).

Methods
We identified 725 patients with primary colon cancer and known RAS mutation status who underwent hepatic resection after preoperative chemotherapy for CCLM (1990-2015). Survival after resection of CCLM from midgut origin (n=238) and hindgut origin (n=487) was analyzed. Predictors of pathologic response and survival were determined. Prognostic value of embryonic origin was validated with a separate cohort of 252 patients with primary colon cancer who underwent resection of CCLM without preoperative chemotherapy.

Results
Recurrence-free survival (RFS) and overall survival (OS) after hepatectomy were worse in patients with midgut origin tumors (RFS rate at 3 years: 15% vs. 27%, P<0.001; OS rate at 3 years: 46% vs. 68%, P<0.001). Independent factors associated with minor pathologic response were midgut origin (odds ratio [OR] 1.55, P=0.010), absence of bevacizumab (OR 1.42, P=0.034), and mutant RAS (OR 1.41, P=0.043). Independent factors associated with worse OS were midgut embryonic origin (hazard ratio [HR] 2.04, P<0.001), carcinoembryonic antigen value ≥5 ng/mL at hepatic resection (HR 1.46, P=0.0021), synchronous CCLM (HR 1.45, P=0.012), and mutant RAS (HR 1.43, P=0.0040).

Conclusion
Compared to CCLM from hindgut origin, CCLM from midgut origin are associated with worse pathologic response to chemotherapy and worse survival after resection.
Embryonic Origin of Primary Colon Cancer Predicts Survival in Patients Undergoing Ablation for Colorectal Liver Metastases

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Background
In patients with colorectal cancer, midgut embryonic tumor origin is associated with worse prognosis. The impact of embryonic origin on survival after percutaneous ablation (PA) of colorectal liver metastases (CLM) is unclear.

Methods
We analysed 74 patients with CLM who underwent PA during 2004-2015. Survival and recurrence after PA from midgut (n=18) and hindgut (n=56) origin CLM were analyzed. Prognostic value of embryonic origin was evaluated by multivariable analysis.

Results
Recurrence-free survival (RFS) and overall (OS) survival after PA were worse in patients with CLM from midgut origin tumors (3-year RFS rate: 5.6% vs 24%, P=0.004; 3-year OS rate: 25% vs 70%, P<0.001). In Cox proportional hazards regression analysis, factors associated with worse OS were midgut embryonic origin (hazard ratio [HR] 4.87, 95% CI 2.14-10.9, P<0.001), multiple CLM (HR 2.35, 95% CI 1.02-5.39, P=0.044), and RAS mutation (HR 2.78, 95% CI 1.25-6.36, P=0.013). At a median follow-up of 25 months, 56 patients (76%) had developed a recurrence, 16 (89%) with midgut origin and 40 (71%) with hindgut origin tumors (P=0.133). Recurrent disease was treated with local therapy in 20 patients (36%), 2 (13%) with midgut origin and 18 (45%) with hindgut origin tumors (P=0.022).

Conclusion
Compared to hindgut origin tumors, CLM from midgut were associated with worse survival after PA, which was partly attributable to the fact that patients with hindgut origin tumors were more frequently candidates for local therapy at recurrence.
Emergency Single Incision Laparoscopic Liver Resection (SILL) in ruptured Liver Adenoma: a Case Report

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Background
Spontaneous rupture of liver tumors, such as hepatocellular adenoma (HCA) and carcinoma (HCC), is rare but might lead to a potentially life-threatening situation, as unspecific symptoms can be misleading. However, immediate interventional or surgical intervention is required to stop the bleeding.

Methods
A female 53-year old patient was admitted to the hospital with unspecific epigastric pain for the past three days.

Successful emergency angiographic embolization was accomplished with gelatin foam powder in the hemodynamically stable patient.

Subsequent magnetic imaging (MRI) revealed the most likely diagnosis of an HCA, which had ruptured and a two additional adenomas with less than 3cm in diameter in segments 4 and 6.

We performed a single-incision laparoscopy to evacuate the hematoma and to address the ruptured liver tumor. Anatomical left lateral sectionectomy was performed. The resected liver lobe was removed via the umbilical single-port incision.

Results
The postoperative course was uneventful and the patient could be discharged on postoperative day 5.

Conclusion
With the high probability of a benign lesion to be resected at the site of rupture and the additional lesions without an immediate indication for surgical removal, it was safe to perform the resection laparoscopically instead of a major open resection.

In our opinion, benefits of routine laparoscopic liver surgery should also be taken into account in emergency settings.
Enhanced Recovery After Surgery Program in Open and Laparoscopic Liver Resection

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Background
Enhanced recovery after surgery (ERAS) has been developed in liver surgery. The program is recognized in reducing postoperative length of hospital stay and patients’ stress response to surgery. The aim of this study is to evaluate its efficacy and feasibility in Hong Kong.

Methods
This is a prospective feasibility study carried out in a tertiary academic hospital in Hong Kong. A multidisciplinary ERAS protocol had been implemented to both open and laparoscopic liver resection. The clinical outcomes of patients underwent liver resection with ERAS peri-operative program were compared with those received conventional peri-operative program in the same period. Propensity score matching method was used to minimize background differences.

Results
From Sept 2015 to Jul 2016, a total of 20 patients underwent liver resection were recruited to ERAS program. Their clinical outcomes were compared with another 20 patients received hepatectomy under conventional perioperative program after propensity score matching. ERAS program was associated with a significantly shorter length of hospital stay (p =0.041) without an increase in complication rate in patients received open liver resection. There was no significance in hospital stay in the laparoscopic group. No patient required readmission in this cohort.

Conclusion
ERAS perioperative program for liver resection is safe and feasible. It significantly shortened the hospital stay in open liver resection but not in laparoscopic liver resection.
Enucleation Plus Caudate Lobe Resection for Central Giant Hemangioma of the liver.

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Background
Hepatic hemangiomas warrant therapy if they are causing significant symptoms or are increasing in size. Enucleation is easier and safer than partial hepatectomy. Giant centrally located lesions are more challenging but can be treated with the same approach.

Methods
A 70 years old man was referred to our hospital for pain in the right upper abdomen. CT scan revealed a central giant liver hemangioma compressing the cava and the suprahepatic veins with fissuration on segment 8. No signs of active bleeding were detected. The right diaphragm was elevated with concomitant right basal effusion and pneumonia. The size of the hemangioma was significantly increased in comparison with a previous exam taken 4 years before (main diameter from 9 to 12 cm). Patient was monitored after admission and surgery was delayed until the resolution of the pneumonia.

Results
Resection of the caudate lobe and enucleation of the giant hemangioma under intermittent clamping was performed. After the caudate lobe was dissected from the caval vein the plan of dissection followed the capsule of the hemangioma to complete the enucleation from the surrounding parenchyma and the suprahepatic veins. Patient did not require transfusion. Postoperative course was uneventful and the patient was discharged 5 days after operation.

Conclusion
Combined resection and enucleation is feasible also for centrally located giant hemangioma and need to be considered the safest approach when surgery become mandatory. It avoids complex liver resections.
Estimated remnant liver function prior to hepatectomy for CR metastasis is a better predictor of post-hepatectomy liver failure than APRI score.

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**Background**

Posthepatectomy liver failure (PHLF) is a major complication after hepatectomy with a high mortality rate. The future remnant liver volume (FLRV%) and the total liver function both influence the occurrence of PHLF. Total liver function can be reduced in chemotherapy associated liver injury (CALI). Different tools predicting PHLF have been described in hepatectomy for colorectal liver metastasis after chemotherapy. Aspartate aminotransferase to platelet ratio index (APRI) has been shown to predict CALI and PHLF related to severe CALI. Estimation of the future liver remnant function (eFLRF) in a formula combining 99mTc-Mebrofenin Hepatobiliary Scintigraphy (HBS) and FLRV% liver volumetry has been shown to predict PHLF. No direct comparison between eFLRF and APRI has been performed up to now.

**Methods**

Estimation of the future liver remnant function (eFLRF) was performed in 140 patients prior to liver resection for colorectal liver metastasis after preoperative systemic therapy. When the cut-off for eFLRF was under 2.3%/min/m², portal vein embolization or ligation was performed. APRI scores was calculated in all patients.

**Results**

In ROC analysis, FLRV% and eFLRF had a better predictive value for PHLF than HBS alone and APRI. In multivariate analysis, eFLRF seems to be the only predicting factor for PHLF.

**Conclusion**

PHLF is best predicted by combining volumetry with liver function in one formula than by separate volumetric or functional evaluation of the liver.
Evaluation of the learning curve for laparoscopic liver resection by risk-adjusted CUSUM analysis using the Iwate difficulty index

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Background
Laparoscopic liver resection (LLR) is technically challenging and requires training in both hepatobiliary and advanced laparoscopic techniques. The aim of this study was to compare the learning curve of LLR using CUSUM (cumulative sum control chart) analysis before and after risk adjusting for operative difficulty using the Iwate difficulty index.

Methods
Retrospective analysis of a prospective database of consecutive patients who underwent LLR by two surgeons at a single centre between January 2011 and June 2016. The learning curve for LLR for both surgeons was evaluated using CUSUM analysis before and after risk-adjusting for operative difficulty using the Iwate difficulty index.

Results
125 consecutive patients underwent LLR during the study period, including non-anatomical resection (57), left lateral sectionectomy (42) and major hepatectomy (26). Conversion to open surgery was necessary in 14 patients (11%).

The first major resection was jointly performed by surgeon A and B after 38 minor resections (surgeon A – 15; surgeon B – 23). Unadjusted CUSUM analysis of operating time identified a learning curve of 50-60 procedures. After risk-adjusting for operative difficulty, the shape of the CUSUM plot changed and the learning curve reduced to 25-30 procedures.

Conclusion
Risk-adjustment using the Iwate difficulty index may enhance the applicability of CUSUM analysis in the assessment of learning curve of laparoscopic liver resection, and warrants further study.
Evolution of ALPPS: the simpler, safer and effective one---TELPP


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Background
Numerous modifications have been suggested for improvement of ALPPS. We suggest Terminal Branches Portal Vein Embolization (TBPVE) as a way to compartment the liver. This method is termed Terminal branches portal vein Embolization Liver Partition Planned hepatectomy (TELPP).

Methods
The procedure of TELPP was that in addition to PVE, embolization agent was infused to the terminal branches of portal vein of S5, S8 or S4. CT scan was taken one or two weeks later, and standard liver volume (SLV), FLR and FLR/SLV are calculated. Two weeks later, open or laparoscopic hepatectomy is performed.

Results
Patients including hepatocellular carcinoma: n = 8, intrahepatic cholangiocarcinoma: n = 1, hilar cholangiocarcinoma: n = 1, colorectal liver metastasis: n = 1. The volume of the FLR had increased from 382ml to 578ml, representing a median volume increase of 51% (range = 32.5%–86.7%). Of the 11 patients with hepatectomy, right hemihepatectomy (n=2), extended right hemihepatectomy (n=5), right trisecmentectomy (n=2), extended left hemihepatectomy (n=1) and left trisecmentectomy (n=1). No patient died, and no severe perioperative morbidity occurred.

Conclusion
The ALPPS and all modifications need two-stage operations with a high morbidity and mortality rate. It seems that TELPP is very promising. It has the merit of ALPPS as extraordinarily rapid increase of FLR volume, yet the morbidity and mortality is much lower, as only single surgical operation is required.
Evolution of parenchymal sparing surgery for colorectal metastases: are we still dealing with “minor” hepatectomies?

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Background
Surgical management of colorectal liver metastasis (CRLM) has changed dramatically with the diffusion of parenchymal sparing liver resection (LR). Aim of study was to assess the evolution of surgical techniques for conservative LR over time.

Methods
From January 2005 to December 2015, 895 consecutive LRs for CRLMs were performed. 568 minor LRs were considered and categorized into 2 groups according to the date of LR: Group A (2005–2010, 271 LRs) and Group B (2011–2015, 297 LRs).

Results
In total, 524 LRs were performed among 271 hepatectomies in Group A versus 728 among 297 in Group B (p=0.016). More than five CRLMs were resected during the same operation in 40 cases in Group A versus 72 in Group B (p=0.005). In Group B, the LRs were technically more demanding (portal pedicle or hepatic vein exposure, and complex vascular relationships occurred significantly more frequently in Group B, associated vascular resection was more commonly performed, the transection area was larger, the parenchymal transection time was longer, and blood loss was greater (p<0.05 for all). Mortality and postoperative complications were comparable among groups (p=ns). The R1 resection rate was significantly higher in Group B (p<0.001). Global recurrences and the re-resection rate for recurrence were similar among groups.

Conclusion
Parenchymal sparing surgery for CRLMs is challenging and becoming increasingly more complex while ensuring safe short-term and oncological outcomes.
Extended left hepatectomy with temporary porto-caval shunt under total hepatic vascular exclusion and liver cooling

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Background
We report the case of a 79-year-old patient with voluminous cholangiocarcinoma that was located in the left liver extended to segment V. A left extended hepatectomy is planned, under temporary porto-caval shunt (TPCS) and Liver Cooling (LC)

Methods
The patient was operated on 5 days before from left portal vein ligation. The first step is preparing for TPCS: the right suprahepatic and the trunk of the main and left suprahepatic veins are controlled and the liver is fully mobilized to expose and control the infra and suprahepatic inferior vena cava with a tape. The pedicle is prepared dissecting the portal vein independently from the artery and bile duct.

Results
The second step is to realize porto-caval shunt: the graft is sutures between the inferior vena cava and the main trunk of the portal vein. The film reports step by step this operative procedure, until the cannulation of the portal vein.
The third step starts with the extended left hepatectomy. The transaction is realized using conventional bipolar electrocautery and ultrasonic dissection. The mains segmental pedicles were controlled using ligation, in particular the pedicle of segment VIII that must be preserved.

Conclusion
Liver is rewarmed, cannula is removed. The interest of this film is: i) the realisation of the venous shunt using a vascular graft and ii) the major hepatic resection, which can be managed safely, taking the time to attentively perform a meticulous haemostasis, thanks to the temporary portacaval shunt.
Extended right hepatectomy with IVC replacement for intrahepatic cholangiocarcinoma: Total vascular exclusion – Veno-venous bypass – Topical cooling

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Background
A 43-years old woman presented with 10-cm right sided intrahepatic cholangiocarcinoma involving inferior vena cava (IVC).
She had an exploratory laparotomy six months earlier disclosing pericaval lymph metastasis.
She received 12 cycles of chemotherapy (gemcitabine/oxaliplatin) and presented at reevaluation with good response: biological (CEA 380 down to 13 ng/ml), functionnal (loss of FDG avidity) and morphological, even if IVC seemed still invaded.

Methods
Right hepatectomy+segments I et IV with caval replacement was performed under veno-venous bypass and topical cooling:
- J-shaped incision
- right lobe mobilisation and caval exposure
- infra-supra-hepatic and retrocaval dissection
- pedicular dissection: cystic pedicle ligation, right hepatic artery ligation, common bile duct section, right portal vein and portal bifurcation resection/anastomosis
- axillary, portal and caval canulations, veno-venous bypass
- left topical cooling
- hepatic total vascular exclusion
- parenchymal transection up to left hepatic vein
- IVC Resection and upper implantation of ringed PTFE graft to the IVC below the remnant left hepatic vein
- clamping of the graft below the anastomosis for hepatic recirculation
- infrahepatic IVC-prothetic anastomosis, and bypass discontinuation after 60 minutes
- Roux-en-y hepaticojejunostomy on left bile duct

Results
Operative and postoperative courses were uneventful. Patients was discharged at day 7.

Conclusion
Pathological examination revealed a R0 ypT3N1.
Gemox adjuvant chemotherapy was resumed at 6 weeks.
Liver surgery: Clinical
FP27.07

External validation of the “ALICE” prediction model for long and short-term outcomes in resected HCC patients: results from a western cohort

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Background
The ALICE model (based on serum albumin and indocyanine retention rate) was shown to be an effective and simple method for predicting postoperative long and short-term outcomes in eastern HCC patients. This study was designed to validate ALICE model in a large western cohort of patients.

Methods
A total of 400 patients who underwent hepatic resection from 01/2005 to 06/2016 at 3 tertiary centers were enrolled. Cases with missing data for the computation of the score were excluded. Harrell's C-index was used as a measure of discrimination for model validation.

Results
Patients population had ALICE grade 1/2/3 in 191/197/12 cases, respectively. The median overall survival in the patients with ALICE grade 1, grade 2 and grade 3 were significant different both in the whole population (95, 67, and 15 months) and in Child A patients (95, 68 and 23 months). The C index was better for the ALICE system (c=0.54) than for the models based on Child Pugh (c=0.21) and BCLC (c=0.35). The ALICE model allowed the stratification of patients according to the risk of overall morbidity (grade1/2:45%, grade3:75%), ascites (grade 1:11%; grade 2:20%; grade 3:58%) and liver failure (grade1:15%, grade2:24%, grade3:50%), but failed to predict postoperative mortality.

Conclusion
The ALICE model is effective in predicting survival, postoperative complications and ascites in our western validation cohort. It represents a useful aid in the surgical decision-making of HCC patients.
Liver surgery: Clinical
FP14.01

First 100 hepatic resections: short-term outcomes from a low volume centre in a developing country.

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Background
Although well established as a therapeutic option in the developed world, hepatic resection has been slow to progress in some developing countries. The objective of our study was to review the early outcomes of hepatic resection from a low volume tertiary care center in Pakistan.

Methods
All patients who underwent elective hepatic resection from January 2008 to December 2016 were reviewed. Data was collected regarding indication for surgery, type of hepatic resection, estimated blood loss (EBL), early morbidity and mortality.

Results
Out of total of 100 patients, there were 53 males and 47 females. Indications for surgery included primary hepatic cancer in 56, metastatic tumors in 24 and benign lesion in 20 patients. Mean duration of surgery was 289 minutes while mean estimated blood loss (EBL) was 629 mls. Overall morbidity rate was 41% and 90-day mortality rate was 6%. Morbidity rates were higher in patients with associated co-morbid conditions (p=0.026) and duration of surgery longer than 300 minutes (p=0.69). Ninety-day mortality was higher in patients with primary hepatic cancers but the results were not statistically significant (p<0.225). EBL was significantly higher in patients with HCC (p<0.008) and in resections performed for primary hepatic cancers (p<0.000).

Conclusion
Morbidity and mortality related to hepatic resection in our center was comparable to the rates reported in the literature. There is a need to focus on optimizing co-morbid conditions, and reducing blood loss by improvising surgical technique.
Liver surgery: Clinical
P50.01

Fluorescence in Hepatobiliary surgery: Novel technique or evolution of practice?

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Background
Liver resection remains the cornerstone of curative treatment for hepatocellular carcinoma and colorectal cancer liver metastases. Its success is dependent upon the extent of resection achieved. To this end, intra-operative imaging techniques have been experimented with to aid the surgeon. Fluorescence guided surgery (FGS) utilises the properties of near infrared light emitting molecules to identify malignant tissue, enabling the surgeon to maximise resection of diseased tissue and minimise collateral damage.

Methods
This review analysed the most significant papers regarding FGS for oncological liver resections.

Results
Data from early trials showed increased superficial lesion detection when using fluorescence to guide liver resection. However, with its increased ability to detect deep malignant liver lesions, the introduction of intra-operative ultrasound (IOUS) appeared to supersede fluorescence. Subsequent trials have shown that the concomitant use of both FGS and IOUS can reliably increase the rate of malignant lesion, with up to twice the number of malignant lesions detected with IOUS + FGS, compared with IOUS alone. To further investigate, clinical trials assessing disease free survival and recurrence rates are required to determine its role in hepatic resection.

Conclusion
This review provides a comprehensive analysis of the most compelling evidence regarding fluorescence in hepatobiliary surgery and addresses the challenges faced introducing it into common practice.
Fully laparoscopic resection of segment VII: tips and tricks

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Background
Minimally invasive surgery can be challenging for hepatic lesions located in posterior-superior segments of the liver.

Methods
We present a fully laparoscopic partial resection of segment VII for single metachronous metastasis of left colon adenocarcinoma.

Results
A 57 years old man was diagnosed in 2014 with left colon adenocarcinoma treated by laparoscopic resection (pTNM:T3N0) MRI and PET CT performed in August 2016 showed a single 30 mm hepatic lesion in the segment VII consistent with metachronous metastasis.
MDT decision was short course chemotherapy (4 cycles of FOLFOX) prior to surgery.
In order to reassess the hepatic lesion, a new MRI scan was performed showing lesion stability and the patient underwent to a fully laparoscopic segment 7 resection.
The patient was placed in a left lateral position. In total, we used 4 trocars (one 5 mm trocar and three 10 mm trocars).
Intraoperative ultrasonography did not disclose additional lesions and the rest of abdominal exploration was normal.
Partial resection of segment 7 was performed with CUSA, bipolar forceps and clips under intermittent Pringle maneuver (15 min with 5 min of release).
An abdominal drain was left in place behind the right lobe of the liver.
The patient was discharged at day 7 with an uneventful post-operative course.
Pathology confirmed colorectal metastasis with 1.3 cm margin.
Four weeks after surgery, the chemotherapy was resumed.

Conclusion
Safe laparoscopic liver resection in difficult segments requires specific patient position and port placement.
Liver surgery: Clinical
P11.05

Functional liver volume following repeated liver resection for colorectal liver metastasis

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Background
Liver resection is increasingly performed for patients with colorectal liver metastases (CRLM). Recurrence is common and the effect of repeated liver resection on liver volumetric regeneration is poorly known. The aim of the present study was to measure functional liver volume (FLV) after repeated liver resection for CRLM.

Methods
89 patients were enrolled. Clinical and pathological outcomes were collected and FLV were measured before the initial liver resection, before and after (>6 months) a second liver resection.

Results
Median total FLV before the initial liver resection was 1546 ml (IQR: 1278 - 1912). Median FLV before the second resection was 1389 ml (IQR 1201 - 1823) and 1411 ml (IQR 1174 - 1650) after the second resection. The ratio of FLV after the second resection to preoperative volume was 92% (IQR 81% - 103%, range: 57% - 151%, 10 patients with less than 75%) respectively (P<0.001).

Conclusion
The volumetric regeneration after repeated liver resections is almost complete although the inter-individual variation is high.
Hepatectomy with or without the thoraco-abdominal approach: impact on perioperative outcome.

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Background
Hepatectomy for liver tumors using the thoraco-abdominal approach (TA) vs the abdominal approach (AA) is debated. We investigated the perioperative outcome of patients operated with or without the TA.

Methods
Our prospectively maintained database was queried. A 1:1 propensity score-matched analysis was applied. 744 patients, 246 hepatectomy with TA and 246 with AA were compared. They were matched for baseline characteristics, underlying liver disease, comorbidity, tumor features and extent of the resection. TA group had significantly more tumors located at caval confluence and S1 paracaval portion. The rates of morbidity and mortality were the endpoints.

Results
Despite more complex tumor position, the rates of morbidity or mortality were not different between the two groups. With the TA, the length of the operations ($P=0.002$), the length of the Pringle maneuver ($P=0.012$) and the rate of blood transfusions ($P=0.041$) were higher. The hospital stay was similar. The independent significant prognostic factors for adverse perioperative outcome were: the renal comorbidity (OR = 2.7; $P=0.001$), the extent of the resection (OR = 3.7; $P=0.001$) and the BILCHE score ≥2 (OR = 2.4; $P=0.002$).

Conclusion
In our hands, the performance of hepatectomy for liver tumors using the TA was not associated with adverse perioperative outcome. The lengths of operations and Pringle maneuver, the blood transfusions reflected the complexity of the tumors presentation rather than of the technical approach.
Hepatic alveolar echinococcosis-sixteen years 237 cases

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Background
Hepatic Alveolar Echinococcosis (HAE) is a parasitic disease and is endemic in our region. This disease is characterized with a slow growing mass that is usually asymptomatic. Both local invasions and distant metastasis are also common features of the disease. Surgical resection is the only curative option. In cases with unresectable masses at the liver and adjacent organs and without distant metastases transplantation is another curative option.

Methods
We evaluated the records of HAE cases followed in our clinic between January 2000 and December 2016. All records including demographic data, clinical, radiological and operative findings were noted.

Results
A total of 237 patients diagnosed to have HAE. Mean follow up was 132 months. One hundred and one patients underwent liver resection. From these 24 underwent multivisceral resection. Resectability rate was 42.6%. From the remaining 136 patients (57.4%) 34 had (14.3%) metastatic disease and 102 were referred to medical treatment or liver transplantation. Forty-four of these underwent liver transplantation.

Conclusion
HAE is endemic in our region. Resectability rate is 42.6%. Liver transplant is another option
Liver surgery: Clinical
P6.01

Hepatic artery aneurysm in an 82 years old patient

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Background
Visceral aneurysms are mostly incidental findings. The risk of the rupture, especially in non atherosclerotic aneurysms, is very high and reaches up to 80% depending on their size. All aneurysms with a diameter bigger than 2cm should be treated.

Methods
A 82 year old patient had been diagnosed with an aneurysm of the hepatic artery. CT scan originally was performed due to an abdominal pain. He was in a good general health with arterial hypertension. We decided to perform a primary operation.
The intraoperative inspection showed a 3cm aneurysm of the hepatic artery. The lesion was resected and we performed an arterial reconstruction with an end to end anastomosis.

Results
Postoperatively, apart from a short confusional state, there were no complications. The ultrasound control of the liver perfusion showed no abnormalities. In the postoperative period heparin in therapeutic dosage was given and we began platelet aggregation inhibition with the acetylsalicylic acid.

Conclusion
The primary endovascular occlusion of visceral aneurysms is in 22-25% not successful and is burdened with a 18-35% recanalisation rate. There are basically no aneurysm recurrences following surgical therapy known, although it carries a postoperative mortality risk of around 3.6%. For this reason the surgical treatment is the therapy of first choice in patients with the low perioperative risk.
Hepatic malignancies infiltrating the hepatocaval confluence - A single center experience with ante situm liver resection

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Background
The ante situm-technique allows for luxation of the liver in front of the situs, enabling the experienced HPB-surgeon to resect liver malignancies invading the hepatic veins/inferior vena cava. Single-center experience with ante-situm liver resection over the past 10 years is presented.

Methods
Retrospective analysis on patients receiving ante situm liver resection comprising demographical and basic clinical data as well as perioperative courses.

Results
Ante situm liver resection was performed on 7 patients suffering from primary (n=5) or secondary (n=2) liver tumors. Patients received trisegmentectomy (n=4), extended left hemihepatectomy (n=1) or atypical liver resection (segments 8/4a; n=2) combined with dissection of the suprahepatic vena cava/liver veins. Venous reconstruction was performed as reinsertion of liver veins (n=3) or vascular replacement with allogeneic donor veins (n=3) or PTFE-graft (n=1) in total vascular occlusion (mean of 29.6 min.). Severe morbidity defined as Dindo Clavien >3a was found in 3 patients; one patient died due to small-for-size syndrome. Mean length of stay at ICU and hospital were 9.0 and 34.3 days, respectively. R0-resection was achieved in 5 cases (twice a R1-situation). Disease-free survival was 24.6 months with an overall survival of 34.4 months.

Conclusion
Ante situm liver resection offers the opportunity to achieve surgical cure in otherwise unresectable tumors. Nevertheless, this approach remains challenging with need for complex vascular reconstruction.
Hepatic resection for hepatocellular carcinoma in cirrhotic patients with portal hypertension

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Background

Hepatic resection (HR) in cirrhotic patients with hepatocellular carcinoma (HCC) and portal hypertension (PHT) is not recommended, according to international guidelines. The aim of the present study was to determine the outcome of HR for HCC in cirrhotic patients with PHT.

Methods

The present study was a single institutional, retrospective study of 170 Child–Pugh class A cirrhotic patients who underwent HR for HCC from 2011 to July 2015. The patients were divided into two groups, according to the presence and absence of PHT.

Results

PHT was present in 91 patients (53.5 per cent). The postoperative morbidity was insignificantly higher in patients with PHT than patients without PHT (31.9 per cent vs 25.3 per cent, respectively, P = 0.36). Patients with PHT showed 90-day perioperative mortality (3.3 per cent), which was similar to patients without PHT (2.5 per cent). In the subgroup analysis, the 1-, 3- and 5-year overall survival for patients with limited HR was 90.3 per cent, 74.3 per cent and 66.2 per cent, respectively, for patients with PHT, and 93.9 per cent, 80.9 per cent and 73.6 per cent, respectively, for patients without PHT, without a significant statistical difference (P = 0.38).

Conclusion

HR in Child–Pugh class A cirrhotic patients with PHT is a safe and effective procedure with good short- and long-term outcomes in comparison to patients without PHT, especially those with limited liver resection.
Hepatic Resection for Isolated Breast Cancer Liver Metastasis; Single Center Experience

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Background
Liver metastases occur frequently in women with metastatic breast cancer, but metastatic breast cancer almost associated with extrahepatic metastasis. Hepatic metastases without extrahepatic metastases are 4-5% of metastatic breast cancer, and the available treatments are limited and ineffective. The aim of this study is to review the outcome of selected patients with BCLM after hepatic resection.

Methods
Between 2011 and 2014, 6 patients underwent hepatic resection for BCLM. All patients received hepatic resection to achieve an R0 resection. The patients without extrahepatic disease in imaging study, was selected for hepatic resection. If R0 resection available and low operative risk in preoperative tests, the patients underwent surgery.

Results
The time interval between initial breast cancer and detection of liver metastases excluding 1 patients with synchronous metastases was 55.2 months. Major liver resection was performed in 4 patients. There was difference in hormone receptor status between primary breast cancer and liver metastases, but no difference in HER-2 status. The 1-year and 3-year overall and disease free survival rates after hepatic resection were 100%, 83.3% and 66.7%, 50.0%.

Conclusion
Curative resection of breast cancer liver metastasis may be considered as one of a multimodal treatment of the metastatic disease. It has benefit for a few patients, and should be needed absolute selection criteria.
Hepatic tuberculoma behaving as metastasis of neuroendocrine carcinoma

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Background
Hepatic involvement in tuberculosis is rare and can be presented clinically in different ways. One of them is hepatic tuberculoma. Since this presentation is very uncommon and the symptoms are non-specific, the diagnosis of suspicion is practically impossible without a confirmatory pathological analysis. It is not uncommon for this pathology to be confused with primary hepatic malignant lesions or secondary deposits.

Methods
75-year-old female patient with a personal history of hypertension, cholecystectomy, total gastrectomy with distal esophagectomy due to neuroendocrine tumor in follow-up by the oncology department; In a CT Scan control after two years, appears hepatic mass in IVb segment with hypervascularized pattern of 7 mm, suggestive metastasis. The study is complemented with MRI of the liver. Non-anatomical resection of segment IVb is performed. The patient was discharged after 72 hours with out complications.

Results
Pathological analysis is reported as Necrotizing granuloma with abundant acid-alcohol resistant bacilli compatible with mycobacteria. The follow-up was carried out by our service and the Infectious Disease Service, which are undergoing treatment with triple anti-TBC therapy for 9 months.

Conclusion
Liver tuberculosis is the most uncommon form of presentation of abdominal tuberculosis. In the absence of systemic symptoms, it is very difficult to suspect and even diagnose it, since the usual imaging tests lack specificity to make a differential diagnosis.
Hepatobiliary scintigraphy for risk assessment of posthepatectomy liver failure

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Background
Aims of the study: 1) to assess the role of hepatobiliary scintigraphy for prognosis of hepatic failure after liver resection.
2) to determine the borderline index of hepatic uptake (IHU) of radioactive agent as an indication for surgical prophylactic of hepatic failure.

Methods
Ninety nine patients were investigated by hepatobiliary scintigraphy for different liver diseases and liver tumors (2015-2016 year):
1) 50 patients from hepatology department with liver biopsy (METAVIR assessment) because of different liver disorders (chronic hepatitis, liver cirrhosis),
2) 49 patients underwent major liver resections (more than 3 segments) for liver tumors.

Results
The mean value of IHU of 2.86 was revealed in patients with liver fibrosis F1, and IHU of 2.02 was identified in patients with liver fibrosis F4. Bordeline mean value of IHU made up of 2.4. In 18 patients with IHU<2.4 and remnant liver <40% surgical prophylactic of hepatic failure was performed: ligation of portal vein (1), portal embolization (12), percutaneous embolization of the right portal vein with radiofrequency ablation along the plane of future liver transaction (5). The increase of index of hepatic uptake up to 2.7±0.47 was revealed in future remnant liver in 14-21 days after devascularization.

Conclusion
Dynamic hepatobiliary scintigraphy is valuable in assessment of volume and function of different areas of liver. IHU of 2.4 and volume of the future remnant liver <40% are the indication for surgical prevention of postresection liver failure.
Histological Evidence of Reversibility of Chemotherapy associated liver Injury

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Background
Chemotherapy-induced liver injury (CALI) is well documented. However, it is not clear whether CALI is progressive or reversible. This study asked whether there was any difference in total liver injury score in patients who had had chemotherapy and repeat liver resections (LR) for colorectal metastases (CRM).

Methods
Of 758 patients undergoing LR for CRM in a single centre between January 2010 and December 2015, 431 had preoperative chemotherapy, 68 of whom had a second LR, after a median (range) interval of 11 (1-45) months. The total histological liver injury scores for parenchymal steatosis, sinusoidal dilation and lobular inflammation were calculated and compared between the first and second LR.

Results
The total liver injury score improved in 29% of cases, stayed static in 31% and deteriorated in 40%. 47 patients did not receive chemotherapy between the first and second LR and their liver injury scores improved in 30%, were unchanged in 34% and deteriorated in 36%, compared to 21 patients who received further chemotherapy, whose scores improved in 28%, were unchanged in 24% but worse in 48%. Of the 37 patients who had an initial major LR, 40% had significantly improved scores on the second LR, compared 16% of patients with a minor LR (n=31) (p=0.034).

Conclusion
This study shows that CALI can progress or improve over time, depending on the magnitude of the initial LR and whether more chemotherapy is given.
How has the expert meeting 2015 changed our practice and results with ALPPS

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Background
ALPPS has been criticized for its high M&M. A world expert Meeting in Hamburg in 02/2015 analyzed the international ALPPS registry data as the base for aiming at providing selection criteria (indication, risk factor selection and technical modifications of the procedure) to overcome the eminent problems. We look at our own data to analyze any differences.

Methods
Analysis of our prospective ALPPS database. Division in 2 groups (before and after the Meeting).

Results
In total 57 ALPPS procedures were performed at our Center. In Group 1: 33 patients - mean Age 66,6y; CRLM 22, other 11; 3 partial ALPPS; Morbidity >3a 27%, Mortality 15%. No step 2 in 2/33 patients. Group 2: 24 patients, (mean age 53,8: CRLM 20, other 4; 24 partial ALPPS, no mobilization technique, Morbidity >3a 16%, Mortality 0%. No step 2 in 4/24 patients < 1 operated and died after hepatic vein embolization, Overall Mortality 4,16%.

Conclusion
A clear shift in indication towards CRLM (<65y) and risk factor stratification (no heart disease) and technical improvements (reduction of trauma in Step1 with no mobilization technique, partial ALPPS) led to significantly lower morbidity. Careful indication for step 2 - omission of Step 2 with signs of liver failure (ISGLS criteria) or non optimal growth led to no more mortality accepting a dropout of 16% - a rate half the one reported for PVE. New promising tools like ALPPS risk score and HIDA scan are becoming available. In conclusion, ALPPS has evolved and become much safer in the new era.
Hydatid disease in South-Africa – Is it a different disease in patients with HIV co-infection?

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Background
Echinococcus granulosus remains a clinical problem in rural sheep-farming communities, with HIV co-infection often seen in patients from endemic regions.

Methods
Data from a prospective database was used to identify patients with and without HIV co-infection that underwent surgery for hepatic hydatid disease between 2012-2017. Clinical presentation, pre-operative intervention, surgical treatment, post-operative mortality and morbidity are reported according to the Accordion severity score.

Results
Twenty-two patients (18 women, 4 men, median age 38 years, range 19-71) underwent surgery, of whom 11 (50%) were HIV positive (HIV+). Two patients in each group that presented with jaundice underwent pre-operative biliary drainage (ERCP=3; PTC=1). Four patients (2 in each group) had intra-peritoneal rupture on imaging. Three patients (27%), all HIV+, needed emergency surgery. Two HIV+ patients were found to have secondary infected cysts. Peri-cystectomy was performed in 20 patients and formal resection in 2. In 8 patients, 4 from each group, biliary communication could be identified intraoperatively. Postoperative complications occurred in 10 patients, 5 in each group of which 9 were severe. Two post-operative deaths occurred, one in each group.

Conclusion
Fifty percent of patients with hydatid disease in our service are co-infected with HIV. HIV+ patients more often had infected cysts and more frequently required emergency surgery.
If you want to know the best anesthetic plan for liver surgery, just ask the patient: Comparative assessment of 174 patient-reported outcomes.

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Background
This study utilized patient-reported outcomes to determine the optimal perioperative care strategy for hepatectomy patients.

Methods
174 patients with liver malignancy were administered a validated PRO tool before and after hepatectomy to assess symptom scores and life interference. Median age was 56 years, 54% were male, and 94% were ASA score ³3. 51 patients had 2-4 liver segments resected and 51 patients were operated with a minimally-invasive approach. Anesthetic approaches included epidural (54%), TAP block (36%), non-narcotic intraoperative IV analgesia (21%) and enhanced recovery protocol (ERP, 123 pts, 71%), consisting of non-narcotic oral analgesia, early feeding and early ambulation.

Results
Median LOS was 5 days, with 11 patients (6%) experiencing major complications. Within 90 days of surgery, 3 were readmitted and there were no mortalities. In multivariate analysis, return to baseline for core symptoms was associated with LOS<6 days (OR:2.78, p=0.004) and absence of complications (OR:2.63, p=0.007), return of GI function was only associated with smaller magnitude of surgery (OR:5.1, p=0.001), and return to overall functional status was associated with absence of complications (OR:2.32, p=0.03) and ERP-directed care (OR:2.29, p=0.04).

Conclusion
Independent of surgical approach and perioperative anesthetic technique, patients report that the strongest modifiable predictor of rapid return to normal function after hepatectomy is use of an enhanced recovery protocol.
Impact of modern chemotherapy before hepatectomy – assessment of hepatocytes function and viability via SPECT-scintigraphy and hepatocytes isolation

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Background
Chemotherapy is increasingly used prior to resection of colorectal liver metastases. We assessed the capacity of ⁹⁹mTc-labelled-mebrofenin SPECT-hepatobiliary scintigraphy (HBS) to predict chemotherapy-associated liver injuries (CALI). In parallel, we analyzed the hepatocyte isolation outcome to elucidate the mechanisms of alteration of liver function.

Methods
From 2011 to 2015, 115 noncirrhotic patients undergoing hepatectomy gave informed consent for preoperative HBS (NCT 02753517), allowing measurements of intrinsic liver function. In parallel, since 2006 hepatocytes viability and yield were analyzed via liver tissues obtained from 164 fully-consenting patients undergoing hepatectomy. Patients were compared according to neoadjuvant chemotherapy and CALI, mainly sinusoidal obstruction syndrome (SOS) and non-alcoholic steatohepatitis activity score (NAS).

Results
In 115 patients, 40% had neoadjuvant chemotherapy and 96% a major hepatectomy. Overall, neoadjuvant chemotherapy had no impact on liver function (except when ≥12 cures), nor hepatocytes isolation. Regarding CALI, NAS significantly impaired the FRL function, cell viability and yield for NAS 2-5, whereas SOS had no impact. Chemotherapy-treated patients with marked SOS and/or NAS (≥2) showed higher rates of morbidity.

Conclusion
Neoadjuvant chemotherapy affected directly hepatocytes in case of NAS with subsequently-impaired liver function, in contrast to SOS involving mainly non-hepatocellular cells with deleterious portal hypertension.
Impact of R1 resection for colorectal liver metastases on local recurrence in the era of modern chemotherapy. Analysis on 1428 resection areas

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Background
Recently some papers showed that R1 resection, together with advances in modern chemotherapy (CT) was associated with similar long-term results to that following R0 resection. Aim of our study was to clarify the impact of R1 resection on local recurrence in patients treated by modern CT.

Methods
Between 2000 and 2014, 630 patients underwent resection for CRLM at our Unit. Of these, 421 underwent preoperative CT and they are the object of our study.

Results
Rate of R1 resection was 26.1%. Local recurrence rate was 12.8% and it was significantly higher after R1 resection than that after R0 resection (24.5%, vs. 8.7%, respectively; p<0.001). At multivariate analysis R1 resection was the only independent risk factor for local recurrence, after preoperative CT (p<0.001). Response to CT was not a protective factor for local recurrence (p=0.519). At the analysis of the 1428 resection areas, rate of local recurrence was significantly higher following R1 resection than that following R0 resection (7.8%, vs. 5.2%, respectively; p=0.004). The 5-year overall survival rate of patients with local recurrence was 36.4%, significantly lower than that of patients without recurrence (54.8%, p=0.036).

Conclusion
R1 resection for CRLM in patients treated by modern CT was associated with significantly higher risk of local recurrence than that of R0 resection, also in patients who showed a response to CT. R0 resection should be considered as the best treatment choice for CRLM also after modern CT.
Impact of the implementation of ERAS program in complex liver resections: a propensity score-based analysis between open and laparoscopic approach

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Background
Modern laparoscopic liver surgery has evolved to encompassing complex procedures. Accordingly, even patients management has improved, within fast-track programs. Aim of the present study was to evaluate the impact of fast-track approach in patients undergoing complex laparoscopic procedures and to analyse factors with influence on morbidity and functional recovery.

Methods
Resections (September 2014 - September 2016) were stratified according to difficulty score: a group of 215 complex resections was obtained (102 laparoscopic and 163 open). The laparoscopic group was matched (1:1 ratio) with open patients to obtain the Lap-group (n=102) and the Open-group, (n=102). Propensity scores were used to achieved the matching using covariates that were representative of patients and disease characteristics.

Results
Postoperative morbidity was 31.4% in the LPS and 38.2% in the Open group (p=0.05) and functional recovery was shorter in the LPS (p=0.041). Adherence to fast-track protocol was high in both groups, with several items with a higher penetrance in the LPS group. Laparoscopic approach and strict adherence to fast-track protocol resulted protective factors.

Conclusion
The combination of minimally invasive approaches and fast-track protocols allows to obtain reduced rate of postoperative morbidity and satisfactory functional recovery even in the setting of complex liver resections.
Impact of the Width of Resection Margin from Colorectal Liver Metastasis on Post-Operative Survival and Recurrence

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Background
Treatment for colorectal liver metastasis (CRLM) involves sparing liver parenchyma surgical techniques. Hence, the impact of subcentimetric resection margins (RM) needs to be investigated.

Methods
682 patients were analysed from 2005 to 2015. They were allocated in four groups according with the width of RM: <1 mm (R1 resection), ≥1mm-4mm, 5-9mm and ≥10mm.

Results
Survival rate was 66.3% in a follow up period of 20.58 months. Survival rates (p=0.027) and overall survival (p=0.001) increased steadily with the increment of width in RM. The disease and liver recurrence rates were 57.3% and 36.1%, respectively, both higher for groups with narrower RM (p<0.001). R1 resection was an independent risk factor for mortality (HR:23.73; p=0.008), hepatic recurrence (HR:1.265; p=0.015) and R0 resection protective for disease recurrence (HR:0.836; p=0.009). Lack of adjuvant chemotherapy following CRLM resection was a risk factor for hepatic (HR:1.229; p=0.003) and disease recurrence (HR:1.143; p=0.013). Although, adjuvant chemotherapy isolated was a protective factor for mortality (HR:0.276; p=0.004) in synchronous presentation, this was not significant for the subgroup with R1 resection (p=0.392) or metachronous disease.

Conclusion
Survival and recurrence were progressively affected with larger subcentimetric histological margins. Adjuvant chemotherapy brought benefits but not for all subgroups, reinforcing the importance of a histologically free RM and a target of 10mm, even in the era of modern treatments.
Incidence and management of post-operative bile leaks. A prospective cohort analysis of 467 liver resections

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Background
This study benchmarked the incidence and identified risk factors for postoperative bile leakage after hepatic resection.

Methods
A prospective database of 467 consecutive liver resections was analysed. Bile leak and post-operative complications severity were graded using the International Study Group of Liver Surgery and Accordion classifications.

Results
Bile leaks occurred in 25 (5.4%) patients and significantly more in patients who had major resections (≥3 segments) and longer total operative times (p<0.05). 5 grade A bile leaks stopped spontaneously and 17 grade B leaks required a combination of percutaneous drainage (n=15), endoscopic biliary stenting (n=8), and PTC drainage (n=3). All 3 grade C leaks required laparotomy for definitive drainage. Median hospital stay in the 442 patients without a bile leak was 8 days (IQR 1-98) compared with 12 days (IQR 6-30) for the 25 with bile leaks (p<0.05) with no mortality. Major resections (≥3 segments) and total operative time were significantly associated with bile leaks.

Conclusion
The Incidence of bile leakage was 5.4 % and occurred after complex or major liver resections with long operative times and resulted in significantly longer hospitalisation. Most were effectively treated non-operatively by percutaneous or endoscopic biliary drainage and did not lead to death.
Liver surgery: Clinical
P49.06

Indices of lipid peroxidation and antioxidant protection after using argon plasma coagulation and monopolar cautery in patients with liver hemangiomas

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Background
Maximum preservation of functioning parenchyma is one of the most important areas of surgery of the liver hemangiomas. The aim was to investigate the indices of lipid peroxidation and antioxidant protection in patients who underwent operative treatment.

Methods
Laparoscopic surgeries using argon plasma coagulation (APC) were performed in 25, and using monopolar cautery (MPC) – in 21 patients. In the pre–postoperative periods we assessed levels of malondialdehyde (MDA), ceruloplasmin (CP), transferrin (TF), CP/TF.

Results
Using of MPC was accompanied by a pronounced positive dynamics of the studied indices – the content of MDA decreased in comparison with that before treatment by 27.5%, the content of CP increased by 66.4%, and the content of TF practically unchanged and remained lower than normal. Coefficient of CP/TF increased in comparison with its value before treatment by 64.6%.
Under the influence of using APC, MDA level decreased by 34.8% in comparison with that before treatment. The content of CP and TF increased respectively by 77.4 and 24.8%, the index of CP/TF also increased by 40.4%. Besides, the level of TF was higher than that in the group of patients who underwent MPC by 26.8%. It should be noted that all the studied indices did not differ from normal.

Conclusion
Under the condition of liver hemangiomas resection using APC in comparison with MPC we can see the improvement of laboratory indices of lipid peroxidation and antioxidant protection.
Individualized risk estimation for postoperative morbidity after hepatectomy: The Humanitas score.

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Background
Estimation of morbidity after hepatectomy is challenging. The aim of this study was to develop a surgical score to predict an individual's risk of complications.

Methods
We included all patients scheduled for hepatectomy from 2012 to 2015. Patients were randomly assigned into a derivation or validation cohort. We developed a score based on preoperative variables using ROC analyses to identify cut-off values, then testing the variables using multivariate analyses. The significant independent variables were used to build the score. Analyses were performed following the TRIPOD statement.

Results
340 patients were included, 240 in the derivation cohort and 100 in the validation cohort. ROC analysis identified patients with liver stiffness ≥9.7 kPa (AUC=0.728, Se=88.9%, Sp=67.3%; P=0.031) and steatosis ≥250 dB/m/MHz (AUC=0.656, Se=80%,Sp=60%; P=0.045) as those at greater risk of complications. Multivariate analysis showed that major hepatectomy (OR=2.01; P=0.001), stiffness ≥9.7 kPa (OR=2.8; P=0.001), BILCHE score ≥2 (OR=3; P=0.001) and presence of esophageal varices (OR=1.98; P=0.002) were independent predictors of complications. A 10-point scoring system was introduced. Patients with ≤4 points did not experience complications, whereas patients with ≥7 experienced up to 46% of complications (P<0.001).

Conclusion
A simple and clinically reliable surgical score based on stiffness, BILCHE score, type of hepatectomy and presence of varices was developed, which may be used to predict morbidity after hepatectomy.
Intention to treat Laparoscopic versus Open Hemihepatectomy: A pair-matched case-control study.

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Background
This study aims to explore potential early postoperative (PO) benefits from a laparoscopic hemihepatectomy (LH).

Methods
Each “Intention-to-treat LH between 08/2012 and 10/2015, was pair matched with an open case using graded criteria, including bio-physiological features and laterality of surgery. Measured outcomes (blinded during the matching process) were intraoperative (IO) and overall blood loss (BL), operative time (OT), length of hospital stay (LOS) and high level care (HLC), morbidity (Clavien-Dindo classification), mortality and surgical margins.

Results
40 patients from the laparoscopic group (LG) were matched with 40 open cases (OG). In both groups, 10 patients had left and 30 right HH. 6 cases in the LG were converted to open. Median hospital and high level care stay was significantly less in the completed LG; 6 vs 8 days, p=0.025 and 1 vs. 2, p=0.024, respectively. Median OT was longer in the LG- (420 vs. 305min, p<0.001). Intraoperative blood was similar. Total blood transfusions (BT) were higher in the LG (50 vs 29 units). In the completed LG, BT were less than in the OG (13 vs 26, p=0.29). Overall complication rate was similar between both groups: 22 vs. 24 patients. One patient died in each group. R1 resections were similar (6 vs 7 cases).

Conclusion
Laparoscopic HH can reduce hospital stay at the expense of a longer operating time. However, overall morbidity, mortality, and resection margin status was similar between both groups.
Interdisciplinary Approach in Treatment of Primary Unresectable Liver Metastases of Colorectal Cancer: 8.5 Years Follow-up

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Background
The aim of the study was to explore the effectiveness of the interdisciplinary approach in the treatment of primary unresectable liver metastasis of colorectal cancer (mCRC).

Methods
Treatment results of 192 patients with mCRC were included in the retrospective analysis. Strategy of treatment were developed due to the interdisciplinary approach of oncosurgery, medical oncologist and intervention radiologist. Patients characteristics: mean age 55.9 ± 12.2 years, primary tumors - colon/rectum 149/43, number of metastases 5.1 ± 2.8. All patients underwent neoadjuvant chemotherapy (FOLFOX, FOLFIRI) 3-9 course (an average 4 courses), 11 patients additionally intra-arterial chemoembolization (an average 2 courses), 97 (50.5 %) patients liver resection combined with RFA, 11 (5.7 %) patients - two-stage hepatectomy.

Results
Tumor response after a first-line chemotherapy gave possibility to perform a resection in 154 (80.2 %) of patients, 38 (19.8 %) had held the second line chemotherapy, which was combined with embolization in 14 (7.3 %) patients.
3-, 5- and 8.5-year survival rates were 51%, 36.2 % and 26.3%, respectively. The median survival was 47 months. Median follow-up was 51.6 months (12-90).

Conclusion
The interdisciplinary approach in treatment of primary unresectable hepatic colorectal cancer metastases increased the 8.5-year survival rate till 26.3%.
International survey on resection margin for colorectal metastases in laparoscopic and open liver surgery

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Background
Consensus on the optimal resection margin for colorectal liver metastases, especially in laparoscopic surgery, is still being assessed. We investigated the opinion of international liver surgeons on resection margin for colorectal liver metastases and the influence of open or laparoscopic surgery.

Methods
A 14-question survey was sent to liver surgeons of the International and European-African Hepato-Pancreato-Biliary Associations and the Association of Upper Gastrointestinal Surgeons between April and October 2016. Incomplete responses were excluded.

Results
One hundred and thirty responses from 31 countries were included. Most surgeons (73%) perform <50 liver resections per year. Twenty-five percent of surgeons believe that the ideal resection margin is not well established yet. The ideal resection margin was believed to be “no tumor cells at the margin” in 32% of surgeons, “more than 1 mm tumor-free margin” in 41% of surgeons, “more than 5 mm tumor-free margin” in 14% of surgeons and “more than 1 cm tumor-free margin” in 13% of surgeons. Ninety percent of surgeons (117/130) think that an open approach is better in achieving a R0 resection than a laparoscopic approach.

Conclusion
Continuing debate exists regarding the most optimal resection margin for colorectal liver metastases. Concerning the type of surgical approach, the majority of surgeons believe that open surgery is better in achieving tumor-free margins.
Interstage Assessment of Remnant Liver Function in ALPPS using Hepatobiliary Scintigraphy: Introduction of The HIBA Index

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Background
ALPPS remains controversial given the high rate of liver-related mortality after stage-2. Hepatobiliary scintigraphy (HBS) combined with single photon emission computed tomography (SPECT) could accurately estimate future liver remnant (FLR) function. Our aim was to evaluate interstage liver function in ALPPS using HBS and whether this may help to predict posthepatectomy liver failure (PHLF).

Methods
Between 2011 and 2016, 20/39 patients (51.3%) underwent SPECT-HBS before ALPPS stage-2 for primary (n=3) or secondary liver tumors (n=17). PHLF was defined by the International Study Group of Liver Surgery (ISGLS) criteria, 50-50 criteria or peak bilirubin >7 mg/dl. Grade A PHLF was excluded, as it requires no change in clinical management. Different HBS parameters were evaluated.

Results
Interstegaly, 3 HBS parameters differed significantly between patients with (n=4) and without PHLF (n=16) after stage-2. Among these, the HIBA-index best predicted PHLF, with a cutoff value of 15%. The risk of PHLF in patients with HIBA-index<15% was 80%, whereas no patient with HIBA-index ≥15% developed PHLF.

Conclusion
Interstage HBS could help to predict clinically significant PHLF after ALPPS stage-2. An HIBA-index cutoff of 15% seemed to give the best diagnostic performance. While further studies are needed to confirm our findings, the routine application of this non-invasive low-cost exam could facilitate decision-making in institutions performing ALPPS.
Intrahepatic Cholangiocarcinoma: Outcome and Prognosis - a single center experience

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Background
The incidence of intrahepatic cholangiocarcinoma (ICC) has doubled over the past 30 years in the western world. Due to oligosymptomatic growth, diagnosis is often delayed. Survival is poor and non surgical treatment options are limited. Prognostic factors are needed in order to select good surgical candidates.

Methods
Patients undergoing curative liver resection for ICC from 2001-2015 were identified. Patients with hilar or distal cholangiocarcinoma were excluded. Outcome and prognostic factors were assessed.

Results
54% were male, median age was 65 years (range 33-83). 81% underwent major hepatectomy (hemihepatectomy or >4 segments). 29% had multicentric tumors. In 56% the tumor diameter was > 60mm. R0 resection was obtained in 77 %. Median follow up was 1.8 years (0-8.8). 5-year overall survival was 26 % (median survival 2.8 years). In univariate analysis survival was influenced by resection margin, nodal status, tumor grading, number of tumors (one vs > one), T stage and presence of (intrahepatic) metastases (all p <0.01). Multivariate analysis showed worse survival for nodal positive tumors (p<0.02, HR 2.7 (CI 1.2-6.2)), (intrahepatic) metastases (p< 0.22, HR 3.3 (CI 1.2-9.1)) and T stage >2 (p<0.16 HR 2.4 (CI 1.2-4.8)).

Conclusion
Poorly differentiated multicentric ICC with positive nodes had a very poor prognosis, even after complete resection. However, following standard surgical criteria of resectability, an attempt to surgical treatment should always be made.
Intrahepatic Glissonian approach for single-port laparoscopic left lateral sectionectomy

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Background
In the last few years, a novel technique using single-incision laparoscopic approach has been described. There are few reports on single-port liver resection in the literature. The aim of this video is to present a single-port laparoscopic left lateral sectionectomy with intrahepatic Glissonian approach.

Methods
A 27 year-old woman with a 6-cm hepatocellular adenoma is referred for surgical treatment. Liver resection is advised and a single-port laparoscopic liver resection using intrahepatic Glissonian approach is proposed. The patient was informed about the advantages and risks of the technique, and she gave consent for its use. A transumbilical incision is performed, and a single-incision platform is introduced. The operation begins with ultrasound examination of the liver. Intrahepatic Glissonian access of the portal pedicle from segments 2 and 3 is performed, and the pedicle is divided with a stapler. The liver is transected, and the left hepatic vein is divided with a stapler. A surgical specimen is retrieved through the single umbilical incision. No drains are left in place.

Results
Operative time was 90 minutes and there was minimal bleeding. Recovery was uneventful and patient was discharged on the first postoperative day. Final pathology showed hepatocellular adenoma with no signs of malignancy.

Conclusion
Single-port laparoscopic left lateral sectionectomy is feasible and can be safely performed in specialized centers. Intrahepatic approach is a useful tool to control the Glissonian pedicle.
Liver surgery: Clinical
P31.03

Intrahepatic splenosis mimicking hepatocellular carcinoma in a patient with non-alcoholic fatty liver disease: a case report

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Background
Hepatic splenosis is a rare condition, preceded by splenectomy or spleen trauma, it refers to nodular implantation of normal splenic tissue in the liver. In patients with risk factors of liver cirrhosis, this can be mistaken as development of early hepatocellular carcinoma (HCC) and can lead to unnecessary diagnostic procedures or surgical interventions. We present a case of intrahepatic splenosis (IHS) resembling HCC.

Methods
A 65 year old male with background of trauma related splenectomy was undergoing evaluation for transaminitis secondary to non-alcoholic fatty liver disease. Magnetic Resonance Imaging of liver showed a 1x0.9cm hypervascular nodule in segment 2 of liver with arterial enhancement without definite washout and a defect on 1-hour hepatobiliary phase that is suggestive of HCC. The patient was counselled and subsequently underwent 3D laparoscopic left lateral sectionectomy.

Results
Histopathological examination showed a circumscribed, red-brown sub-capsular nodule. The nodule contained accessory splenic tissue, suggesting the diagnosis of IHS.

Conclusion
IHS mimics HCC on imaging and should be considered as a differential diagnosis when a history of splenic trauma or splenectomy is present. Additionally, risk factors for HCC warrant consideration, and if absent, IHS should be considered as a differential. Laparoscopic liver resection can be performed with minimal morbidity and enables definitive diagnosis with histopathological examination and avoids the need for long term surveillance.
Intraoperative ultrasound staging for colorectal liver metastases in the era of liver-specific magnetic resonance imaging: is it still worthwhile?

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Background
To assess the efficacy of intraoperative ultrasound (IOUS) compared with liver-specific magnetic resonance imaging (MRI) in patients with colorectal liver metastases (CRLM).

Methods
From January 2010 to December 2015, 365 patients underwent MRI as a part of preoperative work-up within one month before hepatectomy and were considered for the study. Early intrahepatic recurrence was assessed at 6 months after the resection and was considered as residual disease undetected by IOUS and/or MRI. Performance of IOUS and MRI was compared on patients by patients analysis. Long term outcomes were also studied.

Results
A total of 1638 CRLM were detected by MRI. Preoperative chemotherapy was administered in 251 patients (68.8%). Intraoperatively 174 new nodules were found in 92 patients. Among 174 nodules newly identified, 151 were histologically proven CRLM (9.2% of entire series). Median size of new CRLM was 6±2.3mm. Preoperative surgical plan was intraoperatively changed in 77 patients (21%). Early intrahepatic recurrences were 15%. The sensitivity (88.2% vs 68.5%) and specificity (96.7% vs 96.4%) of IOUS were superior to MRI. Five-years overall survival (33.4% vs 51.8%, p=0.008) and 5-years disease free survival 22.4% vs 39.2%, p=0.004) were significantly worse in patients with new CRLM than without.

Conclusion
IOUS improves staging in patients undergoing resection for CRLM even in the era of liver specific MRI. Intraoperative detection of new CRLM negatively affects long term outcomes.
Is laparoscopic resection for lesions in the posterior segment better than open surgery?

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Background
Recently, the left decubitus position and the semiprone position makes lesion in liver posterior segments to anterolateral, which facilitate the liver resection in laparoscopic setting. The advantage of laparoscopic liver resection (lap LR) to the open procedure was analysed in authors institute.

Methods
A retrospective analysis of patients undergoing liver resection from 2014 to 2016 was performed. Patients with only lesions in the posterior segments and received curative resection were identified for the study. The patient demography, operative procedure, preoperative imaging study, and postoperative morbidity, length of hospital stay (LOS) were compared between open and lap LR group.

Results
Among more than 300 liver resection, 27 patients with lesions only at the posterior segments were identified. The procedure ranged from wedge resection to anatomic bisegmentectomy. 18 patients underwent open liver resection (open LR) while 9 patients underwent pure lap LR without transdiaphragm trocar. Child A liver cirrhosis was found in 4 patients from open LR group and 3 from the lap LR group. The postoperative morbidity was found in 9/18 (50%) of open LR group and 2/9 (22%) in lap LR group. The LOS was 10.5 days (range, 7 to 28) in open LR group and 8 days (range, 5 to 15) in lap LR group.

Conclusion
Lap LR for lesion in posterior segment tended to have shorter LOS and less postoperative complication in comparison to the open procedure.
Liver surgery: Clinical
P26.06

Is there any differences in outcome of synchronous liver resection for colorectal metastases stratified by type of colorectal resection?

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Background
The optimal surgical strategy for treating colorectal cancer with synchronous liver metastases is controversial. We aimed to evaluate the outcomes of simultaneous colorectal cancer and liver metastases resection in a single center.

Methods
The prospectively collected data of all cases with synchronous colorectal liver metastases received simultaneous resection with curative intent were analysed retrospectively.

Results
Between January 2005 and October 2016, 114 patients underwent simultaneous resection of primary colorectal cancer and liver metastases. Tumor was localized in right side in 26 (22%), left side in 42 (37%) and rectal in 46 (41%) patients. Perioperative mortality was in 3 (2.6%) patients from the all cohort. Postoperative complications was observed in 32 (28%) patients and the majority of them (75%) were grade 1 to 3 according to Clavien-Dindo classification. Neither Perioperative mortality nor postoperative complications rates after simulatanous resection were different among the groups of right colon, left colon and rectal cancer (4%, 2.5% and 2% respectively; p: 0.89) and (17%, 33% and 34%respectively; p: 0.29)]. 5 year overall survival of the whole cohort was 54% and 3 years overall survival was 67%.

Conclusion
Simultaneous resection for primary colorectal cancer and liver metastases is a safe procedure, and can be carried out without excess morbidity in carefully selected patients; regardless of the location of the primary tumors and type of hepatectomy.
Is there still a place for cholangiocarcinoma in the ALPPS?

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Background
Although the first case of ALPPS was successfully performed in a patient with phCCA, due to the high morbidity and mortality CCA is often considered a relative contraindication to ALPPS.

Methods
We retrospectively analyzed our single center experience on the use of ALPPS for Cholangiocarcinoma focusing on postoperative complications, patient survival and tumor recurrence.

Results
Between November 2010 and November 2016 we performed 21 ALPPS for suspected cholangiocarcinoma (6 phCCA, 11 iCCA, 2 Gallbladder carcinoma (GBCA) and 2 Klatskin-mimicking IPN) with a feasibility of 100%. Median age was 70 years. BDA was performed in 17 patients (5 phCCA, 9 iCCA, 2 GBCA and 1 IPN). T-Tube was used in 1 iCCA and 1 GBCA at Stage 1. A R0 status was reached in 15 patients (4 phCCA, 7 iCCA, 2 GBCA, 2 IPN). Morbidity was 100% for phCCA, 82% for iCCA, 100% for GBCA, 33% for IPN. The postoperative mortality rate was 50% for phCCA, 18% iCCA, 0% GBCA and IPN. ASA-Score 3, preoperative stent, Liver fibrosis, PHLF≥B after Stage 2 were identified as independent risk factors for postoperative mortality. The overall disease-free survival at 1 year was 67% for phCCA, 43% for iCCA. 1 iCCA died after recurrence. The 3y OS was 50% for phCCA and 67% for iCCA, but excluding the postoperative death was 100% for phCCA and 90% for iCCA.

Conclusion
Despite a high morbidity, with a precise patient selection mortality can be avoided and ALPPS can be used with intention to treat also for cholangiocarcinoma.
Is Tumor Detachment from Vascular Structures a Technical Option for Intrahepatic Cholangiocarcinoma?

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Background
R0 resection is the standard for mass-forming cholangiocarcinoma (MFCCC). A recent study validated the possibility to detach colorectal liver metastases from a vessel (R1vasc). R1vasc had outcome equivalent to R0 and superior to tumor exposure along the transection plane (R1par). To investigate the outcome of R1vasc resections for MFCCC.

Methods
All patients undergoing resection between 2008 and 2015 were considered. MFCCC detachment from major vessels (1st/2nd order Glissonian pedicles & hepatic veins) was systematically performed. R0, R1par, and R1vasc were compared in per-patient and per-resection area analyses.

Results
The study included 80 resection areas in 55 patients. 16 (20%) resections in 14 (25%) patients were R1vasc; 19 (24%) resections in 14 (25%) patients were R1par. Ten (13%) local recurrences occurred in 8 (15%) patients. R1vasc group had a local recurrence risk similar to R1par group (per-patient analysis 21.4% vs. 28.6%; per-resection area analysis 18.8% vs. 26.3%), higher than R0 group (3.7% - 4.4%, p=0.063 - p=0.018). R1vasc and R1par groups had similar overall and recurrence-free survival (median OS 29.3 vs. 29.7 months; RFS 10.4 vs. 8.3 months), lower than R0 group (70.3 and 39.3 months, p=0.062 - p=0.017).

Conclusion
In MFCCC patients, R1vasc resection is not an adequate treatment. Local disease control and survival after R1vasc resection are lower than after R0 resection. R1vasc resection should be exclusively adopted to achieve resectability in the otherwise unresectable patients.
Liver surgery: Clinical
V1.04

Laparoscopic ALPPS procedure for large hepatocellular carcinoma

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Background
ALPPS procedure has been a vital alternative strategy for avoiding post-hepatectomy liver failure (PLF) in extended liver resections over the last decade. Here we aim to share our experience with laparoscopic approach to ALPPS procedure in a patient with large HCC.

Methods
A 55 y.o. male patient weighting 68 kg presented with a 22 cm. huge right hemiliver mass extending into the liver segment IV. He was diagnosed with HCC and Hepatitis-B related Child A chronic liver disease. As there was a limited time before progress to unresectability, we decided utilization of ALPPS procedure.

Results
The patient underwent laparoscopic ALPPS procedure as the first step. The right portal vein was ligated and the parenchymal transection was performed between liver segment IV and the left lateral section. The first step was completed within 4 hours with 150 ml estimated blood loss. The recovery period was uneventful. CT scan obtained on POD #9 revealed a 25% growth of the future liver remnant, resulting in a volume increase from 620 ml to 775 ml. The second step was undertaken conventionally on POD 11 with minimal blood loss. The patient was developed a grade A PLF and required medical management of ascites for a month. He was discharged home POD 18 with an abdominal drain.

Conclusion
Laparoscopic approach may offer significant benefits in patients undergoing ALPPS procedure with its potential to reduce the risk of wound related complications, which may complicate and induce post-hepatectomy liver failure.
Laparoscopic caudate lobe resection for hepatocellular carcinoma in cirrhosis

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Background
The caudate lobe is located in the dorsal area of the liver in front of the inferior vena cava and behind the hepatic veins and the portal triad. For these reasons anatomical caudate lobe resection is still rarely performed with laparoscopic approach.

Methods
the video shows the clinical case of a 77 years-old male with a unifocal hepatocellular carcinoma (HCC) of 5cm of the caudate lobe, in well compensated liver cirrhosis (C-P A5). Laparoscopic caudate lobectomy was performed.

Results
The video describes the technique of resection including the segmental portal braches ligation and complete mobilization of caudate lobe from the cava vein. The patient was discharged on 6th postoperative day without any complications. The pathology report confirmed the diagnosis of hepatocellular carcinoma and negative resection margin.

Conclusion
Laparoscopic anatomical caudate lobe resection is feasible and could be performed safety in selected patients.
Liver surgery: Clinical
FP16.04

Laparoscopic Glissonian approach is safe and efficient when compared to standard laparoscopic liver resection

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Background
Standard laparoscopic anatomical liver resection requires the dissection the hilar plate. In contrast, the Glissonian approach identifies the intrahepatic pedicles by tentative clamping. This study examines experience in a single center with regards to safety and efficacy.

Methods
All consecutive patients undergoing laparoscopic liver resections from April 2007 to April 2014 were included. A comparison between Glissonian and standard laparoscopic liver resections was performed. Primary endpoint was safety of the procedures as assessed by the comprehensive complication index. Secondary endpoints were surgical parameters such as operating time, blood loss, blood transfusion, conversion rate, length of hospitalization, and pathological margin of the specimen.

Results
234 laparoscopic resections were performed at our institution, 120 using the conventional approach and 114 using the Glissonian approach. There was no difference in age, gender, tumor types, comorbidities, between the groups. The number of major liver resections was higher in the Glissonian group. There were fewer complications in the Glissonian group as compared to the standard group (p<0.05). Operative time was longer and more transfusions were given in the standard group and more patients had positive margins (p<0.01). Overall hospital stay was shorter in Glissonian group.

Conclusion
In the 7 year experience of a single center, the Glissonian approach is not less safe and may have advantages when compared to the standard laparoscopic approach.
Laparoscopic hemihepatectomy – benefits of hand-assisted and hybrid techniques

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Background
Right and left hemihepatectomy are routinely performed minimally invasive by experienced hepatobiliary centers. Surgical approaches include conventional multiport laparoscopy, hand-assisted laparoscopy and hybrid techniques. However, the superiority of one approach over the others remains speculative.

Methods
Both right and left hemihepatectomy are routinely performed minimally invasive at our center. We here report on our experiences made with conventional multiport laparoscopy, hand-assisted laparoscopy and hybrid techniques for major liver resection.

Results
Fifty percent of all minimally invasive hemihepatectomies were performed in conventional multiport technique. However, distinct benefits for hand-assisted and hybrid techniques have been noted and include 1) haptic detection (additional to laparoscopic ultrasound) of vanishing lesions, 2) oncologically safe dissection of tumors with a close proximity to the hepatocaval confluence, 3) additional safety in case of bleeding (and air embolism) by manual compression and hand-assisted suture, 4) the possibility of extended lymphadenectomy in hybrid technique, 5) convenient and less time-consuming retrieval of the specimen over the hand port and 6) teaching clinical fellows to perform complex liver resections.

Conclusion
We will systemically report on benefits of hand-assisted and hybrid techniques over conventional multiport laparoscopy for right and left hemihepatectomy.
Laparoscopic Left Hepatectomy for Mucinous Cystic Neoplasm of the Liver

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Background
Mucinous Cystic Neoplasm of the liver (MCN-L) constitutes a challenging issue in terms of management: preoperative diagnosis is often unachievable and this may mislead to the wrong choice of treatment. We present the case of a healthy 29 year-old female who underwent in another institution laparotomic cyst unroofing in segment 4 and cholecystectomy. Short term follow up showed early recurrence with volumetric enlargement of the cyst occupying the left hepatic lobe and new satellite cyst in Sg5. The doubt of MCN-L arose, and the patient was scheduled for a laparoscopic treatment.

Methods
Four ports were placed under direct vision. A long adhesiolysis was performed and Pringle’s manoeuver was settled. The cyst on Sg5 was resected first and frozen section was suspicious for MCN-L. In order to prevent a recurrence, a left laparoscopic hepatectomy was performed.

Results
Postoperative course was uneventful and the patient was discharged on POD 5. Pathology confirmed the diagnosis of MCN-L.

Conclusion
Hepatic cystic lesions may be insidious and preoperative biopsy is not always possible due to lack of solid tissue. In unclear settings, an intraoperative frozen section is mandatory to guide intraoperative decisions. In the suspicion of MCN-L, resection with oncologic criteria is the most appropriate treatment to avoid early recurrence. Despite of previous laparotomy, we consider laparoscopic approach could be attempted in selected cases, in institution with particular expertise in laparoscopic liver surgery.
Liver surgery: Clinical
P8.07

Laparoscopic left lateral liver resection is a safe procedure in cirrhotic patients

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Background
Patients suffering from liver cirrhosis have a higher risk for postoperative liver failure and other complications.

Methods
We retrospectively analyzed the postoperative course of all consecutive patients undergoing laparoscopic left lateral liver resection between July 2009 and September 2016 in our center and compared patients suffering from Child A liver cirrhosis with non-cirrhotic patients.

Results
Five of 31 patients suffered from Child A cirrhosis at the time of resection. 8 patients were excluded due to multivisceral resections. Cirrhotic patients were significantly more often male (p=0.027) and significantly older (median 75 years vs. 48 years; p=0.009) compared to non-cirrhotic patients. Length of operation was not significantly different in both groups (non-cirrhotic: median 193 min. vs. non cirrhotic: median 222 min.; p=0.752). While five non-cirrhotic patients (19.2%) had a postoperative complication (grade II (n=3), grade 3a (n=1), grade IIIb (n=1), no complications were observed in the cirrhotic group. No morbidity was observed in neither of the groups. Length of stay did not significantly differ between the two groups (median 6 days vs. median 7 days; p=0.129).

Conclusion
Laparoscopic left lateral liver resection is feasible and safe in patients suffering from Child A liver cirrhosis. Although patients in this group were significantly older compared to non cirrhotic patients, the length of operation, postoperative morbidity and length of hospital stay did not significantly differ.
Laparoscopic left lateral section resection for hydatid cyst of the liver

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Background
Hydatid cyst of the liver is still a relatively common problem in endemic regions. Surgery is one of the most effective way of treatment, and it can be performed using both open and laparoscopic routes. Here, we are presenting a video showing left lateral section resection performed for hydatid liver disease.

Methods
A 42-year old male patient was admitted to clinic complaining with abdominal pain. Physical examination was normal. His bilirubin levels were slightly high. Abdominal ultrasonography, contrast enhanced abdominal computed tomography revealed a 10 cm, partially exofitic cyst, localized in left lateral section of the liver, reported as hydatid cyst. An ERCP was performed. There was a communication between the left lateral biliary ducts and the cyst. Sphincterotomy was performed. Laparoscopic left lateral sectionectomy was decided. Abdominal exploration was performed using a supraumbilical 10 mm port. After hilar dissection and mobilization of the left lateral section, transection line was marked using hook cautery just lateral to the falciform ligament. Paranchymal transection was performed using, bipolar vessel sealing and bipolar radiofrequency ablation devices, clips and endoscopic staplers.

Results
Operative time was 70 minutes and estimated blood loss was 100 ml. Postoperative period was uneventful and the patient was discharged on postoperative second day.

Conclusion
Laparoscopic surgery is a feasible treatment option depending on the localization and type of the liver hydatid cyst.
Liver surgery: Clinical  
EP6.03

**Laparoscopic left liver resections and right portal vein ligation: first step of two stage hepatectomy for colorectal liver metastases**

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**Background**

Hepatic resection is the treatment of choice for patients with colorectal liver metastases but 75-85% of patients are unresectable at diagnosis. Many patients with multiple bilobar metastases are not eligible for surgery because of the small future remnant liver (FRL). Patients with impaired hepatic function (as after prolonged chemotherapy) and scheduled for extended hepatectomy are at greater risk of liver failure.

**Methods**

Two stage hepatectomy (TSH) is a strategy designed to increase the number of patients who may benefit from liver surgery while reducing the risk of postoperative liver failure. In selected patients this technique can be entirely performed in laparoscopy.

**Results**

The video shows the case of a patient with 3 liver metastases scheduled for a laparoscopic right hepatectomy and atypical resection of segment 4a, after neoadjuvant chemotherapy. Intraoperative ultrasound discovers a new lesion in segment 3 that requires an additional wide resection. Taking into account the FRL of the former scheduled resection of 39%, surgical strategy was changed in a TSH. The video shows the first stage of the procedure in which left liver is cleared with a segment 4a resection with exposure of left hepatic vein and a segment 3 subsegmentectomy. At the end of resection, right portal vein is dissected, and ligated after alcohol injection.

**Conclusion**

Left liver clearance and PVL can be performed safely laparoscopically.
Laparoscopic liver resection for hemorrhagic hepatocellular adenoma in a pregnant patient

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Background
Hepatocellular adenoma [HCA] is a benign neoplasm of the liver, however with a potential for life-threatening hemorrhage. The unpredictable course during pregnancy poses a clinical dilemma. Hemorrhage may lead to life-threatening situations with adverse outcome for mother and unborn child. Treatment of symptomatic HCA during pregnancy remains challenging. In literature, only 1 case of laparoscopic resection for this indication is described.

Methods
A 31-year-old pregnant patient presented with an acute episode of right upper abdomen pain. MR-imaging revealed a lesion of 9cm located in segment III with stigmata of recent hemorrhage. Considering the possibility of HCA, this lesion should be regarded as a hormone-sensitive, symptomatic lesion with a likely chance of rebleeding. At 18 weeks of gestation she underwent a laparoscopic left lateral sectionectomy.

Results
Surgery and postoperative recovery were uneventful. Patient was discharged at POD+6. At 40 weeks of gestation she went in spontaneous labour and delivered a healthy baby. Histological examination confirmed a HCA showing features of hemorrhage.

Conclusion
In the pregnant patient, a liver mass represents a significant diagnostic and therapeutic challenge. Anatomically favourable lesions can be safely managed with laparoscopic liver resection. We suggest that laparoscopic liver resection should be considered as part of the currently available strategies for HCA during pregnancy.
Laparoscopic liver resection for hepatocellular carcinoma: a Single Center experience of more than 100 cases.

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Background
Minimally invasive surgery has recently demonstrated results comparable to traditional surgery for recurrence-free or overall survival, even in cirrhotic patients. Laparoscopic liver resection (LLR) is gaining a central role for the treatment of hepatocellular carcinoma (HCC).

Objectives: The aim of our study is to analyze the evolution of traditional and minimally invasive liver resection for HCC in our Center since 2001.

Methods
We divided the cohort into two groups: Group 1, patients between 2001 and 2007 and Group 2 patients between 2008 and 2015.

Results
429 cases were included into this study. In group 1 we performed 42 major hepatectomies (25,3%) and 124 minor hepatectomies (74,7%). In group 2 we respectively performed 49 (19,6%) major hepatectomies and 214 (81,4%) minor hepatectomies. We had no difference between the two groups for major or minor surgery (p= 0.09). In group 1, 3% of patients and 44,5% in group 2 were treated by LLR. Nonetheless, of the 44,5% of laparoscopic resections in the second group only 1 major resection was performed.
We observed an improvement of morbidity between the two groups (p<0,001), and of mortality with 3,6% in group 1 versus no mortality in group 2.

Conclusion
The number of laparoscopic liver resection has increased since 2001. In our experience, the traditional surgical approach has still a place for the major resection in patients with HCC.
Liver surgery: Clinical
FP4.01

Laparoscopic liver resection for metastatic melanoma

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Background
Patients with stage IV metastatic melanoma have dismal survival. In the case of liver metastasis, surgical
resection may improve survival and represents the only curative modality. Laparoscopic liver resection for
metastatic melanoma is poorly studied.

Methods
Between April 2000 and August 2013, 11 (1 cutaneous, 9 ocular and 1 unknown primary) patients underwent
laparoscopic liver resection for metastases of melanoma at Oslo University Hospital-Rikshospitalet.Perioperative
and oncologic outcomes were analyzed. Postoperative morbidity was analyzed by means of Accordion
classification. Life tables and Kaplan-Meier method was used for assessment of survival. Median follow-up was
33 (8.5-90) months.

Results
Twenty three liver resections were performed in 11 patients during 13 procedures. Median operative time and
blood loss were 137 (65-470) min and <50 (<50-1000) ml, respectively. There were no intraoperative unfavorable
incidents and no 30- day mortality in this study. Two patients underwent repeat resection due to developing of
new metastases. One-, 3- and 5 year overall survival were 81%, 45% and 9%, respectively. Median overall
survival compiled 30 (8.5-91) months.

Conclusion
Laparoscopic liver resection melanoma metastases appear to be comparable to those after open resections and
may be preferred over open counterpart due to well known advantages. It facilitates potential repeat liver
resections in case of resectable liver recurrences.
Laparoscopic liver resection in cirrhotic patients with hepatocellular carcinoma located in posterior segments: towards the “gold standard”?

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Background
Laparoscopic liver resection (LLR) for hepatocellular carcinoma (HCC) located in the anterior segments of the liver is well described in the literature. The aim of this study is to evaluate retrospectively our results for LLR including only lesions in the posterior segments (PS) in terms of feasibility, outcome, recurrence and survival.

Methods
Between 2001 and 2016, 30 patients underwent LLR and 51 patients open liver resection (OLR) for single HCC (≤5 cm) located in PS. The groups were selected according to predefined criteria.

Results
There were not differences regarding BCLC staging, tumor size, etiology of cirrhosis and liver function. However, patients with HCC in segments 7 were more often treated by OLR. Although operation duration (208 min. OLR; 173 min. LLR; p=0.005), blood loss (282 ml OLR; 189 ml LLR; p=0.027), and length of postoperative stay (9 days OLR; 5 days LLR; p=0.001) were significantly better in the LLR group, postoperative complications (Dindo-Clavien >2) were similar (19% OLR; 10% LLR); no differences were found about surgical margins (8 mm OLR; 7 mm LLR). During a median follow-up of 44 months, no differences were found about the 5-year survival rate (44% OLR; 57% LLR), intra-hepatic recurrence rates at 5 years (46% OLR; 43% LLR) and local tumor progression (2% OLR; 0%, LLR).

Conclusion
Although LLR is more difficult for HCC located in the PS, it seems to yield better short-term results as compared to OLR, and could well be considered a privileged approach in selected patients.
Liver surgery: Clinical
FP27.02

Laparoscopic liver resection Versus Transarterial Chemoembolization for Hepatocellular Carcinoma in Child B cirrhosis: a propensity score analysis

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Background
Laparoscopic liver resection (LLR) has been reported as safe and effective approach to the management of hepatocarcinoma (HCC). However, in decompensated cirrhosis, studies of long-term outcome about tumor recurrence and patient survival in comparison with other standard treatments are limited. The aim of this study is to analyze the long term outcome of LLR versus transarterial chemoembolization (TACE) for treatment of HCC in Child B patients

Methods
Patients treated with LLR at a single European center were compared with patients treated with TACE included in the ITA.LI.CA database (a national multicenter HCC database). Only patients with same characteristics and adequate follow up were extracted from the database. A propensity score analysis was made matching patients by: age, sex, etiology of liver disease, number of lesions and size of largest nodule

Results
Since 2004 to 2016, 35 patients underwent LLR. Those treated with TACE, identified in the database, were 200. Median overall survival (OS) was not statistically different between groups. After propensity score analysis LLR provided significantly better 3(p=0.05), 5(p=0.04) year survival and OS (p=0.03) than TACE: 44,9months (95% CI:14,9-74,9) versus 18,2 (95% CI:8,4-30,1) respectively

Conclusion
LLR provides significantly better long-term survival than TACE in superselected patients with Child B cirrhosis. Thus, due to its low invasiveness, LLR should be part of multimodal management of HCC even in presence of mild liver function impairment
Laparoscopic liver resection: evolution of a single Surgeon's experience in MILS with 129 cases

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Background
Interest in MILS is increasing, showing significant postoperative advantages for patients

Methods
A single Surgeon with advanced expertise in both open HBP surgery as well as in advanced laparoscopic GI surgery, started a development program for introducing MILS at a large tertiary referral institution in northern Italy, in 2006. In 10 years activity 129 patients underwent laparoscopic liver resection.

Results
Preoperative diagnosis was CLM in 33.5%, HCC in 15.5%, IHCC+CCC in 7%, Non-Colorectal Liver Metastases in 2%, Benign Lesions in 42%. Median operation time was 154 min. Transfusion were necessary in 10%. Liver-specific conversion rate 18.6%. Most common procedures were Single wedge (29.5%), Segmentectomy (16.3%), Left lateral sectionectomy (21.7%). Major complication (Clavien-Dindo >= 3) rate was 10% and median LOS was 5 days. Mortality occurred in none.

Conclusion
TECHNICAL TIPS & RICKS (Educational Video): Intraoperative ultrasound was performed to confirm the number and location of hepatic lesions as well as their proximity to portal pedicles and hepatic veins. Liver parenchyma was transected using ultrasonic scalpel with need of #2 Pringle maneuvers (duration 20 min each - 20 min off). Parenchymal transection with ultrasonic scalpel was undertaken following the US-guided demarcation line. Branches of bile ducts, portal and hepatic veins, were controlled by Hem-o-lok clips or single stitches. Trisegmentectomy (IVbs-Vs-VIs) was performed. Patients are managed post-operatively according to ERAS institutional protocol.
Liver surgery: Clinical
FP27.01

Laparoscopic liver resections for hepatocellular carcinoma. Can we extend the surgical indication in cirrhotic patients?

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Background
Evidence on the value of laparoscopic liver resection (LLR) for hepatocellular carcinoma (HCC) and severe cirrhosis still lacks. Aim of this study is to assess surgical and oncological outcomes of LLR in cirrhotic HCC patients.

Methods
The analysis included 403 LLR for HCC from 7 European centres. 333 cirrhotic and 70 non-cirrhotic patients were compared. A matched comparison was performed between 100 Child-Pugh A and 25 Child-Pugh B.

Results
There was no difference in blood loss (250 vs. 250mL, p 0.465) and morbidity (28.6% vs. 26.4%, p 0.473) between cirrhotics and non-cirrhotics, and liver-specific complications were similar (12.8% vs. 12%, p 0.924). The sub-analysis revealed similar outcomes in either Child-Pugh A or B patients, including ascitis (11% vs. 12%, p 0.562) and liver failure (3% vs. 4%, p 0.595). ASA score (OR 1.76, p 0.034) and conversion (OR 2.99, p 0.019) were risk factors for major morbidity. Despite lower recurrence-free survival in cirrhotics (43 vs. 55 months, p 0.034), overall survival was similar to non-cirrhotics (84 vs. 76.5, p 0.598).

Conclusion
LLR for HCC appear equally safe in cirrhotic and non-cirrhotic patients, and the advantages can be witnessed in those with advanced cirrhosis. Severe comorbidities and conversion should be considered risk factors for complications - rather than the severity of cirrhosis - when liver resection is performed laparoscopically. Such results may be of interest to surgeons and hepatologists when deciding on the management of HCC in cirrhosis.
Laparoscopic liver resections: initial experience in Greece

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Background
Laparoscopic liver resections (LLR) are currently acknowledged as safe and efficient procedures in the treatment of a plethora of benign and malignant diseases when performed by experienced surgeons. The aim of our study was to report our initial institutional experience with LLRs from one certified hepatobiliary surgeon.

Methods
Patients undergoing LLR by one senior hepatobiliary surgeon during the period 01/2012-07/2016 were prospectively sampled and retrospectively analyzed for the purposes of this study.

Results
Thirty-seven out of 151 patients (25%) operated for liver tumors underwent LLR. The patient median age was 64 years; median BMI and Charlson comorbidity index were 27.3kg/m2 and 6.5, respectively. Patients underwent resections for benign (n=19) or malignant (n=18) lesions. Median total operating time was 115 minutes. Blood transfusion was needed in 8 patients. Six patients (16%) presented postoperative complications none of which necessitated reoperation. None of the patients was admitted to the intensive care unit postoperatively whereas the median hospital stay was 4 days. Tumor-free resection margin was documented in all primary or secondary oncologic cases.

Conclusion
Careful patient selection and compliance with the international recommendations are the keys for the successful introduction and evolution of a LLR-program.
**Laparoscopic Liver Surgery: techniques in minor laparoscopic resection**

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**Background**  
Total laparoscopic liver surgery has emerged and has become widely used in so called minor hepatic resections.

**Methods**  
We provide different technical aspects of atypical resections to left lateral resections using bipolar cautery, energy devices and stapler.

**Results**  
Total laparoscopic liver surgery can be performed providing excellent safety for the patients. The techniques used can be adapted to the lesion and each individual patient. Also economical factors can be play a role as by far not all minor laparoscopic resections require the use of e.g. staplers.

**Conclusion**  
These video sequences are to illustrate different ways of performing successful minor laparoscopic liver resections.
Laparoscopic Lymphadenectomy for Intrahepatic Cholangiocarcinoma: Still a Contraindication to Surgery?

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Background
Intrahepatic cholangiocarcinoma is a relatively uncommon indication for laparoscopic surgery because of technical challenges related to the frequent need for complex procedures and the necessity to perform formal regional lymphadenectomy.

Methods
We present two cases of patients requiring laparoscopic lymphadenectomy associated to liver resections, displaying technical keypoints of laparoscopic lymphadenectomy.

Results
The video shows how to perform safely and effectively lymphadenectomy in these patients, with dissection of nodes in the hepatoduodenal ligament, of the proper hepatic artery and of the posterior surface of the head of pancreas.

Conclusion
The technique we presented allows subgroup of patients requiring lymphadenectomy the achievement of improved outcomes associated with the minimally invasive approach.
Liver surgery: Clinical
Sym1.08

Laparoscopic Management of Hepatopulmonary fistula from Hepatic Hydatid Disease

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Background
Liver hydatid disease is one of the most commonest parasitic infection of the liver. Despite advances in treatment it remains to be a disease with serious medical, economic and public health implications. It can be complicated by free rupture, into anaphylaxis, biliary communication, cholangitis, and rarely biliopleural or bronchopleural fistulas. The fistula normally forms through transdiaphragmatic penetration, leading to rupture as a large cyst into the lower lobe of the lung.

Methods
We present the case of a patient who presented to our institution with right upper quadrant pain, recurrent pneumonias and cough. Investigations revealed a hydatid cyst at the dome of the liver at segment VIII communicating with the right pleura and the lower lobe of the right lung.

Results
The hydatid cyst was opened and evacuated through a transabdominal laparoscopic approach with transdiaphragmatic evacuation and cleansing of the pleural cavity and ligation of the hepatopleuropulmonary fistula.

Conclusion
Hepatopulmonary fistulae, although benign in nature, carry an unacceptable mortality risk of up to 10.3 % mainly due to surgical complications.
Laparoscopic approach is a safe modality for treatment
Laparoscopic posterior sectionectomy for HCC

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Background
We present the case of a 56-yo female with HCC on HCV cirrhosis. The lesion is located at the junction of segments 6 and 7. The patient is Child-Pugh A, MELD 8, AFP 6.6 ng/ml.

Methods
The patient was placed in a partial left lateral decubitus. We used three 12mm and two 5 mm trocars. The optical trocar is placed on the mid-axillary line.

Results
Abdominal cavity exploration confirmed macronodular cirrhosis. The lesion in the posterior sector was confirmed at intra-operative ultrasound.
After cholecystectomy a tape was passed around the hepatic pedicle for the Pringle maneuver. The right posterior pedicle was dissected and clamped extraparenchymally in order to define the transection line which was marked with monopolar cautery and Thunderbeat.
The liver parenchyma was partially opened at the level of right posterior pedicle in order to facilitate its control and division using a linear stapler.
The parenchymal transection was pursued along the right hepatic vein with CUSA and Thunderbeat. Hemostasis and biliostasis was achieved with Hem-o-loks. Intermittent hepatic pedicle clamping was used for 105 minutes. Blood loss were 200 cc, no intra-operative blood transfusion were needed.

Conclusion
Pathological report showed a well differentiated HCC with a R0 resection. Post-operative course was marked by transient ascetic decompensation.
Patient is alive without signs of recurrence 12 months after surgery.
Laparoscopic resection of neoplasms in cirrhotic liver. A safe procedure


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Background
For cirrhotic patients with liver tumor, pure laparoscopic hepatectomy minimizes destruction of the collateral blood/lymphatic flow from laparotomy and mobilization, and has advantage of minimal postoperative ascites

Methods
We present a serie of 7 patients operated on in our institution in a period of three years (2014-2016). Six men an one woman, aged between 58 and 75 years old. All of them were Child A class, without portal hipertensión. The causes leading to cirrhosis were HVC infection in 3 cases, autoimmune in 2 and metabolic syndrome in 2. Concerning the surgical risk, three patients were ASA III, two ASA II, and two ASA IV.

Results
Five patients were operated by pure laparoscopic approach. In one case an hybrid procedure was developed and in the other conversion to open technique was necessary related with technical difficulties. The size of the tumors ranged between 22 and 100 mm, and the resections performed were three left lateral sectionectomies and four segmentectomies/limited resections. Only in one case we used hilar clamping. Surgical time ranged between 170 and 510 minutes. The mean postoperative stay was two days. Six patients were Dindo-Clavien class I and one class II. The final histopathologic results of the specimens were hepatocarcinoma in 6 patients and cholangiocarcinoma in the one.

Conclusion
Laparoscopic hepatectomy for liver tumours in chronic liver disease represents a safe treatment in the management of these patients under the presupposition of careful patient selection.
Laparoscopic Reversal ALPPS

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Background
ALPPS (Associating Liver Partition and Portal vein ligation for Staged hepatectomy) allows R0 resection even in patients with extremely small future liver remnants. Reversal ALPPS is a denomination where the future liver remnant is the right posterior section of the liver.

Methods
A 42-year-old woman with colorectal metastases in all segments, except segment 1. CT scan shows a predominance of metastases in the left liver and in the right anterior section. Right posterior section had 3 metastases. The plan was to perform a laparoscopic reversal ALPPS (left portal vein ligation combined with in situ splitting in 2-staged left trisectionectomy).

Results
Three metastases in the right posterior section are resected followed by liver partition and left portal vein ligature. CT scan showed 70% increase of the future liver remnant. The second stage constituted of left trisectionectomy. At laparoscopy after division of adhesions, the left Glissonian pedicle was divided with endostapler. A stapler was also used to transect the left and the middle hepatic veins, and the specimen was removed through suprapubic incision. Operative time was 5 and 3 hours and the patient was discharged on the 4th and 5th day, respectively. No blood transfusion or ICU stay was necessary. Patient has no evidence of the disease 18 months after procedure.

Conclusion
Reversal laparoscopic ALPPS is feasible and safe. Laparoscopy is useful to decrease blood loss and optimizes visualization during liver transection.
Laparoscopic right hemihepatectomy

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Background
Laparoscopic techniques play an increasingly role also in liver surgery. However, they are nowadays mainly used in left lateral or atypical resections.

Methods
In this video, we present a patient with a giant hemangioma of the right liver lobe where we performed a laparoscopic right hemihepatectomy. Whole resection was performed with a 3D laparoscopy system (EinsteinVision, Braun) using 5 trocars. Preparation was done using a Harmonic Ace (Ethicon). Surgical specimen was secured via Pfannenstiel incision.

Results
Intraoperative blood loss was under 300 ml. A pringle maneuver was maintained for under 30 minutes. Patient was dismissed from hospital after 10 days without any complications.

Conclusion
Laparoscopic right hemihepatectomy is a good alternative to the open approach in selected patients. However, experience in liver surgery as well as in laparoscopic techniques is mandatory when performing this procedure.
Laparoscopic right hepatectomy after portal vein ligation: second step of two stage hepatectomy for colorectal liver metastases

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Background
Hepatic resection is the treatment of choice for patients with colorectal liver metastases but 75-85% of patients are unresectable at diagnosis. Many patients with multiple bilobar metastases are not eligible for surgery because of the small future remnant liver (FRL). Patients with impaired hepatic function, scheduled for extended hepatectomy are at greater risk of liver failure.

Methods
Two stage hepatectomy (TSH) is a strategy designed to increase the number of patients who may benefit from liver surgery while reducing the risk of postoperative liver failure. Right hepatectomy is now frequently performed laparoscopically, but it may be challenging in the setting of two stage hepatectomy, after left liver clearance and portal vein ligation.

Results
The video shows the case of a patient in whom TSH is completed with a laparoscopic right hepatectomy after laparoscopic left liver clearance and PVL. FLR had increased to 49% after portal vein alcohol injection and PLV performed during the first stage. Right hepatic vein is dissected at the caval confluence. Dissection of the right side of the liver pedicle is rather difficult because of the previous PVL. Right hepatic artery and right portal vein are clipped and divided. Parenchimal section is performed with ultrasound dissector. Right bile duct is stapled intraparenchimally. Right hepatectomy is concluded with section of the right hepatic vein.

Conclusion
Two stage hepatectomy can performed entirely in laparoscopy in selected patients.
Laparoscopic right hepatectomy for fibrolamellar HCC

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Background
We present the case of a 27-yo female presenting with asymptomatic 8 cm tumor in liver segment 7. Liver function and AFP were normal, no viral infection was detected. Percutaneous biopsy showed hepatocellular carcinoma.

Methods
The patient was placed in a partial left lateral decubitus. We used three 12mm and two 5 mm trocars. The optical trocar was placed on the mid-axillary line. Abdominal cavity exploration confirmed a normal liver with no signs of cirrhosis. The tumor was only visible at laparoscopic ultrasound.

Results
Right portal vein and right hepatic artery were selectively divided extra-parenchymally. The hepatectomy was performed without prior liver mobilization. The parenchymal transection was pursued along the middle hepatic vein with CUSA and Thunderbeat. Hemostasis and biliostasis were achieved with Hem-o-loks. Right hepatic duct was divided intraparenchymally. Once hepatic transection was completed and inferior vena cava exposed, accessory right hepatic veins were selectively controlled with Hem-o-loks. Right hepatic vein was isolated and divided using a linear stapler. The surgical specimen was extracted through a Pfannenstiel incision. Intermittent hepatic pedicle clamping was used for 27 minutes. Blood loss was 350 mL, no intra or post-operative blood transfusion was needed.

Conclusion
Pathological report showed a well differentiated fibrolamellar HCC with a R0 resection developed on a normal liver. Post-operative course was uneventful. Patient was discharged on 6th postoperative day.
Liver surgery: Clinical
V1.02

Laparoscopic right hepatectomy with portal vein reconstruction for hepatocellular carcinoma with tumoral portal vein thrombosis in a cirrhotic patient

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Background
Performing a hepatectomy to treat a hepatocarcinoma in a cirrhotic patient is associated with improved survival, but may be a challenging task due to the risk of postoperative liver failure. [1] The use of the laparoscopic approach has been widely adopted as it presents lower mortality and postoperative liver failure rates when compared to the open approach. [2] Nevertheless, the use of the laparoscopic approach to treat hepatocarcinomas with advanced vein thrombosis is rarely reported because of the technical challenges involved. [3]

Methods
The video presents a totally laparoscopic right hepatectomy with tumor thrombectomy and portal vein reconstruction to treat a large right liver hepatocarcinoma with tumor thrombosis of the right portal vein extending to the main vascular trunk in a cirrhotic patient.

Results
Operative time was 500 minutes. Estimated blood loss was 275 milliliters. Patient developed mild ascitis that was managed with diuretics for one month. Patient was discharged on the tenth postoperative day. Eight months after the procedure he was submitted to a CT-scan that disclosed a patent portal vein and no signs of tumor recurrence.

Conclusion
In selected patients, the laparoscopic approach may be an effective technique to treat primary liver tumors even in patients with cirrhosis and advanced portal vein tumour thrombosis.

References:
Liver surgery: Clinical
EP3.03

Laparoscopic segment 6 resection for alveolar echinococcus of the liver

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Background
Alveolar echinococcus is a parasitic disease affecting the liver. It is located mostly at the right lobe of the liver. This disease can also be located at other organs like the lungs, brain, bone or adrenal gland. Curative resection is not always possible.

Methods
We present here a case of liver alveolar echinococcus located at segment 6.

Results
A 47 year old patient admitted to our clinic with complaints of abdominal discomfort and pain. At physical examination there was palpable mass at the right upper quadrant. Laboratory data revealed nothing abnormal. Computed tomography evaluation revealed a semi-solid mass located at segment 6. CT features were consistent with alveolar echinococcus mass. Since this disease is endemic in our region we didn’t perform any biopsies. The patient underwent a laparoscopic non-anatomic resection of segment 6. We used harmonic scalpel and CUSA. Operation time was 185 minutes. Blood loss was approximately 300 cc. The patient discharged from the hospital at 5 po day

Conclusion
Laparoscopic resection is safe for alveolar echinococcus of the liver
Liver surgery: Clinical
P12.03

Laparoscopic surgery for hydatid disease of the liver

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Background
Laparoscopy is improving especially in liver surgery. Hydatid disease is endemic in our region and unfortunately it is not possible always to manage this disease percutaneously. Therefore surgical treatment is necessary. Laparoscopic surgery for hydatid disease is not widely used. We report here our experience with laparscopic hydatid disease.

Methods
Between January 2012 and January 2017, a total of 27 patients underwent laparoscopic hydatid surgery. We evaluated the records of these patients retrospectively. All operations were done by the same team. After the first trocar insertion at the operation the cyst was identified and wrapped with chlorhexidine gluconate solution containing sponges. Cyst contents were evacuated via a cystotomy after injection of chlorhexidine gluconate solution into it. Existing bile duct were closed.

Results
A total of 27 patients were operated. They had 33 cystic lesions. Twenty-two of the cysts were located at the right lobe and the others at the left. Mean diameter was 7.4 cm (5.6-21cm). All underwent drainage of the cavity and 15 partial cystectomy or unroofing. Mean hospitalization time was 4.5 days. Mean follow up was 13 months.

Conclusion
Laparoscopic surgery is safe in selected cases of hydatid disease of the liver.
Laparoscopic versus open major hepatectomies: analysis of surgical outcomes and cost effectiveness in a high-volume centre

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Background
We compared the clinical and financial outcomes of laparoscopic major hepatectomies (LMH) with open procedures (OMH).

Methods
Intra, post and total expenses were considered. Intention-to-treat (ITT) and per-protocol (PP) analysis were undertaken, considering converted patients either in the LMH or OMH group.

Results
Patients receiving major hepatectomy (May2014-Dec2016) were identified (132, 80LMH vs. 52OMH). 21 LMH were converted (26.2%), with the commonest reason being oncologic concerns (n=9, 42.8%).

At the ITT analysis LMH showed longer operative time (p=0.03), but lower blood loss (p<0.001), transfusions (p=0.01), hospital stay (p=0.006) and morbidity (p=0.03). LMH had less investigations (p=0.004) and interventions (p=0.03). The higher intraoperative costs of LMH (p<0.001) were balanced by lower postoperative expenses (p=0.03), resulting in a total cost neutrality if compared to open (p=0.60). The PP analysis did not confirm longer operative time for LMH (p=0.44), while blood loss/transfusion (p<0.001, p=0.002), morbidity/investigations (p=0.01, p=0.001) and length of stay (p=0.002) were still lower and with increased significance. Higher intraoperative costs for LMH were confirmed (p<0.001), but lower postoperative expenses were exacerbated (p=0.004), now resulting in inferior global costs (p=0.02).

Conclusion
Completed LMH provide significant advantages and cost savings compared to OMH. Despite some of these may be jeopardized by conversion, a program of LMH appears worth in a high-volume centre.
Laparoscopic liver resection for hepatocellular carcinoma: 5-year experience at a single center

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Background
Laparoscopic liver resection for hepatocellular carcinoma (HCC) has become an increasingly popular operation, even in the presence of liver cirrhosis. Here we evaluate the outcomes of laparoscopic liver resection for HCC at a single center.

Methods
From November 2011 to August 2016, 24 patients with HCC underwent various laparoscopic liver resection at a single institution. The operation was performed by one team of surgeons. The clinical data of these patients were retrospectively reviewed and analyzed by reviewing the medical records, radiologic images and pathologic reports.

Results
The mean age of the patients was 58 years (range 41-80 years) and 22 patients were men. The types of resection were resection of one segment (7 cases), resection of two segments (9 cases), resection of three segments (2 cases) and four segments (6 cases). The mean tumor size was 3.4 cm (range 0.8-10 cm). The mean resection margin was 17.9 mm (range 1-50 mm). The median follow-up duration was 29 months (range 4-45 months). The 3-year overall survival rates were 83.3%.

Conclusion
Laparoscopic liver resection for HCC is feasible, safe with good oncologic outcomes. Major liver resection is possible with improved surgeon’s skill and experience.
Left trisectionectomy with long-distance reconstruction of the right hepatic vein for ICC

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Background
Left trisectionectomy is one of the most challenging procedures in liver surgery. In particular, the additional resection and reconstruction of the inferior Vena cava (IVC) and/or the right hepatic vein (RHV) is difficult.

Methods
In a 50-year old man (180cm, 112kg) with jaundice imaging studies revealed a centrally located tumor, consistent with an intrahepatic cholangiocarcinoma (ICC), leading to obstruction of the right intrahepatic biliary system. In addition, infiltration of the right hepatic vein and the Vena cava could not be excluded.

Results
After complete mobilization and lymphadenectomy of the liver hilum the left hilar structures (artery and portal vein) were divided. Parenchymal dissection was performed with an ultrasonic surgical aspirator under intermittent Pringle’s manoeuvre. The right biliary tree was divided intrahepatically, resulting in resection of the entire hilar bifurcation. Due to suspected infiltration of the right hepatic vein total vascular occlusion with partial clamping of the IVC was performed and the RHV partially resected. Reconstruction of the RHV was performed with a bovine pericardium patch. Four bile ducts were reinserted into three biliodigestive anastomoses. At duplex ultrasound control, arterial, portal venous and hepatic venous flows were normal.

Conclusion
Left trisectionectomy with vascular reconstruction can be performed safely after detailed operation planning. In selected patients, these procedures offer a chance for cure even in advanced ICC.
Lessons learned from 103 Consecutive laparoscopic liver resections

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Background
Laparoscopic liver resection (LLR) is increasingly performed worldwide. The present study describes the initial experience of our new hepatobiliary center.

Methods
Between September 2012 and November 2016, among 282 patients who underwent liver resections, 103 (36.5%) were LLR. Biliary cysts and laparoscopic thermal ablation (TA) without liver resection were excluded. During the two first years (2012-2014), only minor LLR were performed. Intraoperative parameters, mortality, morbidity and pathological findings were evaluated.

Results
The median age was 60. Malignancies represented 68% of the indications. Unisegmentectomies or atypical resections represented 63% of the procedures, left lateral sectionectomies 27% and major hepatectomies 10%. Associated US-guided TA was performed in 26% of cases. Among LLR, 80% were full LLR and 20% hand-assisted procedures. The conversion rate was 7.7%. The median operating time was 197 minutes (155-270). Median blood loss was 156 mL. Transfusion rate was 3.8%. R1 resections represented 15.5% of the examined specimen for malignancies mainly CRLM. Major postoperative complications (DINDO>2) occurred in 5% of the patients. The median hospital stay was 12.8 days (3-41). One patient died within 30 days of the liver resection (1%) after lateral sectionectomy for HCC in a cirrhotic patient.

Conclusion
This humble experience of our first 103 LLR confirms the international conference recommendations. One third of our liver resections are LLR. The morbi-mortality was acceptable.
Live laparoscopic liver resection allow to achieve the necessity of training without negatively affecting the postoperative outcome

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Background  
The aim of the present work was to analyse, in a case-matched study, the outcome of laparoscopic liver resections performed by the same surgeon during live events and conventional elective procedures.

Methods  
30 consecutive patients who had undergone laparoscopic resection during live events of training (Live group) were compared with 90 of 506 patients who had undergone laparoscopic surgery during conventional elective procedures (Control group). The groups were matched in a ratio of 1:3 using propensity scores based on covariates representing relevant patient characteristics and severity of disease. The main endpoints were intraoperative and short-term postoperative outcomes.

Results  
Live and Control group had comparable blood loss (300 vs 350 mL, p NS) and conversion rate (13.3% vs 14.4%, p NS) despite longer operation time for patients in Live Group (280 ± 30 minutes vs 210 ± 20 minutes, p=0.032). There was no difference in perioperative morbidity and mortality: severe complications occurred respectively in 2 patients in Live and 7 patients in Control group (p NS) with none directly related to intraoperative accidents. The same outcomes were confirmed for the subgroup of major resections and for procedures performed with a trainee as part of the surgical equipe.

Conclusion  
Live surgery in the setting of laparoscopic liver resections does not negatively affect intra and postoperative outcome of patients if performed by expert surgeons.
Liver hydatid cyst opened into portal vein

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Background
Hydatid liver disease is endemic especially in Mediterranean countries. Portal vein rupture of hydatid cyst is not frequent. The aim of this case report is to report an exceptionnel complication of liver hydatid cyst and to expose problems of therapeutic management.

Methods
We here present a case of liver hydatid cysts complicated by rupture into the portal vein. Diagnose was made by abdominal computed tomography. The patient had a conservative treatment. No surgical treatment was possible.

Results
She developed cirrhosis of the liver and died from complications.

Conclusion
Complications of hydatid disease, such as rupture into the portal vein, can be lethal. Its therapeutic management is still problematic.
Liver injury following blunt abdominal trauma – evaluation of a new mechanism-driven classification

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Background
Current classifications for blunt liver trauma focus on the extent of liver injury only. These scores are independent from localization of liver injury and trauma mechanism. Slotta et al. described the type of liver injury after blunt abdominal trauma using a new classification (type A and type B). The following retrospective analysis was performed to evaluate this new classification for basic surgical practice in a regional trauma center.

Methods
With the use of clinical database data were analyzed regarding the trauma mechanism, as well as radiological and intraoperative findings retrospectively. Type A and B injuries were compared with the literature.

Results
In 32 patients type of liver injury following blunt abdominal trauma was clearly linked with the trauma mechanism (2012-2016): type A injuries (n=15) were associated with a frontal trauma, whereas type B injuries (n=17) were found after complex trauma mechanisms. Interestingly, whereas 70% (12/17) with type B rupture were managed by immediate surgical intervention, 66.6% (10/15) with type A rupture required conservative treatment.

Conclusion
Type of liver injury correlated with necessity for surgical therapy and is very helpful for triage regarding the indication for urgent surgery. Interestingly, within our regional trauma center, only 33.3% with type B rupture underwent surgery compared to the literature by Slotta et al. This difference could be explained by the different surgical regime.
Liver surgery: Clinical  
P10.01

Liver metastasis of squamous cell carcinoma of the pyriform sinus

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Background
Squamous cell carcinoma of the pyriform sinus (SCCPS) is a rare tumour with poor prognosis due to delayed diagnosis. It usually metastasizes to the lymphatic region or nearby organs. Distant dissemination is uncommon. We report the case of a patient diagnosed with SCCPS and a single liver metastasis.

Methods
A 63-year-old man diagnosed with SCCPS 3 years ago, stage IVa(T1N2b), treated with QT/RT and a complete response. A control CT showed a liver mass of 68x59x48mm located in segments V-VI. The biopsy demonstrated a liver metastasis of SCCPS. The patient received 6 cycles of QT, with partial response. We decided to perform a segmentectomy V-VI. The specimen was compatible with metastasis of SCCPS, poorly differentiated. At present free-disease after 8 months.

Results
SCCPS is the most frequently tumour in hypopharynx(70%), with an incidence of 1750/year. It is usually found in patients with tobacco or ethanol abuse. Only a small percentage present with early stage(T1-T2)without nodal involvement or distant metastases. Those are rare, with an incidence of 5%. Most of these patients have stage III or IV disease at presentation and, when present, they commonly involve lung and mediastinum(53%), bone(15%), skin(7%), and CNS(3%). To the present, this is the first report describing a liver metastasis from SCCPS resected.

Conclusion
SCCPS is a low-frequency tumour with poor prognosis which rarely metastasizes to distant organs. We report a liver metastasis from SCCPS which was successfully treated with surgery.
Liver surgery: Clinical
P31.07

Liver PEComa. An extremely rare case report with complicated post-operative course.

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Background
Perivascular epithelioid cell tumor (PEComa) is a rare type of mesenchymal tumor with heterogeneous clinical
behavior. Liver PEComas are very rare.

Methods
The case of a 47-year-old man with hepatic PEComa and a complicated postoperative course is reported.

Results
The patient had a history of systemic lupus erythematosus (SLE) and developed epigastric pain. An abdominal
CT showed a large (7 cm) heterogeneous mass on segments I/IV, in direct contact with the inferior vena cava and
portal vein. Percutaneous liver biopsy showed PEComa and the patient underwent left hepatectomy. On post-op
day 7, he became pyrexial, with significant elevation in transaminases and inflammatory markers. Imaging
(CT/MRI) showed a hypodense area in segment VIII close to resection margin. Blood cultures were taken and
broad spectrum iv antibiotics were administered. As he continue to be pyrexial with a clinical picture of sepsis he
underwent a second laparotomy, where necrosis of segment VIII was found and it was resected. As he became
again pyrexial (on day 7), a new CT abdo was done revealing concentric hepatic artery stenosis with hypodense
areas on segment VI with sphenoid shape. Acute exacerbation of SLE with right hepatic artery partial thrombosis
or vasculitis was considered to be the diagnosis. He was commenced on steroids and anticoagulants with good
clinical response.

Conclusion
Management of hepatic PEComas can be very challenging especially in patients with significant co-morbidities.
Liver surgery: Clinical
P31.06

Liver pecoma: perivascular epithelioid tumor. a case report.

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Background
Perivascular epithelioid cell tumors (PEComa) are an unusual mesenchymal tumors family, including the classic angiomyolipoma (AML), lymphangioleiomyomatosis and clear-cell tumors, that can arise from different locations of the body.[1][2][3][4] We present a rare case of a Liver PEComa.

Methods
A 58-year-old female with no background of cirrhosis or any other liver disease, who in an abdominal ultrasound, presented an exophytic heterogeneous/solid mass of 5x6 cm in the left lateral section. Computed Tomography found a hypodense mass of 6.2x4.9x6.2 cm with fat density areas, quickly enhanced in the arterial phase and becoming less enhanced on venous and delayed phases of imaging, suggesting a PEComa as diagnosis. Laparoscopic Left Lateral Sectionectomy was performed. Pathology findings were a mix of three type of components: Adipose, vascular and perivascular epithelioid cells, HMB-45+, with conclusive findings of an angiomyolipoma. The patient was discharged at the second postoperative day, with no complications so far

Results
Liver PEComas were before considered as benign tumors, with surgical treatment in selected cases. The publications in the medical literature of some cases that confirm a malign transformation of AML have made the surgical indications for this pathology a controversial issue, recommending it in exophytic, >5cm or fast growing tumors[1][2][3]

Conclusion
Nowadays, liver PEComas are considerate as rare tumors with risk of malignancy in some cases, making the surgical intervention the primary treatment.

References:
[1] Da Tang, MD; Jianmin Wang, MD; Yuepeng Tian, MD; Qiuguo Li, MD; Haixiong Yan, MD; Biao Wang, MD; Li Xiong, PhD; Qinglong Li, PhD., (2016), Hepatic perivascular epithelioid cell tumor. Case report and brief literature review, Medicine, 95, 51, http://dx.doi.org/10.1097/MD.0000000000005572, 2016-11-14, Department of General Surgery, Second Xiangya Hospital, Central South University,
Liver resection for colorectal liver metastases: Risk of recurrence from liver-first approach associated with Pringles manoeuvre

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Background
Animal studies have previously demonstrated that hepatic ischaemia reperfusion injury induces the expression of adhesion molecules which promote colorectal liver metastasis. However, no association has been identified between the Pringle manoeuvre and recurrence risk in clinical studies. We aim to investigate the risk of metastatic recurrence due to hepatic ischaemia reperfusion injury in liver-first resections which more closely resemble animal models of colorectal liver metastases.

Methods
This study included patients undergoing liver-first resections for synchronous colorectal liver metastases between 2012 and 2016. Demographic, oncological, operative and follow up data were retrospectively collected from medical records.

Results
Twenty patients were included in this study and were divided into two groups: Patients in the PM+ group (n=8) were subjected to inflow clamping at the time of liver resection while those in the PM- group (n=12) were not. No significant differences were noted between the two groups in demographics, tumour features, adjuvant therapy or operative procedure. Recurrence after liver resection was demonstrated in 87.5% and 50% of cases in group PM+ and PM- respectively (P=0.15). The 2-year recurrence-free survival was 12.5% in the PM+ group (versus 33.6% in the PM- group; Log rank P=0.6).

Conclusion
We could not demonstrate any increased risk of recurrence as a result of the Pringle manoeuvre during liver-first resections. This may be due to the small sample size in this study.
Liver resection for differentiated thyroid cancer metastases

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Background
Liver metastases of differentiated thyroid cancers (DTC) are rare. Surgical treatment remains the best modality when hepatic lesions are 131I negative.

Methods
We present two patients who underwent liver resection for metastases of DTC.

Results
The first patient is a 36-year-old woman who presented with 70mm large metastases of papillary thyroid cancer in the liver. After treatment of the primary cancer she was disease free for eight years when the level of TSH elevated. Notably, 131I SPECT did not show any lesions. The CT scan visualized the mass within the liver. Histology confirmed metastasis of the papillary thyroid cancer. Lack of iodine uptake and size of the lesion excluded treatment with radioactive iodine. Radical resection of the metastasis was performed with disease-free survival time of 65 months. The second patient is a 65-year-old man who was previously treated for follicular thyroid cancer. When iodine negative metastasis was detected within the liver he was referred for surgical treatment. In 21-months follow-up he remained stable, with no signs of disease recurrence.

Conclusion
Our cases underscore that resection of hepatic metastases of DTC is safe option even in the case of large lesions. Early detection of hepatic metastases might be facilitated by inclusion of abdominal sonography or CT in the follow-up of the DTC patients. Decision of surgical treatment should be based on analysis of the primary tumor biology and ability to perform the radical and safe resection.
Liver resection for ruptured hepatocellular carcinoma – a propensity matched analysis

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Background
Ruptured hepatocellular carcinoma (HCC) are considered to have worse prognosis compared to non-ruptured. Factors implicated include advanced disease, cirrhosis and peritoneal seeding. We aimed to assess the effect of rupture as a potential adverse prognostic indicator among patients with HCC that undergo resection.

Methods
Retrospective observational study among HCC patients that underwent resection in a single UK center between 2005 and 2015. Patients with ruptured HCC (group A) were matched with non-ruptured HCC (group B) using a propensity score. Covariates included age, cirrhosis, size, multifocality, vascular invasion, extrahepatic disease, AFP, background liver function and type of resection.

Results
Fifteen subjects in group A (7 female, mean age: 56.9) underwent hepatectomy (7 major hepatectomy, 8 minor) and were matched with an equal number from group B. Mean follow up for group A was 45 and for group B 39 months. 27% of patients had moderate fibrosis, 23% severe fibrosis and 13% had cirrhosis confirmed by histology. The 3-year and 5-year survival for ruptured and non-ruptured HCC were 83% and 59% vs. 84% and 84%, respectively for group A and B. There was no difference in the overall survival (78.3 vs 99 months, p=0.347) or disease-free survival (60.8 vs 38.4 months, p=0.397) between the two groups.

Conclusion
In this propensity-matched comparative study, rupture was not found to be a prognostic factor for patients with HCC who underwent liver resection.
Liver resection in a Ghanesian patient with hepatocellular carcinoma – case report

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Background
Introduction: Major liver resection in patients from abroad have become popular in selected patients. However, there may be culture-specific risks with negative impact on long-term outcome.

Methods
A 51-year old patient from Ghana presented with a resectable 8 cm HCC in segments 6/7, which had been judged non-resectable in his home tumor board, due to a suspected caval and portal vein thrombosis. He suffered from hepatitis B and from Child A cirrhosis with adequate liver function.

After surgical exploration, the tumor was found close to but not infiltrating the caval vein with minor satellites. Hemostasis was time-consuming. The complete tumor resection was performed within 200 min. using an ultrasound dissector plus a stapling device. Adequate substitution of 8U blood, 4U fresh frozen plasma, fluids and PPSB was started.

Results
The patient developed an intermittent renal failure and a severe constipation during 4 weeks in hospital. UICC classification was pT3 pNx cM0, R0, L0, V0.

Back at home, the patient felt well and gained weight under antiviral therapy with tenofovir alafenamide. Two months later, he was admitted to his home hospital with symptoms of heart failure. In spite of intensive diagnostics including liver biopsy, he succumbed to heart failure.

Conclusion
Major surgical procedures can be performed with good short-term results in patients from abroad. However, long-term results strongly depend on local conditions and can hardly be influenced by the primary surgery institution.
Liver resection is safely performed in patients receiving antithrombotic therapy.

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Background
This study was to assess the safety and feasibility of liver resection in patients with antithrombotic therapy (ATT, including antiplatelet therapy (APT) and anticoagulation therapy (ACT)) for thromboembolic risks.

Methods
344 patients receiving liver resection at our institution between 2005 and 2016 were retrospectively reviewed. ATT was used in 123 patients (35.8%). Our perioperative management included maintenance of preoperative aspirin monotherapy for APT and bridging heparin for ACT in patients at high thromboembolic risks. Outcomes variables were compared between the patients with ATT and those without ATT.

Results
This series included 202 partial liver resection, 66 sectionectomy and 76 lobectomy. Patients with ATT showed high frequency of history of acute coronary syndrome and cerebral infarction, though the type of operation was similar. There were 14 bleeding complications (4.1%) and 6 thromboembolic events (1.7%). No significant differences were found between the groups in operative blood loss and blood transfusion rate. Multiple analysis showed that increased bleeding complications were independently associated with high-risk liver resection (HR 6.125, p=0.004). Poor performance status (HR 14.945, p=0.020) was the significant prognostic factor for thromboembolic events. Neither ACT nor preoperative aspirin continuation affected bleeding or thromboembolism.

Conclusion
In patients undergoing ATT, liver resection is safely performed under the relevant perioperative management of ATT.
Liver surgery at Kenyatta National Hospital - a referral hospital experience

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Background
Liver surgery/resections are rarely undertaken in most African Countries, due to lack of trained personnel and the necessary equipments. In Kenya liver surgery was started n 2015 by a team of committed gastrointestinal surgeons. Since then Kenyatta National Hospital- the main referral and teaching hospital, has invested in most of the equipments required for liver surgery. In 2016, with collaboration with EAHPBA, we held our 1st International congress on liver and pancreas surgery.

Methods
This was a retrospective review of liver surgeries performed at Kenyatta national hospital from 2015 to December 2016. Patients data was prospectively maintained and analyzed.

Results
A total of 12 patients underwent various types of liver resections. The diagnosis/indications for resections were; Haemangioma, hydatid disease, benign liver cysts, hepatocellular cancer, cholangiocarcinoma and sarcomatous tumor. The resection types were ; 4 wedge resections, 1 Lt lateral sectionectomy, 3 cystectomies,2 Rt hepatectomies and 2 Rt extended hepatectomies.

There was no 30 day mortality. Two patients had significant post operative haemorrhage requiring re- laparotomy and control of bleeding. Three patients developed post operative bile leaks and were managed conservatively.

Conclusion
Liver Surgery can safely be performed at Kenyatta National Hospital.
Liver surgery – a single center five year experience

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Background
Different focal lesions including benign tumors, primary malignant tumors and metastasis from other organ malignancies frequently affect the liver. Aim of the study was to analyse the results of liver surgery in the last five years, focusing on long term follow-up.

Methods
We conducted a prospective study of patients with liver lesions operated on in the time period from 2011 until 2016. Clinicopathological characteristics and survival outcomes were analyzed as well as preoperative and surgical variables.

Results
A total of 91 patients with liver lesions underwent surgery during the study. Mean patient age was 56.49 ± 13.75 years. The female-to-male ratio was 53:38. Operation time was 212 ± 77 min. Mean hospital stay was 9 ± 3.84 days. Mean follow-up was 36 ± 8 months. During follow-up 12 had recurrence, 7 of them were reoperated. Two patients underwent transcatheter arterial chemoembolization. 19 died, 8 lost of follow-up. 60 patients (65.9%) underwent one segment resection, 21 patients (23.1%) underwent hemihepatectomy and 7 patients (7.7%) had multiple segment resections. Morphological findings revealed that the most frequently-operated pathology was liver metastasis (n=40), followed by primary malignant liver tumours in 26 cases and benign lesions in 25 cases.

Conclusion
Liver surgery is complex surgical field with comparatively higher morbidity and mortality. Carefull patient preparation and consideration for operation as well as postoperative supervision is essential to obtain adequate results.
Liver transplantation or liver resection for cirrhotic patients with hepatocellular carcinoma: comparison of long-term survival

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Background
Liver transplantation (LT) and liver resection (LR) represent curative treatment options for hepatocellular carcinoma (HCC) in patients with liver cirrhosis. With regard to improvements in oncologic liver surgery, we compared outcomes between historical and more recent patient cohorts offered LT and LR.

Methods
All patients with HCC and cirrhosis who underwent LT or LR between 1989 and 2011 were evaluated. Overall survival (OS) was analyzed focusing on changes between different time periods and relevance of tumor burden, as classified by Milan criteria (MC).

Results
In total, 364 and 141 patients underwent LT and LR for HCC in cirrhosis, respectively. Postoperative morbidity (52% vs. 14%, p<.0001), but not mortality (6% vs. 3%, p=.06), was higher after LR than after LT. In the period 1989–2004, OS was significantly higher in patients who underwent LT compared to LR, both within MC (5-year OS: 77% vs. 36%, p<.0001) and beyond MC (5-year OS: 45% vs. 19%, p=.016). Interestingly, in the period 2005–2011, OS was comparable between LT and LR both within MC (5-year OS: 73% vs. 53%, p=.122) and beyond MC (5-year OS: 33% vs. 38%, p=.370).

Conclusion
We noted improved outcomes after partial hepatectomy in recent years, comparable to stable results after LT. These improvements may be explained by advances in surgical techniques and improved perioperative management. Therefore, in the light of organ shortage, patients with HCC and compensated cirrhosis should be evaluated for liver resection in specialized hepatobiliary centers.
Local control of hepatic metastases is a prognostic factor for survival of patients with metastatic colon cancer – results of a single center analysis

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Background
The aim was to evaluate local liver directed therapy on overall survival of patients with metastatic colon cancer.

Methods
320 patients were treated for either local recurrence or metastases, out of these 288 developed liver metastases, with simultaneous extrahepatic disease (63 local recurrence, 47 lung metastases, 12 bone metastases, 8 peritoneal cavity). The mean age was 62 ± 11 years, the ratio m/f was 2 : 1. The follow up was 41 ± 37 months. A local liver directed therapy (resection n=172, resection + RFA n=25, RFA n=33) was performed. Chemotherapy was applied in up to 4 lines.

Results
The median and 5 year overall survival (5-YOS) were: with liver only metastases 152 months 5-YOS 65% and with liver and extra hepatic disease 52 months, 5-YOS 47%. The survival of patients with metastases that did not receive a local liver directed therapy was 51 months, 5-YOS 42%, one liver directed therapy 5-YOS 73%, median not reached, two or more liver directed therapies 5-YOS 70%, median not reached. Multivariate Cox regression analysis revealed pN of primary, number of chemotherapies 1 versus >1; and number of liver directed therapies (1 versus > 1) RR 0.53; 95%CI 0.38 -0.78 as significant factors, while age, sex, pT-stage and presence of extrahepatic disease were not significant.

Conclusion
Control of liver metastases has a major influence on overall survival. Sequential and repeated use of local liver directed therapy has a major influence on overall survival even in the presence of extrahepatic disease.
Liver surgery: Clinical
FP6.03

Long term follow after Surgical Treatment of Intrahepatic Biliary Cysts (Types IV & V)

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Background
Intrahepatic Biliary Cysts (IHBC) are rare congenital lesions of the biliary tract. Types 4A and 5 (Caroli Disease) are frequently confused but both entities present distinct therapeutic options.

Methods
Between 1991 and 2017, 38 patients with cysts dilatations were operated. 89.5% were CD. Diagnosis was performed by US, CT, ERCP, MRI. The diagnosis was confirmed by histology.

Results
63.2% patients were female, average age was 47.42 years (20-71). 97.3% symptomatic. Cholangitis was the main presented symptom (96%). The left hemiliver was involved in 67.6%. Bilateral disease in 21.6% Surgical procedures performed were: A) Unilateral IHBC Type 5: left lateral sectionectomy (LLS) 12, left hepatectomy (LH) 16 and right hepatectomy (RH) 5 B) Bilateral IHBC Type 5: RH 1, LH 4 and hepaticojejunostomy (HY) 2. C) Unilateral IHBC Type 4A: LH 1. D) Bilateral IHBC Type 4A: LH 1 and percutaneous treatment 2. Morbidity was 28.9%. 81.6% of patients followed for >5 years. After a median follow-up of 172 months 97.4% of patients are alive and free of symptoms. Diagnosis of CD was confirmed by histology. Cholangiocarcinoma was present in one patient (2.6%).

Conclusion
IHBC in Argentina are more common in females with left hemiliver involvement. Surgical resection is the best curative option in unilateral disease with long term survival free of symptoms and complications. In cases of bilateral disease types 5 or 4A cysts, hepaticojejunostomy could be an alternative treatment before indication of liver transplantation.
Long-term outcome for intrahepatic cholangiocellular carcinoma: Is stereotactic radiofrequency ablation the new standard of care?

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Background
This study aims to compare the outcome of patients with intrahepatic cholangiocellular carcinoma (ICC) after hepatic resection (HR) and stereotactic radiofrequency ablation (SRFA).

Methods
Retrospective single centre analysis of patients with ICC that were treated from 01/2005 till 09/2016 by HR or SRFA. All patients that underwent primary SRFA were deemed unresectable.

Results
Patient characteristics and tumour stages were comparable. There was no perioperative mortality in both groups. The major morbidity rate in the HR group was 16.3% and 0% in the SRFA group. Length of hospital stay was significantly different between the groups (HR 19.0 vs. 4.9d SRFA, p=0.008). After a median follow-up of 24.3 mo for HR, and 58.1 mo for SRFA the local recurrence rates were not significantly different (HR 15.1%, SRFA 7.6%, p=0.473 ). Median survival was 31.3mo for HR and 58.1mo for SRFA (p= 0.254). Disease-free survival (DFS) was comparable in both groups (median HR 7.5/ SRFA 15.0mo, p=0.473 ). 1-, 3- and 5-year overall-survival was 83.5%, 60.2% and 23.9 % for HR, and 86.7%, 73.3% and 46.7% for SRFA respectively.

Conclusion
Due to better survival despite the inclusion of unresectable patients, lower complication rates and shorter hospital stay, SRFA may be used as first line treatment for ICC.
Longitudinal Study of Hepatocellular Adenoma Formation and Behavior in Patients With Hepatic GSD

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Background
Hepatic glycogen storage diseases (GSD) are associated with the formation of hepatocellular adenoma (HCA). Longitudinal data are scarce on HCA formation, their behavior and development into secondary complications, like bleeding and malignant transformation into hepatocellular carcinoma (HCC). Our aim is to study the epidemiology, formation and behavior of HCA in hepatic GSD patients.

Methods
Retrospective single center cohort study of hepatic GSD patients in whom abdominal imaging was available.

Results
Abdominal imaging was available in 131 out of 147 GSD patients. Nineteen out of 52 GSD Ia patients (8 males) developed HCA. No HCA were observed in other GSD subtypes than Ia. Median (range) age of HCA presentation was 22 years (17-43). Median age was significantly higher in patients with versus without HCA, 37 (22-49) versus 24 (1-59) years, respectively (p<0.05). Survival analysis revealed a peak incidence of HCA formation in the third decade of life. Four female patients without documented HCA developed HCC, with GSD Ia (n=2), IIIa (n=1) and IIb (n=1). Surgery was performed in 11 patients with HCA or HCC. Neither clinically significant bleeding nor HCA- or HCC-related mortality was documented.

Conclusion
We report lower incidence of HCA and related complications in hepatic GSD patients. Interestingly, besides in GSD Ia patients, no adenomas were documented in patients, including subtype GSD Ib and GSD III. HCA related complications (i.e. bleedings or malignant transformation) were not documented.
Massive spontaneous liver haemorrhage and acute liver failure due to Peliosis Hepatis in an immunocompetent patient

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Background
Peliosis hepatis is a rare condition of unknown aetiology. It most commonly involves the liver and is characterised by cystic blood filled cavities throughout the parenchyma. Presentation varies from asymptomatic lesions to cholestasis, liver failure or spontaneous rupture. Diagnosis is often delayed as radiological appearances are suggestive of neoplasm, haemangioma or abscess.

Methods
A 42-year-old woman presented with a one-day history of abdominal pain and distension. She was hypotensive and tachycardic

Results
On admission laboratory findings revealed haemoglobin of 6.4g/dL, platelets of 150x109, INR of 1.4 and deranged LFTs.

CT showed near complete destruction of the right lobe of the liver with arterioportal shunting and active extravasation of contrast. She underwent embolisation of the right hepatic artery and wash out for haemoperitoneum.

Post-operatively she developed acute hepatic failure and a right hepatic lobe abscess, which required percutaneous draining. She was discharged with drain in situ when laboratory results had normalised. MRI twenty months post embolization showed complete atrophy of the lesion with compensatory left hypertrophy.

Conclusion
Peliosis hepatis should be considered as a differential diagnosis in acutely presenting liver masses, with associated intraperitoneal haemorrhage.
It is often asymptomatic but may result in fatal haemorrhage and liver failure.
Surgery should be reserved for cases where haemorrhage becomes life threatening.
May liver transaminases substitute for computed tomography in evaluation of blunt liver injury? With special emphasis on serum cut-off levels

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Background
Although computed tomography (CT) has become the standard diagnostic modality for patients with blunt liver trauma, it is costly and results in a marked increase in radiation exposure. Purpose of this study was to establish cut-off values for transaminases, and to interrogate the necessity of CT.

Methods
Transaminase levels of all patients with blunt abdominal trauma admitted to our clinic from 2009 to 2014 were analysed, and compared to radiological findings and final outcome. Classification of injury was done according to the American Association for the Surgery of Trauma (AAST)'s hepatic injury scale. Chisquare and Mann–Whitney U tests were used for statistical analyses, and receiver operating characteristic (ROC) curve was performed to define the cut-off values for aspartate aminotransferase (AST) and alanine aminotransferase (ALT).

Results
Of the 285 patients with blunt abdominal trauma, 50 (17.5%) had radiological evidence of liver injury (Group 1). Remaining 235 (82.4%) had no liver injury (Group 2). Group 1 had significantly increased AST and ALT values compared to Group 2 (p=0.001). AST as well as ALT levels were significantly higher in patients with major liver injury. Optimal cut-off values for AST and ALT were 313 IU/L and 250 IU/L, respectively, with 95% specificity. There was no mortality in both groups.

Conclusion
Liver transaminases can be used effectively in eliminating unnecessary use of CT. This allows for cost-effective use of resources, and eliminates the risks of radiation.
Meta-analysis of concurrent hepatectomy with extrahepatic bile duct resection in hepatocellular carcinoma patients with bile duct tumor thrombi

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Background
To compare recurrence and survival outcomes of concurrent hepatectomy with extrahepatic bile duct resection(H+BDR) and hepatectomy with only removal of bile duct tumor thrombi(H+T) for hepatocellular carcinoma(HCC) patients with bile duct tumor thrombi(BDTT).

Methods
A systematic search of the PubMed, Medline, Cochrane Library and Embase databases was used to identify relevant articles. The recurrence and survival outcomes were analyzed and compared by using Review Manager.

Results
Eleven studies including 310 patients were enrolled. The H+BDR group exhibited a lower 1-year recurrence rate after surgery (OR=0.46, X²=3.61, df=2, p=0.05, I²=45%). No significant differences were found between the H+BDR group and H+T group with respect to 3-year and 5-year recurrence rate. There were better in 1-year survival rate(OR=2.15, X²=9.26, df=8, p=0.01, I² = 14%) and 3-year survival rate(OR =1.72, X²=13.56, df=9, p=0.04, I²=34%), however, 5-year survival rate was no difference in the H+BDR group(OR=1.79, X²=6.9, df=7, p=0.07, I²=0%).

Conclusion
Hepatectomy combined with BDR for the HCC patients with BDTT offers decreasing recurrence at 1-year, better survival at 1-year and 3-year but similar long-term survival and should be considered when feasible. Further randomised controlled trials are necessary to determine the prognostic effects of the addition of BDR to the surgical procedure.
Metastatic colorectal cancer (mCRC): Adoption of progressive surgery and modern chemotherapy regimens leads to improved survival

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Background
Multimodal chemotherapies showed improved survival (OS) for mCRC patients in trials. The rate of curative resections in these studies remains <15%, different to reports by centres with extensive liver surgery. Cytoreductive surgery + HIPEC and lung metastastasectomy may also improve OS in a multidisciplinary setting. The study aims to investigate real-life practice and prognosis of mCRC.

Methods
Retrospective analysis of all patients with newly diagnosed mCRC presenting to our hospital (2003-2014). Palliative (group A) and curative (Group B) patients were compared. The percentage of patients undergoing curative surgery in 3 periods (2003-2006/2007-2010/2011-2014) was compared to detect changes in the medical & surgical management.

Results
420 patients were included (250 Gr.A, 170 Gr.B). In each period the number of patients presenting remained consistent, while curative cases increased from 28.8% to 54.5%, with increase in 5-year-OS from 13% to 27% (p=0.017). This was facilitated by significant increase of liver resections (21.2% to 34.8%), pulmonary surgery (6.2% to 17.4%) and peritonectomy +/- HIPEC (0% to 7.6%). Concurrently, chemotherapy did not substantially change. Curative treatment intent is the major factor for improved OS (HR 0.23).

Conclusion
Progressive surgery with increasing curative resection rates led to superior survival in mCRC patients over the last years. With specialization and centralization in surgery, results from prospective trials can clearly be further improved.
Microwave ablation for breast cancer liver metastasis

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Background
Prognosis of patients with Breast Cancer Liver metastases (BCLMs) is dismal. Retrospective data support the role of adjuvant surgery in selected patients. Ablative treatments are a minimally invasive but their role in the management of BCLMs still remains controversial.

Methods
A retrospective analysis of patients who underwent laparoscopic or percutaneous microwave ablation (MWA) between January 2009 and December 2016 at a single center was made. Analysis was performed in a nodule-oriented and patient-oriented base. Post-procedural complications were recorded according to the Clavien-Dindo classification. Radiologic scan review was centralized.

Results
Thirty-four patients presented with 60 nodules with median number of nodules of 1 per patient (range 1-6). Ablations were carried out 17 percutaneously and 17 laparoscopically. Median tumor size was 26mm (range 10-80). Median patient age was 53 years (range 30-81). Median time from breast cancer to metastases was 50 months (range 0-184). Median single ablation time was 10 min (range 3-46). Median length of hospital stay was 1 day (range 1-9). Complete ablation, evaluated at 1 month, was achieved in 85% of nodules and in 75% of patients. Complication rate (Grade I or II) was 20.5% with no major complications recorded and no death at 90-days.

Conclusion
Minimally invasive MWA is safe, effective and feasible. In selected cases it could play a role as adjuvant treatment. Patients may benefit from locoregional therapy as a part of a multi-modal treatment.
Microwave ablation of resectable colorectal liver metastases - one year into the MAVERRIC study

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Background
Colorectal cancer is the third most common cancer worldwide and approximately 30% of patients will develop liver metastases of which 40% are surgically treatable. With the development of ablative tools and a clear trend in going for tissue sparing resections there is an unanswered question whether ablative techniques could replace resections for small, <30mm, metastases. If oncological results are the same, an ablative approach would mean less complications and post-operative disabilities, shorter length of stay and lower over-all costs for health-care providers.

Methods
A prospective, multicentre, matched case-control study where 100 resectable patients with no more than 5 metastases, not larger than 30mm and accessible with a percutaneous microwave ablation with computer assisted navigation in a CT, are included and then 1:3 matched against controls in the swedish liver registry. The primary endpoint is overall survival at 3 years with secondary endpoints being survival at 5 and 10 years, complications, length of stay and an health economic analysis. Patients are recruited in Stockholm, Bern and Groningen.

Results
The study is ongoing and all three centres are recruiting patients. This is a preliminary report with approximately half of the patients included.

Conclusion
This is a half-way report from the first study comparing microwave ablation with resection for resectable colorectal liver metastases.
Liver surgery: Clinical
P7.06

Microwave Ablation Provided Better Overall Survival Than Liver Resection For Small Hepatocellular Carcinoma In Patients With Borderline Liver Function

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Background
Microwave ablation (MWA) is showed to be at least as effective as, if not superior than, radiofrequency ablation in treating HCC. Studies comparing MWA and liver resection are lacking. The aim of this study is to evaluate the survival of patients who were treated with liver resection and MWA and to evaluate if the newly developed Albumin-Bilirubin (ALBI) grade can help in patient selections for liver resection or ablation.

Methods
This is a retrospective analysis on patients who received curative liver resection and MWA for primary HCC from March 2009 to December 2015. Baseline clinical and laboratory parameters were retrieved and reviewed from the hospital database. Propensity score matching was used at 1:1 ratio. The ALBI grade was evaluated for their abilities of patient selection.

Results
A total of 442 patients underwent MWA and liver resection for primary HCC during the study period. Propensity scoring matching was used and resulted in 63 matched pairs for further analysis. While liver resection still offered better overall and disease-free survivals in patients with ALBI grade 1, MWA provided a significantly better overall survival in patients with ALBI grade 2 or 3. (p=0.025)

Conclusion
Microwave ablation, as a treatment for HCC, offered superior overall survival to liver resection in patients ALBI grade 2 or 3.
MINI-ALPPS Achieves Adequate Future Liver Remnant (FLR) Hypertrophy To Allow Safe Two Stage Liver Resection

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Background
Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy (ALPPS) for patients with otherwise unresectable disease has generated controversy due to high morbidity and mortality. We present our series of patients with parenchymal transection limited to 30-40% (MINI-ALPPS).

Methods
Patients who had MINI-ALPPS between April 2015 and April 2016 were included. In patients with colorectal liver metastases (CRC) the FLR was cleared with metastasectomies; all patients had the liver divided along the future line of transection to 30-40%. The Right portal vein was stapled and divided without extensive hilar dissection. In Stage1 there was minimal handling of right liver which was not mobilised and the middle hepatic vein was preserved. Data was collected prospectively looking specifically at hypertrophy of the FLR and morbidity and mortality.

Results
There were 8 patients (Age 25-68). 1 patient with cholangiocarcinoma had portal vein embolisation, but then proceeded to MINI-ALPPS. All patients completed two stages with adequate FLR hypertrophy at a median of 30 days. There was no mortality. Median length of stay after Stage 1 and 2 were 9 and 9.6 days respectively. All patients had CT scan to assess FLR volume prior to Stage 2.

Conclusion
A limited transection of 30-40% achieves adequate levels of hypertrophy in order to proceed to the second stage of the operation with low morbidity and no mortality. We feel it is worth pursuing this strategy for patients with otherwise inoperable disease.
Liver surgery: Clinical
FP4.08

Missing Liver Metastases in colorectal cancer as a clinical challenge. Single centre experience

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Background
Chemotherapy regimens have changed the current scenario of CRC LM, making some difficult to identify through classic radiological techniques. Missing Metastases (MM) arise as a clinical challenge for the surgeon.

Methods
The aim of this study was to identify “Missing Metastases”, defined as lesions on baseline imaging that were not identifiable on pre-operative MRI.
Retrospective review of hepatic resections for colorectal metastases between 01/2014 and 12/2016 was performed to evaluate the rate of complete radiological and pathologic response.

Results
In the 2 year period we performed liver resection (LR) in 172 patients, of which 13 presented MM. The total number of MM identify on baseline imaging for these patients was 51.
At surgical pathology 6 of 16 lesions resected demonstrated viable tumor. Twenty two of 35 lesions left in situ presented a sustained clinical response, meanwhile 13 of 35 relapsed in the same location.

Conclusion
Despite disappearance on MRI imaging, pathology exam showed viable tumor in 37% of resected LM. On the other hand, in patients with MM left in situ, more than the third part relapse during the first year.

New radiological techniques such as Fusion CEUS-CT and Fiducial markers could help the surgeon to identify the original location and perform a complete resection.
Monitoring of liver function using the novel liver maximum function capacity test (LiMAx) in a patient undergoing ALPPS

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Background
ALPPS has been described as a promising method to increase the resectability of liver tumors. Optimal timing of hepatectomy at the point of sufficient hypertrophy of the future liver remnant (FLR) is essential for the morbidity and mortality of this procedure. The recently developed LiMAx-test can be applied to monitor postoperative liver function and hence might represent a useful tool for decision-making regarding the timing of the second step of ALPPS.

Methods
A 73-year-old female patient presented with metachronous colorectal liver metastasis comprising the complete right liver lobe as well as segment IV. Due to an insufficient FLR (19.3%) and a low FLR:body weight ratio (0.28%) the decision was made to perform ALPPS.

Results
Despite a formally sufficient increase of the FLR to 30.8% within 7 days after the first step of ALPPS, the liver function was seen to only slowly increase as expressed by a LiMAx value of 245 µg/h/kg. By means of the LiMAx-test, sufficient increase of liver function eventually was detected by postoperative day 11 (LiMAx value of 371 µg/h/kg; FLR 35.2%) so that second step of ALPPS was performed with no signs of liver failure during further clinical course.

Conclusion
Applying LiMAx during ALPPS, we have found a significant difference between increase in volume and function of the FLR. LiMAx hence might proof valuable for application in two-stage liver resection to avoid postoperative small-for-size syndrome.
Morbidity and Health-related Quality of Life after laparoscopic liver resection

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Background
Potential benefits of laparoscopic liver resections (LLR) over open liver resections (OLR) such as the clinical outcome and Health-Related Quality of Life have not convincingly been investigated so far.

Methods
All patients who had undergone LLR and OLR at our Department between 1st June 2014 and 10th October 2016 were identified. Health-Related Quality of Life (HRQoL) was assessed using the Short Form 36 (SF-36). All patients who returned the surveys were then retrospectively analyzed with regards to the perioperative outcome.

Results
We received 66 eligible questionnaires (50%). The number of major liver resections did not significantly differ between both groups (LLR: 11 [33%], OLR: 16 [48%], p=0.211). The proportion of patients with 2 or more comorbidities (p=0.044) and liver cirrhosis (p=0.016), respectively, was significantly higher in the LLR group, when compared to the OLR group (LLR: 11 [33%] versus 3 of 33 patients [9%], p=0.016). There were significantly more pulmonary complications in the OLR group compared to the LLR group (p=0.044). HRQoL scores were good with no significant differences between both groups.

Conclusion
Despite more comorbidities as a well as a higher proportion of patients with liver cirrhosis in the LLR group, pulmonary complications were less frequent, length of hospital stay was shorter, and HRQoL scores were as good as in the OLR group. Laparoscopic liver surgery can be performed safely even in multimorbid elderly patients resulting in high HRQoL scores.
Multicentric evaluation of liver function in ALPPS using hepatobiliary scintigraphy - liver volume overestimates liver function

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Background
ALPPS induces a rapid and extensive increase in liver volume. The functional quality of this hypertrophic response has been questioned since ALPPS is associated with a substantial incidence of liver failure and increased perioperative mortality. This multicenter study aimed to evaluate functional liver regeneration in contrast to volumetric regeneration using 99mTc hepatobiliary scintigraphy (HBS) in ALPPS.

Methods
Patients who underwent ALPPS and HBS in four centers were included. HBS data were analyzed centrally by a single Nuclear Medicine physician according to established protocols. Increase in liver function after stage 1 ALPPS was compared to the increase in liver volume. In addition, the impact of liver function and volume on postoperative outcomes was analyzed including liver failure, morbidity, and mortality.

Results
In 34 patients, future liver remnant volume increased by 76% (median, range 7-287) over 7 (median, range 3-31) days after stage one, while function increased by 41% (median, range 40-243%) over 6 days (median, range 5-17). After stage 2 ALPPS, liver failure occurred in 4/34 (12%) patients, severe complications in 17/34 (50%), and mortality was 12% (4/34).

Conclusion
In ALPPS, volumetry overestimates liver function and may be responsible for the high rate of liver failure. Quantitative liver function tests are indispensable to avoid post hepatectomy liver failure.
Multimodal threedimensional resection planning for extended liver resection in a severe case of Echinococcus multilocularis

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Background
Liver infections of Echinococcus multilocularis (EM) are rare in Germany. The optimal therapy of EM is surgical liver resection similar to malignant tumors.

Methods
We describe the case of a 22-year-old patient who was diagnosed with increased liver enzymes during a routine checkup. Further radiologic diagnostics revealed an extended, cystic tumor of the liver with infiltration of left and middle hepatic vein and close contact to the right hepatic vein (RHV) and the inferior vena cava (VCI). Serologic tests confirmed the infection with EM. The patient was referred with the question of resectability after primary azole treatment. For a better preoperative evaluation, we performed a 3D reconstruction and resection planning. We combined this with 3D printing of the liver and the virtual display of the reconstruction in a virtual reality head mounted display (VR-HMD). For a curative and functional operation, resection of the VCI and reconstruction of the RHV seemed the only possibility.

Results
We performed extended left hepatectomy with resection of segment 1, the extrahepatic bile duct, partial resection of the VCI and reconstruction with pericardial patch and end-to-end anastomosis of the segmentally resected RHV. The tumor was completely resected and histopathological analysis confirmed EM.

Conclusion
In extended cases, the use of 3D reconstruction in combination with latest display methods such as VR-HMD or 3D printed models can improve surgical liver resection planning.
Multimodal treatment modalities are associated with improved long-term outcome in patients with recurrent hepatocellular carcinoma

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Background
Tumor recurrence after liver resection remains a major problem in hepatocellular carcinoma (HCC). We evaluated prognostic markers for HCC tumor recurrence (TR) and overall survival (OS) in patients who underwent liver resection in curative intent. Furthermore, we examined the effect of multimodal treatment on OS in a subgroup of patients with HCC recurrence.

Methods
Between 2009-2015 96 patients underwent surgical resection for HCC at our institution. Median follow-up was 50 month. In cases of TR, patients underwent repeated liver resection, liver transplantation, local ablative procedures or palliative treatments. The associations of recurrence-free-survival (RFS) and OS with clinicopathological characteristics were assessed using univariate survival analyses.

Results
Median OS was 31 months and median RFS was 30 months. Macrovascular invasion (p=0.001), Milan-criteria (p=0.013), number of nodules (p<0.001) and largest tumor diameter (p=0.023) were associated with RFS. In patients with TR (54%), we did not observe an association with OS (p=0.488). Nevertheless, patients with HCC recurrence who underwent repeat-surgical or interventional treatment showed significant improved OS compared to patients treated with palliative treatment alone (OS: 32m vs. 13m; p<0.001).

Conclusion
Tumor recurrence alone is not associated with poor oncological outcome and repeat liver resections and local ablative procedures are crucial to improve OS in HCC. Large prospective trials are needed to validate our findings.
Multimodal treatment of Rt. gastroepiploic arterial leiomyosarcoma suspected gastrointestinal stromal tumor (GIST) with hepatic metastasis

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Background
Leiomyosarcoma of an artery is very rare, and cases with synchronous hepatic metastasis are even rarer.

Methods
To the best of our knowledge, this is the first report of intra-abdominal arterial leiomyosarcoma with hepatic metastasis.

Results
We herein describe the case of a 70-year-old man who had a leiomyosarcoma of the right gastroepiploic artery with synchronous hepatic metastasis was survived during 36 months after multimodal treatment (three times of surgical resections, radiofrequency ablation, transarterial chemoembolization and chemotherapies).

Conclusion
Even though aLMS shows aggressive clinical features, if it is detected in the early stage, it can be removed; such cases show good outcomes after the multimodal treatment (resection, CTx, chemoembolization and RFA). Consequently, multimodal treatment might be helpful to manage this kind of disease.
Multivariate analysis of preoperative risk factors for prolonged operating time in laparoscopic liver resection

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Background
Laparoscopic liver resections (LLR) are associated with improved short-term patient outcomes. However LLR is technically demanding and complex procedures, such as major hepatectomy, take significantly longer when undertaken laparoscopically. The aim of our study was to evaluate preoperative factors that influence operating time in LLR.

Methods
Retrospective analysis of a prospective database of consecutive patients undergoing LLR between January 2011 and June 2016. Univariate and multivariate analyses of factors influencing operating time were performed.

Results
159 patients underwent LLR during the study period. Median age was 67 years (IQR 57-74). Median BMI was 27 (IQR 24-30). Fifty six patients (35%) had undergone previous laparotomy and 131 patients had malignant tumours (82%). Conversion to open surgery occurred in 21 patients (13%). Median operating time was 138 minutes (IQR 105-212). Median Iwate difficulty index was 4 (IQR 3-5), including 29 patients with an index > 6. ASA grade, BMI, Iwate index, parenchymal disease and postero-superior location were all significantly associated with prolonged operating time on univariate analysis. Previous laparotomy (p=0.013), Iwate index (p<0.001) and parenchymal disease (p=0.003) were significant on multivariate analysis.

Conclusion
This study has identified risk factors for prolonged operating time in laparoscopic liver resection. High risk patients should be operated by experienced surgeons, and conversion to open surgery should be considered early.
Multivisceral resection for Hepatic Alveolar Echinococcosis

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Background
HAE is an endemic zoonotic disease in our region. This disease is characterized with slowly growing asymptomatic mass that invades adjacent structures like the inferior vena cava, adrenal gland, diaphragm and stomach. Resectability rates are low. Besides anatomic and non-anatomic liver resections complex resections including the adjacent organs may be necessary.

Methods
We retrospectively evaluated our records of HAE cases. A total of 237 HAE cases were followed by our clinic between 2000-2016. There were 101 patients underwent liver resection (42.6%). Twenty-four (10.1%) underwent multivisceral resections. All data of these patients were evaluated, retrospectively

Results
Twenty-four (10.1%) underwent multivisceral resections. Besides the liver, adrenal gland (11 cases), right hemidiaphragm (partial) (7 cases), inferior vena cava (7 cases), stomach (1 case partial resection) and right kidney (1 case) were resected. Mean operating time was 240 + 77 mins. Four patients died (17%). Complications were observed in 16 (66.6%).

Conclusion
Complex multivisceral resections are sometimes necessary and should be done with in experienced centers
Liver surgery: Clinical
FP27.04

Multivisceral resection in locally advanced hepatocellular cancer

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Background
In locally advanced hepatocellular carcinoma (HCC) complete tumor removal is the only potentially curative approach. The aim was to study the outcome of multivisceral resection (MVR) in our single center experience.

Methods
Between 1997 and 2016, a total of 417 liver resections (LR) for HCC were performed and prospectively collected in an SPSS database. In 44 cases LR was combined with resection of either an adjacent organ (group A, n=15), the diaphragm (group B, n=17), or a major hepatic vessel / extrahepatic bile duct (group C, n=12), respectively. As a control group (D) served 24 irresectable patients. The organs resected in group A were the adrenal gland (n=7), the intestine (n=5), stomach (n=4), peritoneum (n=2), lung (n=1) or spleen (n=1). Of 44 resected patients, 38 had primary and 6 recurrent HCC, 13 (29.5%) patients had cirrhosis.

Results
The 30-day mortality across all groups was 9%. The 1-, 2- and 3-year OS (RFS) was 53.3 (20)%, 26.7 (6.6)% and 20 (6.6)% in group A, 47.1 (29.4)%, 41.2 (23.5)% and 29.4 (5.8)% in group B, 58.3 (33.3)%, 41.7 (25)% and 25 (16.7)% in group C, and 20.8%, 8.3% and 0% in group D, respectively. Maximum survival was 14.2 years in group A, 5.8 years in group B, 5.4 years in group C, and 2.1 years in group D. Maximum survival for patients with recurrent tumor across groups A to C was 1.9 years.

Conclusion
For patients with locally advanced primary HCC, MVR can offer mid- and long-term survival in selected cases.
Neoadjuvant Folfiri+Bevacizumab in resectable liver metastases from CRC: results and comparison of PET/CT scan vs RECIST in predicting outcome

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Background
Preoperative treatment of resectable liver metastases from CRC is an hot topic. The aims of this study were to test the feasibility and activity of Bevacizumab+FOLFIRI in this setting and to explore the role of PET/CT in predicting the efficacy of treatment and to compare it to the standard RECIST response.

Methods
A single-arm phase 2 study design enrolling 39 patients was applied with 1-year PFS as primary end point. PET/CT was performed before and after 1 cycle of treatment. For each lesion a ≤50% change from baseline was used as threshold for significant metabolic response for maximum SUV. RECIST response was assessed with CT after 3 months of treatment. The association between metabolic and CT/RECIST and pathologic response (PR) was tested as well as the ability to predict PFS and OS.

Results
Response rate was 66.7%. 37 patients (94.9%) were operated with a R0 rate of 84.6%. 5 patients had a complete PR (14%). At 1 year 24 patients were alive and free from disease (61.6%). Median PFS and OS were 14 and 38 months. Early metabolic PET/CT response had a stronger, independent and statistically significant predictive value for PFS and OS than both CT/RECIST and PR at multivariate analysis.

Conclusion
Preoperative treatment of patients with resectable liver metastases from CRC with bevacizumab plus FOLFIRI is feasible. PET/CT response was significantly predictive of long-term outcomes during preoperative treatment and its predictive ability was higher than that of CT/RECIST response after 3 months of treatment.
Oncological outcomes of ablation and liver resection vs liver resection alone for colorectal liver metastasis from a single centre.

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Background
Surgical resection is the standard treatment for colorectal liver metastases(CRLM). The use of ablation in combination with resection allows more patients to benefit from cure. We report the outcomes & recurrence rates of ablation & resection vs liver resection alone for CRLM.

Methods
We analysed prospectively maintained database of 133 consecutive patients from 2012-2016 who underwent surgical treatment for CRLM. 107 patients underwent resection alone & 26 had resection & ablation.

Results
Baseline variables like age, BMI, preoperative ALT, Bilirubin, INR, CEA & size of largest lesion on imaging were similar in both groups. The mean operative time 244 mins was higher in ablation&resection vs. 178 mins in resection only (P<0.01). The mean intra-operative blood loss was similar in both groups P=0.17. The mean number of lesions on histology, the largest lesion on histology and the distance from resection margin on histology were similar (3.8 vs 2.1 P=0.002, 33 vs 38 mm P= 0.418 and 20.5 vs 6.1 mm P= 0.54). In ablation & resection group 38% patients had R1 resection as compared to 22% in resection only group. 1 year liver and multiorgan recurrence rates were 46% and 15% in ablation & resection group as compared to 19.6% and 12.11%. The overall recurrence rate in ablation & resection group was 34.6% vs 56.1% in resection.

Conclusion
There is higher recurrence rate in ablation & resection group compared to resection only group reflecting advanced disease in the group but we believe ablation till has a role in curative treatment.
One-stage pure laparoscopic resection of primary colorectal cancer and synchronous hepatic metastases: a single institution experience

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Background
Simultaneous pure laparoscopic resection (SPLR) of the primary colorectal cancer and synchronous liver metastases (LM) is rarely performed. The aim of this study is to review a single institution experience.

Methods
Between 2012 and 2016, 64 patients underwent laparoscopic liver resection for various benign and malignant liver tumors. The analysis included SPLR. The primary outcomes of this study were clinical and pathological variables. The secondary outcome was survival.

Results
Eight patients underwent SPLR with laparoscopic colectomy (n = 3) and proctectomy (n = 5). Liver resections included only minor surgery: left lateral sectionectomies (n = 4) and atypical resections (n = 4). Average operating time was 270 minutes (range 180 - 390 minutes). Estimated blood loss was in average 380 mL (range 50 - 600 mL). Conversion to open procedure was performed in one patient. All patients had only one LM and the size was in average 2.6 cm (range 1 – 5 cm). R0 resection was achieved in all cases. Resection margin was in average 6.8 mm (range 2-15 mm). Median (range) hospital stay was 9 (7-42) days. The number of major morbidity was: 1 (Clavien-Dindo 3B), and there was no postoperative mortality. Median follow-up for surviving patients was 13 months. Six patients are alive with no evidence of disease, one patient is alive with disease and one patient died of disease.

Conclusion
SPLR is feasible and safe for treatment of synchronous LM and there is no compromise of oncological surgical principles.
Open versus laparoscopic liver resection for colorectal metastases located in the posterosuperior segments

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Background
Laparoscopic liver resection of tumors located in the posterosuperior segments is considered to be technically challenging. This study aimed to compare the perioperative outcomes for laparoscopic versus open resection of colorectal liver metastases (CRLM) located in the posterosuperior segments.

Methods
This is a sub-study of the Oslo-CoMet trial. In this trial, 280 patients were randomly assigned to open or laparoscopic parenchyma sparing liver resections of CLRM. Inclusion was from February 2012 to February 2016. Patients with CRLM in posterosuperior segments were identified, and perioperative and short-term oncological outcomes were collected from the prospective trial database. The Accordion system and the Comprehensive Complication Index were used for grading of postoperative complication.

Results
62 patients underwent laparoscopic and 78 patients open liver resections. Postoperative complications developed in 22 cases (28.2%) in open group and 16 cases (25.4%) in laparoscopic group (p=0.71). The median postoperative hospital stay was 2 days in the laparoscopic and 4 days in the open group (p<0.001). Further perioperative outcomes will be presented at the congress.

Conclusion
We found similar postoperative complications rate and decreased hospital stay, following laparoscopic resection of posterosuperior segments in patients with CRLM.
Operation video: Associating Liver Partition and Portal Vein Transection for Staged Hepatectomy

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Background
To report one case on associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) in patients with multiple liver tumors.

Methods
The male patient was diagnosed with HCC and HBV-related liver cirrhosis. CT showed that the tumors were located in right liver lobe (13cm), segment 3 (1cm) and segment 4 (5cm) respectively, and proximal parts of right portal vein and right hepatic vein were suspiciously invaded. The remnant liver volume (RLV) was measured before or after each stage.

Results
Before stage I, the RLV of segment 4 without tumor (S4 WT) was 168cm³. RLV of segment 2-3 without tumor (S2-3 WT) was 402 cm³. Left hemi-liver volume (without tumor)/total liver volume (LHV/TLV) was 52.6%. The procedure of stage I was including: Remove the tumors located in S3 and S4, transection of right portal vein, dissection of ventral liver parenchyma along Cantlie plane. 8 days after stage I, RLV of S2-3 WT was increase by 19.9%. LHV/TLV was 58.2%. The procedure of stage II was carried out: Ligation of right hepatic artery, dissection of dorsal liver parenchyma along Cantlie plane, transection of right hepatic vein and division of peripheral ligaments of right liver and ligation of splenic artery. 15 days after stage II, RLV of S4 WT was increased by 43.6% compared with pre-stage II, whereas RLV of S2-3 WT was not changed compared with pre-stage II.

Conclusion
ALPPS is safely achieved, and suit for the patients with multiple liver tumors.
Optimizing prognostication in patients with synchronous liver metastases from rectal cancer treated according to the liver-first approach.

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Background
Patients with rectal cancer (RC) and synchronous rectal liver metastases (sRLM) can be treated according to the liver-first approach. A proportion of patients does not complete the full treatment trajectory. This study aims to evaluate currently available prognostic factors in patients treated according to the liver-first protocol. It also aims to improve prognostication for non-completion of the treatment sequence in this highly selected patient population.

Methods
Retrospective analysis of all patients treated for RC with sRLM at the Erasmus MC Cancer Institute according to the liver-first protocol.

Results
In total 132 consecutive patients were included in this study, of which 90 patients (68%) completed the full treatment trajectory. Logistic regression showed that two well-known clinicopathological factors (RLM size > 5cm, bilobar RLM) were associated with not completing full treatment trajectory. Receiver operating characteristic (ROC) analysis identified the optimal cut-offs for preoperative CEA (37 ug/L), size (2.65 cm) and number (5) of RLM. The use of optimal cut-offs improved performance of the logistic regression model, as the area under the curve (AUC) increased from 0.62 to 0.73.

Conclusion
The study identified optimal cut-off points for currently available clinicopathological factors, which improved prognostication in this selected patient group. The obtained results can be used for counselling but, cannot be used to exclude patients from treatment according the liver first protocol.
Our experience in surgical resection of hepatoblastoma

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Background
Hepatoblastoma (HB) is the most common malignant liver tumour in children; it accounts for 50% of liver tumours and 1.3% of malignant tumours in childhood. Surgical resection remains the cornerstone of curative therapy.

Methods
Retrospective review of patients diagnosed of HB in the last 15 years in our centre and review of literature.

Results
5 patients were identified. Male: 100%. Mean age: 3.15 years-old. Low birth weight: 0. Tumour biopsy: 100%. α-fetoprotein (α FP) < 100 ng/mL: 20%; the same patient was initially diagnosed of metastases (lungs, bilateral) and finally died. Chemotherapy regimens: SIOPEL 3 (PLADO): 60%, SIOPEL 4: 20%, SIOPEL 6: 20%. Mean time diagnostic-surgery: 96.26 days. Staging CT post neoadjuvant chemotherapy: 100%. Types of surgery performed: right hepatectomy 60%, left hepatectomy 20%, transverse hepatectomy 20%. Postoperative complications: Clavien-Dindo grade II: 80%, grade III: 20%. Free surgical margins: 80%. Histology: epithelial 60%; mixed epithelial-sarcomatous 20%; mixed epithelial-mesenchymal 20%. Portal, suprahepatic or extrahepatic intraabdominal disease were not observed. Mean disease free survival: 9.19 years. Mortality: 20%.

Conclusion
HB is the most frequent malignant liver tumour in children. Low α FP (< 100 ng/mL) and the presence of metastases initially diagnosed worsen prognosis. Neoadjuvant chemotherapy may lead to downstage tumour size and ease surgery, even though surgery is the only curative therapy.
Our first laparoscopic right hepatectomy. A challenge for a surgical team

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Background
In our group we decided to face this difficult procedure after having performed resection in all hepatic segments, including the demanding segment VII.

Methods
We present the case of a young woman, 22 years old, who presented a liver mass, 70 mm in diameter, atypical characteristics in diagnostic procedures (CT, MR) and that showed hypermetabolic activity in CT-PET suggesting malignancy.

The patient was placed in a supine position with legs open and partial elevation of the right chest and abdomen. Five trocars were used and an extracorporeal tourniquet was prepared using a 20 Fr thoracic drain.

Surgical steps were: 1) right liver mobilization; 2) placement of a textile tape around the hepatic hilum for Pringle manoeuvre if necessary; 3) dissection and section of cystic artery and duct; 4) hilar dissection with control and section of right hepatic artery and right portal vein; 5) completion of cholecystectomy; 6) parenchymal transection, section of right hepatic duct with stapler and final section of the right hepatic vein with a vascular stapler. A midline incision was performed for the extraction of the specimen an a drain was left in place.

Results
No Pringle manoeuvre was used. Intraoperative bleeding was 500 ml. No transfusion was necessary.

The postoperative course was uneventful, with a postoperative stay of 5 days.

Conclusion
Right laparoscopic hepatectomy is a demanding procedure. Strict criteria of selection of patients should be applied in the early experience of the surgical teams in order to face this procedure.
Outcome of liver resection for intrahepatic cholangiocarcinoma with macroscopic vascular invasion. Analysis of a multi-institutional database

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Background
Surgery is the standard treatment of intrahepatic cholangiocarcinoma (ICC). In presence of macroscopic vascular invasion (Macrovasc), the outcome of resection is still to elucidate.

Methods
A multi-institutional series of ICC patients was analysed. The 247 patients undergoing resection without operative mortality were included. Preoperative imaging and pathology data were reviewed to identify Macrovasc.

Results
Of the analyzed patients, 82 (33%) had Macrovasc: 39 of a portal branch, 21 of a hepatic vein, and 22 of both. Patients with Macrovasc had larger tumors (>50 mm 65 vs. 44%, p=0.002) and more N+ (44 vs. 30%, p=0.068). Patients with Macrovasc had lower survival (3-year OS 47 vs. 61%, p=0.025). Lower OS was observed for both hepatic vein Macrovasc (3-year OS 40.1%, p=0.032) and portal Macrovasc (44.7%, p=0.010). The level of portal invasion (1st- vs. 2nd-order branches) did not modify prognosis (p=0.813). If both a hepatic vein and a portal branch had Macrovasc the prognosis further decreased (3-year OS 29.1%), but was still higher than unresected patients (0% at 24 months, p<0.001).
At the multivariable analysis, hepatic vein invasion was a negative prognostic factor of OS (p=0.041, OR=1.709). Additional prognostic factors were N+ (p< 0.001), R1 resection (p=0.040), ICC size >50 mm (p=0.040) and number>1 (p<0.001).

Conclusion
One-third of patients with ICC have Macrovasc. It is a negative prognostic factor, but not a contraindication to surgery because complete resection may confer a survival benefit.
Liver surgery: Clinical
FP4.02

Outcome of liver resection for non-colorectal, non-neuroendocrine metastases - a single-center experience

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Background
Evidence is increasing that subgroups of non-colorectal (NCRC), non-neuroendocrine (NNE) liver metastases (LM) benefit from liver surgery.

Methods
Patients who underwent curative surgery for NCRC/NNE-LM were recorded in a prospective institutional data base. Patient age, tumor entity, histology, type of resection, R-status, extrahepatic disease, overall (OS) and disease-free survival (DFS) were assessed. Re-resections were excluded.

Results
Of 129 patients who underwent liver resection for NCRC/NNE LM, 83 patients with a median age of 61.2 years were included. Liver surgery was performed for metastases from periampullary (n=14), urogenital (UGT, n=13), upper gastrointestinal (UGI, n=13), breast (BC, n=9) and renal cancer (n=6), as well as for gastrointestinal stromal tumors (GIST, n=11) and others (n=17). Twenty-nine major resections were performed, while the remaining 54 were resections of less than 3 segments. R0 resection was achieved in 76 cases (91.6%). Median OS and DFS for the entire cohort were 46.1 and 16.4 months, respectively. Patients with metastases from GIST and BC revealed the best median OS (92.5 months). Patients with renal cancer, urogenital tumors, and others revealed a median survival of 57.3 months while the remaining entities achieved a median OS of 29.6 months.

Conclusion
Patients with NCRC/NNE LM benefit from liver resection with curative intent. Breast cancer and GIST liver metastases have benefited the most from liver surgery in our cohort of patients.
Outcomes of laparoscopic radiofrequency ablation of liver tumours

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Background
Radiofrequency ablation (RFA) of malignant liver tumours is a well-established alternative to resection, particularly in patients with cirrhosis or severe comorbidities. We report on outcomes of laparoscopic RFA (LRFA) as an alternative to access via laparotomy for those tumours that are not amenable to the percutaneous route.

Methods
This retrospective study evaluates the introduction of LRFA at a tertiary referral centre between November 2015 and December 2016. All patients were assessed by a multidisciplinary team and if deemed unsuitable for resection were considered for RFA. Those lesions that were inaccessible to percutaneous route such as in superior liver segments close to the diaphragm or at peripheral location underwent LRFA.

Results
Six patients underwent LRFA, with one patient requiring conversion to laparotomy due to bleeding. Five patients had HCC and 1 patient had colonic cancer metastasis. All patients had a single lesion, mean size was 27.33 mm. Mean length of stay was 2.67 (range 1-7) days. Two patients suffered minor complications, no death occurred during the follow-up period. There were no local recurrences during the study period (mean follow-up 5.5 months, range 1-11).

Conclusion
LRFA is a safe and effective approach to managing tumours deemed not amenable to resection or percutaneous RFA. This technique extends the option of curative treatment to this category of patients. Due to the small number of cases in this study more experience will be needed to confirm these results.
Outcomes of liver-first strategy and classical approach for synchronous colorectal liver metastases in Sweden.

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Background
Patients with synchronous colorectal liver metastases (sCRLM) are increasingly operated with liver resection (liver-first strategy) before resection of the primary colorectal cancer (classical strategy). The aim of the present study was to compare outcomes in patients following the liver-first and classical strategies using data from a nation-wide registry.

Methods
In this prospective cohort study, clinical, pathological and survival outcomes were compared between liver-first and classical strategies (2008-2015).

Results
A total of 623 patients with sCRLM were selected, of which 246 patients were treated by the liver-first strategy and 377 by the classical strategy. Patients treated by the classical strategy had a higher proportion of T4 tumours (23% vs 14%, p=0.012) and positive lymph nodes (70% vs 61%, p=0.015) and patients treated by the liver-first strategy had more liver metastases (2 (1-4) vs 2 (1-3), p<0.001). Survival analysis showed positive lymph nodes (HR: 1.7, CI: 1.29-2.25, p <0.001), T4 tumours (HR:2.03, CI: 1.53-2.69, p<0.001), tumour score (HR: 2.00, CI: 1.29-3.11, p=0.002), and ASA class 3-4 (HR: 1.55, CI: 1.17-2.05, p=0.002) as unfavourable prognostic factors affecting overall survival (OS). No difference was seen in OS between the groups (56.9% vs 58.5%; P = 0.27).

Conclusion
Patients that follow the classical strategy for sCRLM had more advanced primary tumour disease and patients that follow liver-first strategy had more liver metastases. No difference was seen in overall survival.
Outcomes of transarterial chemoembolization (cTACE) in elderly patients with non-resectable hepatocellular carcinoma

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Background
There are a number of treatment options to palliate patients with unresectable hepatocarcinoma (HCC), but they must be tailored carefully. Aim of this study was to evaluate the safety and efficacy of conventional transarterial chemoembolization (cTACE) in elderly patients treated at the Royal Infirmary of Edinburgh.

Methods
Between May 2007 and May 2015, 88 patients older than 70 years received cTACE. Centralized radiologic review of tumor response was made according to mRECIST criteria.

Results
Radiological Response (RR) after the 1st TACE was observed in 56/88 patients (64.4%), of which 29% had a complete response (CR) and 42% partial response (PR). At 2nd TACE, RR was 17/40 patients (42.5%), of which CR 17.5% and PR 25%. Median overall survival (OS) was 32.8 months. Survival rates at 1, 3 and 5 years were 78.4%, 41.8% and 14%. Median disease free survival (DFS) was 20 months. DFS rates at 1 and 3 years were 63.8% and 17.4%. Factors associated with shorter OS at multivariate analysis were: female gender (HR 1.788, p=0.098), tumor burden beyond 7 criteria (HR 2.1, p=0.058), progression of disease (PD) (PR vs PD: HR 0.467, p=0.035; SD vs PD: HR 0.435, p=0.085). Complications occurred in 37/189 procedures (2.7%) with only 1 death.

Conclusion
Elderly patients treated with TACE for unresectable HCC have good OS with low complication rate. Thus age should not be an exclusion criteria to TACE when considering treatment allocation.
Pain treatment in open liver resection, systemic multimodal analgesia vs epidural analgesia: A randomized controlled trial (data from Oslo-Comet study)

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Background
Epidural analgesia (EA) is commonly provided to treat pain following major abdominal surgery. There is a discussion on the efficacy and safety of EA compared with other kinds of patient controlled analgesia. The aim of our study was to evaluate systemic multimodal analgesia including Intravenous Patient Controlled Analgesia (IV-PCA) vs EA in patients undergoing liver resection by open laparotomy. Our hypothesis is that IV-PCA is non-inferior to EA.

Methods
Patients were randomized to ketobemidon based IV-PCA in combination with fixed doses of ketorolac, or EA. Both groups received a single dose of dexamethasone and paracetamol 1 g qid. Primary outcome measure was overall pain intensity during the days 1-5 and scores on day 0 and 1 using numeric rating scale (NRS). Secondary endpoints included hospital length of stay, complications and side-effects.

Results
A total of 143 patients were included. Overall pain intensity was similar between the groups and with mean NRS < 2, (p=0.31). On postoperative day 0 and 1 the EA group showed somewhat better pain relief, but thereafter IV-PCA was superior. Total opioid reduction and removal of the infusion pumps were achieved earlier in the IV-PCA group while opioid side-effects were more frequent in the EA group. Hospital stay was shorter in the IV-PCA group (median 74 vs 104h, p<0.001).

Conclusion
Overall, IV-PCA demonstrated effective postoperative analgesia non-inferior to EA with a trend towards less side-effects and significantly shorter hospital length of stay.
Parenchymal sparing laparoscopic liver resections of colorectal liver metastases

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Background
Patients with multifocal colorectal liver metastases (CRLM) should undergo parenchymal sparing resections whenever possible. Lesions close to the hepatic hilum or veins are frequently judged to require extensive liver resections. This video demonstrates that lesions in proximity to the hepatic veins and hilar structures are well resectable laparoscopically using a parenchymal-sparing approach.

Methods
Two laparoscopic liver resections for CRLM performed in 2016 are reviewed. One patient has a lesion in segment 4b in proximity to the left hepatic hilum. Another patient has a lesion between the left and middle hepatic vein in proximity to the middle hepatic vein. Both procedures are planned using 3-dimensional MRI reconstruction. Video documentation of the resections is used to review approach, tips and pitfalls.

Results
Laparoscopic resections of segment 4b, 5, 6 are demonstrated in a 49 year old male patient and of segments 2, 3 and 4 are demonstrated in a 75 year old male patient. No hilar dissection or preparation of the hepatic veins is performed in either patient. The purely parenchymal transection approach using bipolar and CUSA allows parenchymal sparing laparoscopic resections for patients, who may otherwise have been offered major resections of more than 70% of the hepatic parenchyma.

Conclusion
This video demonstrates that colorectal liver metastases close to hepatic inflow and outflow can be approached using a laparoscopic parenchymal sparing approach.
Percutaneous echinococcectomy from the liver

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Background
Improving the results of treating patients with hepatic hydatid due to differentiated application of percutaneous and traditional surgical methods of echinococcectomy.

Methods
62 patients with hepatic hydatid were operated during the period from 2010 till 2016.

Results
We took guidance from the classification recommended by the echinococcosis work group of WHO for ultrasonic images of echinococcus cysts. Percutaneous interventions were performed under ultrasonic guidance on cysts of CL, CE1, CE2, CE3, CE4 and CE5 types. Traditional intervention (modified pericystectomy with cold-plasma argon intensified electrocoagulation) was performed on cysts of CE2, CE3, CE4 and CE5 types. Polymorphism of cysts is conditioned by multiple focal lesions of liver, simultaneous lesion of lungs, repeated recurrence of cysts after surgeries made in other hospitals, or spontaneous death of mother hydatid.

Conclusion
1). Percutaneous echinococcectomy under ultrasonic guidance is more effective on hepatic hydatid of CL, CE1, CE2 and CE3 types. 2). Modified pericystectomy with cold-plasma argon-intensified electrocoagulation of fibrous capsule has several advantages as compared to traditional echinococcectomy and radical echinococcectomy (pericystectomy). 4). After echinococcectomy of any type, patients need routine care during 10 years with ultrasonic / CT / MRI control and with determination of IgG titer dynamics in blood.
Performance of liver resections in Greece: factors that dictate postoperative ICU admission

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Background
The scarcity of available intensive care unit (ICU) beds in Greek hospitals prevents major surgical procedures and leads to repeated postponement of operations. The aim of our study was to evaluate risk factors that constitute admission to the ICU mandatory following hepatectomy.

Methods
 Patients undergoing heptectomy by one senior hepatobiliary surgeon during a 5 year period were prospectively sampled and retrospectively analyzed for the purposes of this study.

Results
ICU coverage was requested for the performance of hepatectomy in 10 of 151 cases and a total of 23 patients (15%) were transferred to the ICU postoperatively. Patient age (p=0.0356; cutoff at 62 years), estimated surgery duration (p<0.0001; cut-o at 260 min), open hepatectomy (vs laparoscopic; p=0.0156), hemihepatectomy (p=0.0094), and performance of biliodigestive anastomosis (p=0.0138) were statistically significant parameters for postoperative ICU bed demand. Multivariate analysis showed patient age (p=0.0215) and hepatectomy duration (p=0.0238) were prognostic factors. Patient age and operative duration represent the most important factors that can prevent postoperative ICU treatment in patients undergoing hepatectomy.

Conclusion
Individualised preoperative patient evaluation could enable hepatectomies to be performed without the need for ICU beds. Such approach would increase the amount of responsibility for surgeons and anesthesiologists, requiring detailed and sincere patient consent.
Liver surgery: Clinical
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Performance Validation of the ALPPS Risk Model


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Background
Due to the unfavorable reported outcome in ALPPS, a precise risk stratification is needed. Based on the International ALPPS Registry, we have recently proposed two easily applicable risk models (pre-stage1 and 2) for predicting 90-day mortality in ALPPS but a validation of both models has not yet been performed.

Methods
One year after the development of the ALPPS risk model, the ALPPS registry was screened for subsequent cases not used for the development cohort (DC) of the risk model. Four centers outside the ALPPS registry were contacted to provide additional ALPPS cases. Pre-stage 1 and 2 futility risks were calculated for each patient according to the developed risk formula. ROC curve analysis was performed to assess the predictive ability of the ALPPS risk model in the validation cohort (VC).

Results
The VC was composed of a total of 176 patients including 36 patients outside the ALPPS registry with 30 cases of early mortalities (17%). The DC and VC were comparable in terms of patient and surgery characteristics. The VC validated both models with an acceptable prediction for the pre-stage 1 (c-statistic 0.62, p=0.041 vs. 0.75, p<0.001) and an excellent prediction for the pre-stage 2 model (c-statistic 0.82, p<0.001 vs. 0.84, p<0.001) as compared to the DC.

Conclusion
The ALPPS risk score is a validated tool to assess the individual risk of patients before stage-1 and stage-2 surgery. Risk adjustment in ALPPS using the risk score is an easy applicable strategy to make this procedure safer.
Peritoneal hydatid cysts: an unusual finding in western countries

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Background
Hydatidosis is a parasitic infection caused mainly by Echinococcus granulosus and Echinococcus multilocularis. Peritoneal involvement is infrequent, even following rupture of liver cysts. We report a case of peritoneal hidatid cyst in a non-endemic area.

Methods
A 67 year old female patient presented to our hospital with right abdominal pain and large palpable mass. She previously underwent a liver resection for hydatid cyst. Abdominal ultrasound, CT scan and MRI described a 15 cm peritoneal hydatid cyst. Serological tests for Echinococcus were positive.

Results
The patient underwent surgical resection of the cyst and postoperative treatment with albendazole for 3 months was prescribed.

Conclusion
Peritoneal hidatid cysts are rare in the western countries. However, since they are usually due to rupture of hepatic cyst into the peritoneal cavity or previous liver surgery, it is important to follow up high-risk patients.
Portal pressure and somatostatin: variations and effects after major hepatectomy

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Background
Major hepatectomy (MH) can lead to an increasing portal pressure (PP) and to lesions of the hepatic parenchyma. Somatostatin was efficient in experimental studies as a reversible portal inflow modulator (PIM) [1]. The aim of this study was to assess the effect of a high PP in the course of MH and to evaluate the impact of somatostatin in PP modulation and in liver function preservation.

Methods
Between January 2015 and December 2016, 52 patients underwent MH. Among them, 30 were included in a prospective protocol with an intraoperative measurement of PP. Somatostatin was used in 10 patients with a post-hepatectomy PP (PHPP) above 20 mmHg. Liver laboratory tests, postoperative morbidity and mortality were evaluated. The MD Anderson postoperative liver failure definition was used.

Results
In this study, 30 patients were enrolled. Patients were divided into two groups according to PHPP: Group A (PHPP > 20 mmHg) and group B (PHPP < 20 mmHg) with respectively 13 and 17 patients. POLF occurred only in group A accounting for 4 cases (30%) with 4 deaths (p = 0.05). In group A, 10 patients received somatostatin. The mean decrease of PP (ΔPP) was 3.3. In 4 patients, ΔPP was less than 3 mmHg; among them, two cases of POLF occurred. In the opposite case, with a ΔPP above 3 mmHg, no cases of POLF happened (p = 0.05).

Conclusion
Elevated PHPP is associated with a worse outcome after MH with a higher risk of POLF. Somatostatin is efficient as a reversible PIM and can thus reduce the risk of POLF especially in patients having a ΔPP above 3 mmHg.

References:
Portal vein embolization does not result in microvascular flow differences between the embolized and non-embolized liver lobes.

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Background
Preoperative portal vein embolization (PVE) is used to increase future remnant liver volume enabling extended resections. The microvascular effects occurring after unilateral portal venous occlusion are however, poorly understood.

The aim of this study is to assess the microvascular changes in the liver lobes after right PVE.

Methods
Videos of the hepatic microcirculation in patients undergoing right hemihepatectomy following PVE were recorded using a handheld intravital microscope, the CytoCam. Hepatic microcirculation was measured in the embolized and the non-embolized lobe after laparotomy. AVA software v. 3.2 was used to obtain the microcirculatory parameters: total vessel density (TVD), microcirculatory flow index (MFI), proportion of perfused vessel (PPV), perfused vessel density (PVD).

Results
Five patients were included after PVE (3 males, 2 females, age 66±5 years). TVD and PVD in the non-embolized lobe were significantly increased compared to TVD and PVD in the embolized lobe (i.e. 31.47±2.7 19.7±5.9 mm/mm²P:0.0159). PPV and MFI were not significantly different between the lobes indicating similar microvascular flow despite the difference in vessel density.

Conclusion
The non-embolized lobe has a significantly higher microvascular density (TVD and PVD), however without differences in microvascular flow (PPV and MFI). The overall microvascular flow is not affected by PVE which casts doubts on the portal flow differential in inducing the hypertrophy response in the non-embolized lobes.
Portal vein embolization prior to resection of colorectal liver metastases does not impact oncological outcomes

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Background
Concerns have been raised concerning tumour progression after PVE. This study aimed to compare the survival outcomes of patient subjected to major liver resection for colorectal liver metastases with or without PVE. To reduce selection bias, PVE patients were matched to non-PVE patients using propensity score matching with as primary endpoints overall and disease-free survival.

Methods
All consecutive patients who underwent major liver resection for colorectal liver metastases at three academic medical centers between January 2000 and December 2015 were included. For a propensity matched comparison, all patients who underwent PVE before major liver resection were selected. Patients were matched to patients who had undergone major liver resection without PVE.

Results
Of 745 patients undergoing major liver resection for CRLM, a total of 46 patients who underwent PVE had sufficient data and were matched. Both disease-free and overall survival were comparable between the two groups after matching.

Conclusion
Comparable disease free survival and overall survival were found in patients who underwent portal vein embolization before major liver resection compared to matched controls treated with major surgery alone. PVE is a valuable tool to improve resectability rate of patients with colorectal liver metastases and does not affect long term oncological outcomes in patients proceeding with liver resection.
Portal vein embolization with stem cells application for increasing future liver remnant volume in primary non-resectable colorectal liver metastases

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Background
Insufficient future liver remnant volume (FLRV) is the main cause of non-resectability of colorectal liver metastases (CLM). Portal vein embolization with application of autologous hematopoietic stem cells (PVEHSC) are possible methods for stimulation of FLRV growth.

Methods
PVEHSC was used in 24 patients with primary non-resectable CLM due to insufficient FLRV. PVE was performed on the site of CLMs. HSC were received in the first eleven patients via apheresis after a four-day stimulation by granulocyte-colony stimulating factor and in the following 13 patients from bone marrow and prepared by centrifugation at the same time. The product was applied via vena ileocolica to the contralateral liver lobe, which was free of CLM. Liver resection was performed as soon as after sufficient growth of FRLV.

Results
Procedure morbidity and mortality was zero. Sufficient FLRV developed in all patients in the interval of three weeks. The median of FLRV enlargement was 181 ml and average FLRV growth was 3.4 ml/day. The average growth of CLM volume was 41.5 ml, resp. 0.9 ml/day. R0 right hepatectomy was performed in 20 patients (83.3 %), exploratory laparotomy in four patients (3x tumor progression, 1x severe adhesions). One and three years OS was 76.6, resp. 50.3%, DFI 67.2, resp.32.1% in patients after liver resection. More than three CLM were the only significant factor for DFI (p<0.04).

Conclusion
PVEHSC is a safe and promising method for increasing FLRV in patients with primary non-resectable CLM.
Liver surgery: Clinical
FP30.06

Postoperative liver failure risk score identifying patients with resectable perihilar cholangiocarcinoma who may benefit from portal vein embolization

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Background
Major liver resection for perihilar cholangiocarcinoma is associated with an incidence of postoperative liver failure (PLF) of 22-33%. The aim of this study was to analyze the predictive value of future liver remnant (FLR) volume and to develop a risk score for PLF after resection for PHC.

Methods
The 217 patients included from 1997 to 2014 at two Western centers were analyzed; FLR volumes were calculated with CT volumetry. Other variables included jaundice at presentation, immediate preoperative bilirubin, and preoperative cholangitis. FLR volume was categorized as < 30%, 30%-45% or >45%. A risk score for PLF (grade B/C according to the ISGLS criteria) was developed using multivariable logistic regression.

Results
PLF incidence was 24% and PLF-related mortality 12%. Risk factors for PLF were FLR volume below <30% (OR 4.0 95%CI (3.2-6.4) and FLR volume of 45-30% (OR 2.0(1.6-3.12)). Also jaundice at presentation (OR 3.1(1.1-9.0), immediate preoperative bilirubin above 50µmol/L (OR 4.3(1.7-10.7)) and preoperative cholangitis (OR 3.4(1.6-7.4) were risk factors for PLF. These variables were included in a risk score that showed good discrimination (AUC 0.79(0.72-0.86) and good calibration.

Conclusion
The selection of patients for PVE using only liver volume is insufficient considering the other predictors of PLF in PHC patients. The proposed risk score can be used for selection of patients for PVE, for adequate patient counseling and identification of other modifiable risk factors besides liver volume.
Liver surgery: Clinical
Sym30.06

Postoperative serum phosphate drop is an early marker of liver growth after ALPPS stage 1 and predicts outcome after ALPPS stage 2

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Background
The accelerated hypertrophy after ALPPS stage-1 is based on rapid cell division. This process demands tremendous amounts of phosphate for the synthesis of nucleotidetriphosphates during DNA replication. The aim of this study was to analyze whether changes in serum phosphate levels are associated with liver growth and posthepatectomy liver failure (PHLF) after ALPPS.

Methods
Serum phosphate changes within the first 7 postoperative days (POD) after ALPPS stage-1 were assessed in 49 patients. All patients underwent volumetric imaging of the future liver remnant before ALPPS and at POD 7 after stage-1. The association of serum phosphate drop (PD) after ALPPS stage-1 with liver hypertrophy after stage-1 and with incidence of PHFL after stage-2 were investigated.

Results
After ALPPS stage-1, serum phosphate levels decreased from 1.1 mmol/l (IQR 0.92-1.2) preoperatively to a nadir of 0.7 mmol/l (IQR 0.54-1.02; p< 0.001). The median PD was 40.9%/day (IQR -68.9 to -17.3%/d). Patients with a PD >40%/day showed significantly accelerated liver hypertrophy (median +264ml; IQR 196-347ml) after ALPPS stage-1 as compared with patients with a drop ≤40%/day (median +183ml; IQR 112-211ml; p=0.018). ROC analysis confirmed a PD >40%/day after stage-1 as a predictor of PHLF after ALPPS stage-2 according to 50-50 (AUC 0.769, p=0.015) and ISGLS criteria (AUC 0.760, 0.006).

Conclusion
Serum PD represents a novel early predictor of liver growth and PHLF in patients undergoing ALPPS.
Postoperative thrombocytopenia aggravates liver dysfunction after resection of hepatocellular carcinoma in the cirrhotic liver

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Background
Blood platelets are critical for liver regeneration through their contents of serotonin. Postoperative thrombocytopenia may contribute to deterioration of the clinical outcome after liver resection for hepatocellular carcinoma (HCC).

Methods
Medical records of two groups of adult patients who underwent elective liver resection for chronic hepatitis C virus (HCV)-related cirrhosis and HCC (HCC-Cirrhosis group) versus other liver masses (Matched Control group) at Sohag University Hospital (February 2012 - September 2015) were analyzed. Incidence of thrombocytopenia < 100,000/μL versus ≥ 100,000/μL in the first postoperative day (POD-1), frequency of postoperative liver failure and postoperative complications, including mortality according to Clavien-Dindo system were compared between both.

Results
Twenty two patients were enrolled (11 patients per group). Indications of liver resection in the control group entailed benign liver lesions and metastasis. POD-1 thrombocytopenia < 100,000/μL was encountered only in HCC-Cirrhosis group (7 patients). This group exhibited higher complication rates (p< 0.05), prolonged hospital stay (p< 0.05), increased levels of bilirubin and reduced prothrombin concentration (p< 0.05). Mortality occurred only in HCC-Cirrhosis group with reduced postoperative platelet count (two patients) compared with no mortality in the control group.

Conclusion
The increased susceptibility for thrombocytopenia after liver resection in HCC patients is related to preexisting cirrhosis. Concomitant postoperative thrombocytopenia and liver cirrhosis are associated with worse clinical outcome after liver resection for HCC.
Predicting local regrowth after radiofrequency ablation of colorectal liver metastases by 3D merging of pre- and post-ablation imaging

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Background
Radiofrequency ablation (RFA) as an alternative to surgery in patients with colorectal liver metastasis (CRLM) is associated with high local recurrence (LR) rates. RFA requires a wide margin to prevent LR. It is yet unclear how large the margin should be and how this can be measured reliably. The aim of our study was to evaluate the feasibility of 3D margin assessment and correlate the obtained margins to LR rates.

Methods
Patients treated with percutaneous RFA for a solitary CRLM were included. Pre- and post-ablation CT scans were loaded into Mirada RTx (Mirada Medical, Oxford, UK) and merged based on venous structures in proximity of the tumor. Tumor and ablation volumes were determined on both scans based on automatic contour detection. Overlay of the pre- and post-scans allowed 3D assessment of ablation margins. The minimal margin was compared with the occurrence of LR during follow-up.

Results
Ten patients were included so far (median follow-up 35 months). LR occurred in 5 patients (median tumor size 17mm, range 11-42) in which ablation was incomplete in 4 patients. Location of the LR was at the margin most-at-risk in all patients. Five patients did not develop LR and their tumors were ablated completely (margins: 1, 2 and ≥5mm (n=3)). Median tumor size was 19 mm, range 10-27.

Conclusion
Automated 3D margin assessment is feasible and appears to aid in LR prediction. Real-time margin assessment can directly influence the precision and completeness of RFA, potentially achieving improved local control.
Liver surgery: Clinical
P9.02

Predictive factors of survival in liver resections for colorectal cancer metastases

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Background
It is a controversy about predictive factors and if the Positive Resection Margin (R1) affects the survival in hepatectomy secondary to colorectal cancer. Our purpose is to study the outcome of the Positive Resection margin and predictive factors on survival.

Methods
Between January 2011 and December 2015 we have conducted a retrospective study in our Institute. Patients who underwent curative surgery of liver metastases secondary to colorectal cancer were enrolled in the study. The incidence of the R1 (tumor at ≤ 1mm. from the margin) along with other possible predictive factors were investigated.

Results
A number of 75 patients underwent curative liver resection for metastases secondary to colorectal cancer. R1 was performed in 27 cases (36%). In 9 cases (12%), the metastases were synchronous. The mean time from the intervention for primary tumor until the diagnosis of metachronous metastases (n=66, 88%) was 31 months. The surgical margin recurrence occurred after an average time of 356 days, in 20% (n=15) patients.
R1 didn't influence the survival (p=0.781) and only the tumor biology has proven to influence the length of survival (p= 0.004). The group with poorly differentiated tumor had the shortest mean survival, of 16 months. In cases of moderately differentiated, the mean survival was 46 months and for well differentiated, 53 months.

Conclusion
Microscopic positive margin is not an independent factor for 5-years survival. The tumor biology is the only factor that influences overall survival.
Predictive value of CA 19-9 elevation in the evaluation of occult biliocystic communication in uncomplicated liver hydatid disease

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Background
Current studies have postulated that intraoperative identification of biliocystic communication (BCC) could be the key to avoid complications. Carbohydrate antigen (CA) 19-9 is a frequently used tumor marker, and its elevation in benign hepatobiliary diseases has frequently been reported in icteric patients. However, its value in assessing occult BCC is unknown.

Methods
Thirty-seven patients with hydatid disease were surgically managed from 2013 to 2016. Icteric patients with complicated cysts were excluded. Serum samples were obtained from all patients before and after surgical treatment, and CA 19-9 level above the cut-off value of 37 IU/mL was accepted as an elevation.

Results
There were 19 male (51.3%) and 18 female (48.6%) patients. Mean age was 46.6 years (range, 19-71). BCC was detected in 21 patients (Group I, 56.7%). There was no BCC in the remaining 16 patients (Group II, 43.2%). Hepatic enzymes primarily associated with cholestasis (GGT, ALP, total bilirubin) were detected to be normal in both groups. Preoperative CA 19-9 concentrations were significantly greater in Group I compared with Group II (124±48 vs 27±9, respectively, p<0.001). In Group I, CA 19-9 concentrations regressed to its normal level after surgery (p<0.001). Mean follow-up period was 26 months (range, 8-42). There was no external biliary fistula. Median postoperative stay was 3 days (range, 1-12).

Conclusion
The measurement of tumor marker CA 19-9 may further help to suspect the occult BCC.
Preoperative Evaluation of Liver Function in Patients with Hepatocellular Carcinoma using the LiMAx Test

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Background
Besides liver transplantation, resection surgery provides the best long term survival in patients with hepatocellular carcinoma. To properly select patients for surgery an adequate estimation of liver function is of great clinical importance.

Methods
We performed a retrospective analysis of patients diagnosed with HCC that had received the LiMAx test for evaluation of surgical treatment in our department. LiMAx is a non-invasive 13C-breath-test for specific measurement of cytochrom P450 capacity by intravenous administration of 2mg/kg 13C-Methacetin. This system can be purchased commercially.

Results
A total of 47 patients were identified. After evaluation of liver function 24 patients received resection surgery. The LiMAx results were higher in resected patients (392 vs. 247 µg/kg/h; P=0,022). Patients diagnosed with liver cirrhosis had significantly lower results (242 vs. 450 µg/kg/h; P<0,006). In 10 patients surgical treatment was cancelled due to reduced liver function (mean LiMAx 181 µg/kg/h). After surgery 7 patients presented with postoperative liver failure (5 patients grade A, 1 grade B and 1 grade C). Histologic assessment revealed complete liver cirrhosis in 5 resected patients not influencing their risk for postoperative liver failure.

Conclusion
Evaluation of preoperative liver function by the LiMAx test allows patient selection to reduce severe postoperative liver decompensation. In appropriate patients mortality and morbidity remains low, even in the presence of liver cirrhosis.
Preoperative percutaneous drainage of the cystic cavity facilitates resectability in hepatic alveolar echinococcosis

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Background
HAE is a parasitic disease. The dense pericystic inflammation caused by this disease makes resection difficult even impossible. The cystic cavity is full with necrotic material and sometimes infected bile or even an abscess. We hypothesised that drainage of the cystic contents can reduce inflammation and facilitate surgery

Methods
We retrospectively evaluated our records of HAE cases. Records of patients who had unresectable liver masses at the first diagnosis and further underwent preoperative percutaneous drainage with a subsequent liver resection, were evaluated. All demographic, radiological and clinical data were collected.

Results
Between January 2000 and December 2016 237 HAE cases were followed in our clinic. From these 151 had unresectable liver mass at the first diagnosis. Among these patients with unresectable disease 25 had solitary lesions with a cystic cavity. These 25 patients underwent a preoperative percutaneous drainage and re-evaluated for resection and 15 patients underwent a curative resection. The resectability rate was 36.2% at the first evaluation and 42.6% after the drainage. The remaining 10 patients referred for medical treatment. One denied further treatment, three were transplanted and six are still at medical treatment.

Conclusion
Preoperative percutaneous drainage of the solitary cystic cavity reduces pericystic inflammation and facilitates resection. Decision for resectability could be made after percutaneous drainage in patients with solitary lesions with cystic cavity.
Prevention of postop liver failure after major liver resections: the role of functional tests

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Background
This study deals with the preoperative HBS and 13C-methacetin breath test for the measurement of liver function with the ultimate goal to design a method to identify patients at risk of postoperative liver failure

Methods
Two groups: main (n=53) and historical (n=35), all patients underwent liver resections for primary or metastatic liver tumors. The patients of both groups have passed standard clinical and lab tests, the values of TB, ALB and PT showed no decrease in liver function. CT volumetry and 99mTc-technephyl HBS with 13C-methacetin breath test were performed in all main arm patients

Results
A strong positive correlation (r 0.71) was found between HBS and 13C breath test results. ROC curve analysis demonstrated high and good quality methacetin test and HBS for liver function reserve in predicting postop liver failure (AUC=0.89 & 0.78 resp.). An incidence of post-resection acute liver failure by 50-50 criteria in the main group was sign. 2.2-fold lower than in the historical group (10.6% vs. 23.3%, p<0.001). In conformity with functional tests results SVI-SVIbisegmentectomy was performed instead of right hepatic resection in 15 cases (31.2%). In 6 patients (12.7%) surgical approach was revised for TSH.

Conclusion
Preop evaluation of FRL function is important not only in order to detect patients at risk of developing liver failure after liver resection but also for tailoring the appropriate extent of resection. Developing a dynamic liver function test can therefore be considered the ‘holy grail’ of liver surgery
Primary malignant mesenchymal tumors of the liver and the inferior Vena cava: A rare tumor entity

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Background
Malignant mesenchymal tumors (MMT) of the liver and the inferior vena cava are a rare tumor entity. Primary hepatic angiosarcoma (PHA) and hepatic epithelioid hemangioendothelioma (HEH) are of endothelial origin, whereas leiomyosarcoma (LMS) arise from smooth muscle cells. While HEH seems to be a low-grade malignant tumor, PHA is assumed to be an aggressive tumor. In the absence of established treatment guidelines radical surgical resection is considered the best treatment.

Methods
All resections of primary MMT of the liver (January 2007 until January 2017) were identified from a database of all liver resections performed at our department. We analyzed the completeness of resection (R0/R1), disease-free (DFS) and overall survivals (OS).

Results
15 resections were performed for MMT. Of these, 7 resections were performed for PHA, 4 for HEH and 4 for LMS. 8 out of 15 (53%) patients are tumor free until last follow-up: 3 patients with LMS relapsed, while 3 patients with HEH were tumor-free during follow-up, as well as 2 patients with PHA, who had received neoadjuvant chemotherapy (Ifosamid/Vincristin/Doxorubicin or Paclitaxel). 3 patients with PHA were multifocal when operated and relapsed within three months. One patient with HEH died independently from tumor. The median OS was 108 months and the median DFS was 45 months.

Conclusion
Until now the efficiency of chemotherapy could not be proved. In accordance with the literature the best treatment for MMT is the radical surgical resection.
Liver surgery: Clinical
P51.02

Prior hepatectomy predicts local tumor progression and survival after percutaneous ablation of colorectal liver metastasis.

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Background
We hypothesized that the currently utilized hepatic resection criteria for patients with colorectal liver metastasis (CLM) promotes selection of patients with optimal tumor biology translated in low rates of local tumor progression (LTP) at post-resection developed CLM treated with percutaneous ablation (PA).

Methods
82 consecutive patients with 97 CLMs treated with PA during 2004-2014 were included. Local tumor progression-free survival (LTPFS) at the ablated lesions between patients with (n=49) and without (n=33) prior hepatic resection were analyzed. Multivariate Cox regression analysis was utilized to identify factors associated with LTPFS.

Results
Median follow-up period was 28 months. 3-year actuarial LTPFS at the ablated lesions was better in patients with prior hepatic resection when compared to patients without prior hepatic resection (73% vs 34%, P<0.001). 3-year recurrence-free survival (RFS) (23% vs 9.1%, P=0.02) and overall survival (OS) (78% vs 48%, P=0.003) were better on patients with prior hepatic resection. Negative predictors for LTPFS on multivariate analysis were: no prior hepatic resection (hazard ratio [HR] 2.35, 95% confidence interval [CI] 1.02-5.45; P=0.045), minimal ablation margin < 5 mm (HR 2.4, 95% CI 1.18-4.87; P=0.016), and RAS mutant (HR 2.65, 95% CI 1.18-5.94; P=0.019).

Conclusion
Prior hepatic resection is associated with improved LTPFS, RFS, and OS after PA of CLMs. This suggests inherent differences in tumor biology among surgical and non-surgical populations.
Prognostic determinants in patients with multiple colorectal liver metastases: the relevance of the primary tumor features

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Background
Aggressive surgical indications are adopted for colorectal liver metastases (CLM). The hepatic tumor burden poorly predicts outcome. To assess the prognostic impact of the primary tumor data

Methods
All patients undergoing a first liver resection (LR) for CLM between 2005 and 2014 were considered. Those with >3 CLM and a follow-up >24 months were included. Patients with disease progression while on chemotherapy were excluded

Results
176 patients were analyzed. CLM were >7 in 40% of patients, bilobar in 72% and synchronous in 80%. The primary tumor site was: 21% right colon, 50% left colon, and 28% rectum. The primary tumor was T4 in 10%, N+ in 73%, KRas mutated in 35%, and mucinous in 15%. Patients with left colon cancer had better survival (OS) than those with right colon/rectal cancer (3-year OS 58.4% vs 39.8%/39.4%, p=0.018). T and N (N0/N1/N2) stages did not predict the outcome. Patients with mucinous tumor and KRas mutation had lower OS (27.8% vs 56.9%, p=0.001; 32.8% vs 58.0%, p=0.003). At multivariate analysis, the independent prognostic factors were right colon/rectal cancer (p=0.004, OR=2.297), mucinous tumor (p=0.001, OR=2.858), K-Ras status (p=0.005, OR=2.183), and >7 CLM (p=0.005, OR=2.183). One point was assigned to each variable: median OS was NA if 0 points, 52.6 months if 1, 25.5 if 2 and 16 if 3/4, p<0.001

Conclusion
In patients with CLM, the primary tumor data (tumor site, mucinous histology and KRas) should be accurately considered to better predict outcome and refine patients’ selection
Prognostic role of KRAS mutational status and response to preoperative chemotherapy in patients undergoing hepatectomy for colorectal liver metastases

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Background

Both pattern of response to preoperative chemotherapy (pCHT) and KRAS mutational status are associated with survival following hepatectomy for colorectal liver metastases (CLM). The current study aims at investigating the prognostic role of these two factors in a large cohort of patients from a single high volume hospital.

Methods

Data on 281 patients with a known KRAS mutation status who underwent curative resection for CLM after pCHT were reviewed. Recurrence-free (RFS) and disease-specific survival (DSS) were compared according to KRAS mutational status (mutated (mutKRAS) vs wild-type (wtKRAS)) and to response to pCHT (progression/stability (PD/SD) vs partial/complete response (PR/CR)).

Results

At univariate analysis, mtKRAS and PD/SD after pCHT were associated with significantly shorter RFS (p=.015 and p=.024, respectively) and DSS (p=.026 and p=.006, respectively) and independently predicted an higher risk of recurrence (Hazard-Ratio(HR)=1.6 and 1.4, respectively) and mortality (HR=2.1 and 1.6, respectively). Subgroup analysis showed that, among patients with PD/SD after pCHT, mtKRAS was still associated with poorer outcomes both at the univariate and multivariate analysis (all p<.05), compared to wtKRAS.

Conclusion

mtKRAS and lack of response to pCHT are both independently associated with poor survival outcomes after CLM resection. KRAS mutational status may further stratify survival among patients not responding to pCHT.
Liver surgery: Clinical
FP14.02

Prognostic score of 90-day in-hospital mortality after hepatectomy –

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Background
Complex liver resection with concomitant biliary or vascular resection is a standard surgical procedure. Objective was to evaluate variables associated with surgical outcomes and to identify risk groups for post-operative mortality.

Methods
Records of 1796 patients undergoing liver resection for >1 segment were analyzed. Primary endpoints were 30- and 90-day in-hospital mortality. Logistic regression analyses were performed to identify independent predictors for mortality. A prognostic risk score according to weighting points based on OR from multivariable logistic regression analyses was created for 90-day mortality.

Results
30-90-day in-hospital mortality rates were 3.0% and 4.5%. Risk factors for 90-day in-hospital mortality were age ≥60 years (OR 3.7), ASA III/IV (OR 2.9 / 15.6), intrahepatic cholangiocarcinoma (OR 3.0), perihilar cholangiocarcinoma (Klatskin tumor) (OR 5.6), right trisectionectomy (OR 2.8), Quick< 85% (OR 2.4), g-GT >60U/L (OR 2.8), plateletcount < 120/nL (OR 5.5) and creatine >2mg/dL (OR 9.8). C-index of 90-day mortality was 0.840. Weighting points were: Age≥60 years 1, ASA III 1, ASA IV 5, Intra-hepatic cholangiocarcinoma 1, Peri-hilar cholangiocarcinoma 2, Right trisectionectomy 1, Quick < 85% 1, g-GT >60U/L 1, Platelet count < 120/nL 2, Creatinine >2mg/dL 3. Mortality risk for 2-3 points - OR 12.2, 4 – 5 - OR 71.6 and ≥6 208.4 (p<0.0001).

Conclusion
The proposed model would predict surgical outcomes of hepatectomy and be useful to evaluate and benchmark performance.
Proper patient selection leading to comparable major complication rate after ALPPS or non-ALPPS - a cohort study in a single institute

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Background
During the period of exploration, ALPPS was found to have more postoperative complication in comparison to one-stage liver resection. Beside the technical refinement, a proper patient selection might change the conventional view.

Methods
A retrospective analysis of 130 patients undergoing major anatomic liver resection from 2013 to 2016 was performed. Among them 34 were ALPPS. To compare the postoperative morbidity and mortality, the following patients undergoing right hepatectomy or right trisectionectomy were included: 1) the age of the patient was below 80 years; 2) hilar cholangiocarcinoma was not the indication for surgery; 3) liver cirrhosis was not proven in the histology; 4) patients did not receive concomitant major resection of other organs.

Results
The population of the cohort study consisted of 30 ALPPS and 47 non-ALPPS. The rate of major complication (Clavien grade IIIa and more) after a right hepatectomy was 3/11 (27%) in ALPPS group and 2/21 (9.5%) in non-ALPPS group with nil 90-day mortality (p>0.05). The rate of major complication after a right trisectionectomy was 4/19 (21%) in ALPPS group and 11/26 (42%) in non-ALPPS group with 90-day mortality of 1/19 (5.2%) and 2/26 respectively (7.7%) (p>0.05). Of notes, none in ALPPS, but two patients in non-ALPPS group, experienced grade C posthepatectomy liver failure.

Conclusion
ALPPS was not found to be associated with increased major surgical complications in comparison to non-ALPPS group when above patient selection criteria were considered.
Liver surgery: Clinical
P31.04

Pyogenic liver abscess: treatment modalities

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Background
Treatment of pyogenic liver abscesses (PLA) is not well codified yet. Our aim is to compare treatment modalities of PLA that are antibiotics, percutaneous drainage and surgical drainage.

Methods
We performed a retrospective analysis of 36 patients with PLA admitted in the Surgery unit of Mongi Slim Hospital between January 2003 and December 2013.
Patients were distributed in three groups and compared retrospectively:
The first group was treated by antibiotics only.
The second group was treated by antibiotics and percutaneous drainage.
The third group was treated by antibiotics and surgical drainage, with or without percutaneous treatment.
The three groups were matched by age, sex, comorbidities and characteristics of PLA.
Patient’s outcomes, including duration of symptoms, length of hospital stay, procedure-related complications, treatment failure and death were recorded.

Results
Medium age was 60 years. Sex ratio was 2.27. Ultrasound made diagnosis in 79.4% of cases. Computed tomography showed abnormalities in 97.1% of cases.
Mortality rate was 16.6%. Most deaths occurred in surgical drainage group. Longest duration of symptoms and hospital stay were found in the group treated by antibiotics only. Procedure-related complications and failure were not significantly different between the three groups.

Conclusion
Percutaneous drainage is the best treatment for PLA. Surgical drainage must be undertaken in case of abdominal emergency. Exclusive medical management should be avoided and reserved for small PLA.
Radiofrequency-assisted liver partition for staged hepatectomy (R-ALPPS). A preliminary experience with a fully laparoscopic first stage approach.

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Background
ALLPS is still a matter of debate among HPB surgeons. The main criticism concerns its worrisome complication rate. To reduce morbidity, few technical variations have been described. We present 2 cases of modified ALLPS, being the liver parenchyma laparoscopically ablated with radiofrequency (R-ALLPS).

Methods
Recently, we carried out 2 R-ALLPS. Stage I was performed laparoscopically, right portal vein was secured by locking clips and liver partition was obtained by radiofrequency. Stage II required open right trisectionectomy (ORT).

Results
Case 1: 67 year-old male with a metachronous colorectal liver metastasis involving S-IV/V/VII/VIII and middle hepatic vein. FLR/ETLV and FLR/BW were 15% and 0.33. CT volumetry was performed on day 8 and 15 after stage I. FLR/ETLV increased to 24%, FLR/BW to 0.52. An ORT was carried out. The patient developed transient grade A liver failure.

Case 2: 70 year-old HBV-cirrhotic male with a huge HCC involving S-IV/VIII/VII with a right anterior portal pedicle thrombosis. FLR/ETLV and FLR/BW were 27% and 0.44. CT volumetry after 10 days showed FLR/ETLV and FLR/BW of 39% and 0.63. He was discharged 9 days after ORT without complications.

Both patients were discharged 3 days after stage I R-ALLPS without complications.

Conclusion
We believe that R-ALLPS will play a major role in patients in need of a two-staged hepatectomy due to its safety and feasibility. Trials are needed to compare the difference with ALLPS in inducing FLR hypertrophy both in normal and cirrhotic livers.
Randomized Clinical Trial of Abdominal Wound Catheters (AWC) versus Epidural Analgesia (EP) following Open Liver Resection (OLR): An Interim Analysis

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Background
To compare outcomes following OLR between patients receiving EP vs AWC plus PCA (morphine). This is the mid-point analysis of a RCT powered to detect a difference in hospital length of stay.

Methods
Patients undergoing OLR were randomized 1:1 to receive EP or AWC/PCA for 60 hours within an enhanced recovery protocol (ERAS). Postoperative variables recorded included pain scores and peak flow twice a day, need for ionotropic support, intravenous fluid requirements and length of stay amongst others.

Results
Between April 2015 and January 2017 45 patients were randomized to EP (n=25) or WC (n=20). No differences were noted in pre-operative variables including age, sex, ASA grade, diagnosis, resection type and wound length. EP patients required more inotropic support in theatre (52% v 35%, ns), immediately postoperatively on day 0 (52% vs 20%, p=0.028 and day 1 (20% v 5%, ns). Accordingly, mean HDU stay was longer in patients with EP (1.6 days v 0.9, ns). No significant differences were noted in pain scores between the two groups except at Day 0 (EP 0 (0-8) vs WC 3 (0-6), p=0.004). Peak flow measurements, intravenous fluid requirements and overall length of stay were similar in both groups.

Conclusion
The utilization of AWC was not inferior to EP in OLR. EP-associated hypotension translates into a greater need for ionotropic support when compared with WC following open liver resection. Whether this leads to a longer length of hospital stay remains to be seen.
RCT of open versus laparoscopic left lateral hepatic sectionectomy within an enhanced recovery after surgery programme (ORANGE II study).

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Background
Laparoscopic left lateral sectionectomy (LLLS) has been associated with shorter LOS and reduced overall morbidity compared with open left lateral sectionectomy (OLLs). Strong evidence has not, however, been provided.

Methods
In this multicentre double-blind RCT, patients requiring left lateral sectionectomy were assigned to OLLS or LLLS within an ERAS programme. A parallel prospective registry (open non-randomized (ONR) vs laparoscopic non-randomized (LNR)) was used to monitor patients not enrolled for randomization because of doctor or patient preference. The primary endpoint was time to functional recovery (FR). Secondary endpoints were LOS, readmission rate, overall morbidity, composite endpoint of liver surgery-specific morbidity, mortality, and reasons for delay in discharge after functional recovery.

Results
Patients were recruited between January 2010 - July 2014. 24 patients were randomized, and 67 patients were included in the registry. Owing to slow accrual, the trial was stopped on the advice of an independent DSMB. No significant difference in median (IQR) time to FR was observed: 3.0 (3–5) days for OLLS vs 3.0 (3–3) days for LLLS; and 3.0 (3–3) days for ONR vs 3.0 (3–4) days for LNR. There were no significant differences with regard to LOS, morbidity, reoperation, readmission and mortality rates.

Conclusion
This RCT comparing open and laparoscopic LLS in an ERAS setting was not able to reach a conclusion on time to functional recovery, because it was stopped prematurely owing to slow accrual.
Recurrent Biliary Cystoadenoma

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Background
Cystadenomas are uncommon benign cystic neoplasms of the biliary system, of unknown aetiology and account for approximately 5% of all the hepatobiliary cystic masses, are found most often in middle-aged women and have a strong tendency to recur after partial excision.

Methods
A 31-year-old patient, who consults with her primary care physician for presenting nonspecific abdominal pain and fullness after ingestion. Abdominal ultrasound is requested where cystic lesion is observed in the right hepatic lobe and surgical intervention is indicated with suspicion of simple cyst causing symptomatology.

Results
The lesion is unroofing and its wall is sent for its pathological analysis where it is reported as a mucinous biliary cystadenoma.
The patient was discharged in the fourth day
In the MRI follow-up it can appreciated a new cystic lesion. It performed analysis of the content and was appreciated, higher levels of CEA
With diagnosis of relapsed Biliary Cystadenoma, radical surgery is performed with subtotal exeretic surgery and fulguration of the residual wall in V segment

Conclusion
Biliary cystadenomas are benign neoplasms. Complete resection is advised as preoperative diagnosis is often questionable, as well as the risk of malignant transformation into cystadenocarcinoma or sarcoma is significant.
There is a very high recurrence rate in incompletely resected biliary cystadenomas
A treatment algorithm has been proposed: cyst aspiration to measure CEA and CA19-9 levels, and cyst wall biopsy whenever possible.
Reliability of imaging in the pre-operative assessment of microvascular invasion in HCC resected or Transplanted patients.

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Background
Microvascular invasion (mVI), associated to high probability of recurrence and recognized as negative prognostic factor in HCC, could be pre-operatively assessed by CT or MRI. The present study was undertaken in order to establish the reliability of preoperative imaging in recognizing mVI in patients cadidated to liver resection (Res) or Transplantation (Ltx).

Methods
Fifty-three (median age 62 y, range 37-85 y; Res 31, Ltx 22) out of 89, underwent CT scan (39) or MRI (14). Two observers independently and blindly evaluated imaging investigations and filled in a pre-defined form, considering the following findings of lesions: number, size and major diameter, capsula presence and characteristics, peripheral enhancement and margins. Pathology examination was assumed as Gold standard. Interobserver variability was assessed by k-statistics; findings correlated to mVI were analyzed by chi-square test and Logistic Regression; outcome (DFS) was analyzed by life-table and log-rank test.

Results
Size (cut-off 3cm; p< 0.001), capsula (p<0.001) and margins (p<0.02) were correlate to mVI for both observers, with high agreement (k=0.81, 0.87, 0.66). Agreement between pathology and imaging for capsula and margins was 0.73 and 0.78. Recurrence correlated to the mVI as defined on imaging by the two independent observers: 3y- DFS was 0.48 vs 0.65, p<0.02.

Conclusion
The pre-operative evaluation of mVI in HCC patients by imaging resulted reliable and may be taken in the account for therapeutic decisions.
Reporting of risk of bias at trial registration

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Background
Conducting a RCT of poor methodological quality in which study results may be unreliable, can be considered unethical since the unnecessary burdening of the treatment for patients. Implementing the Cochrane risk of bias (RoB) assessment items through standardized forms in trial registries would benefit transparency and eventually improve quality of research. This study assessed the possibilities of registration of RoB in the 5 largest trial registries and provides a proposal for the registration of RoB.

Methods
The 5 largest trial registries were assessed for the presence and type of implementation of an option to provide information on all Cochrane collaboration RoB assessment tool items.

Results
None of the registries enabled complete, adequate and reproducible registration on all necessary items. Blinding was the only item that could be registered in all five registries. The most poorly registrable item was type of analysis. The highest amount of properly registerable RoB items was found in the ISRCTN registry. Clinicaltrials.gov was the registry that provided the lowest amount of properly registrable items.

Conclusion
Trial registries fail to ensure adequate registration of RoB. This problem could be solved by introducing a standardized template containing all necessary RoB items. Since RCT registration is mandatory, obligatory inclusion of the RoB items as listed in the Cochrane RoB assessment tool could improve transparency and reduce bias.
Liver surgery: Clinical
FP15.08

REsect: Blinded assessment of resectability of previously unresectable colorectal cancer liver metastases following chemotherapy±Y90-RadioEmbolization


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Background
Secondary resection of primarily unresectable liver metastases (LM) from colorectal cancer (CRC) prolongs survival and cures some patients. Effective downsizing treatments are needed but their impact on secondary resectability is difficult to evaluate objectively. The added value of Y90-RE (SIRT) is not well established.

Methods
Baseline and follow-up imaging at best response for CRC patients treated with FOLFOX chemotherapy (CT)+bevacizumab (bev) at investigator’s discretion vs. CT+SIRT in the phase III SIRFLOX RCT were reviewed by 3–5 expert HPB surgeons (from a panel of 15) for resectability of LM. Reviewers were blinded to each other and to the clinical patient information including time of imaging (baseline or follow-up). Resectability was called when 60% of the reviewers assessed a patient as resectable.

Results
472 patients were evaluable (CT, n=228; CT+SIRT, n=244). There was no significant difference in LM resectability between groups at baseline (CT, n=25, 10.96%; CT+SIRT, n=29, 11.89%; p=0.77). At follow-up, significantly more patients in the SIRT group were deemed to have resectable LM (CT, n=66, 28.95%; CT+SIRT, n=93, 38.11%; p<0.0001). Of 203 patients in the CT group and 215 patients in the CT+SIRT group deemed unresectable at baseline, 46 (22.66%) and 67 (31.16%), respectively, were converted to resectability (p<0.0001).

Conclusion
The addition of SIRT to FOLFOX-based CT(±bev) significantly increased the gain in resectability of primarily unresectable CRC LM compared with CT (±bev) alone.
Liver surgery: Clinical
P32.06

Resection for Hepatocellular Carcinoma in Octogenarians is safe.

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Background
The percentage of the U.K. population over 75 is expected to double to 16.4% by 2044. The incidence of Hepatocellular Cancer (HCC) is associated with increasing age and is also expected to rise. There is little information about elderly patients (>80) who undergo liver resection for HCC in western institutions.

Methods
This is a retrospective review of a prospectively maintained database of all patients who underwent hepatic resection for HCC between January 1 2005 and December 31 2015. Groups were formed younger than 80 (<80) and 80 (>80) years and older.

Results
200 patients underwent resection for HCC during this time period. 19 were over 80 and 181 were under 80. 33% vs 11% of the <80 vs >80 group respectively had cirrhosis.

There was a non significant trend for smaller resections in the >80 (37% had a hemihepatectomy) when compared with the <80 (44% had a hemihepatectomy).

Length of stay had a median of 7 days for both groups, and in-hospital death was 7% (95% CI 3-11%) for under 80 and 0% (95% CI 0-15%) for over 80 group. The complication rate for under 80s vs older 80s was 27% and 16% respectively. One and 5 year survival rates were 83.4% and 56.3% for under 80s and 88.2% and 55.8% for the over 80s group respectively (p=0.83).

Conclusion
In carefully selected patients over the age of 80, we have demonstrated no significant difference in outcome. This data suggests that extending the criteria for more aggressive surgical resection in the elderly needs further investigation.
Liver surgery: Clinical
FP10.05

Resection of benign liver tumours: an analysis of 62 consecutive cases treated in an academic referral centre

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Background
This study assessed the safety and outcome after resection of benign liver tumours (BLT) at a major referral centre.

Methods
All patients with symptomatic BLTs who underwent resection were identified from a prospective database of 474 liver resections. Operative management, morbidity and mortality using the Accordion classification were analyzed.

Results
62 patients (56 women, 6 men, median age 45 years, range 17-82) underwent resection of symptomatic haemangiomas n=23 (37.1%), FNH n=19 (30.6%), biliary cystadenoma n=16 (25.8%) and hepatic adenomas n=4 (6.5%). A major resection was required in 25 patients (4 segments n=14, 3 segments n=11). 37 patients had 2 or fewer segments resected. Median operating time was 169 min (range 80-410). Median blood loss was 300ml (range 50-4500ml). An intra-operative blood transfusion was required in 6 patients. Median length of post-operative hospital stay was 7 days (range 4-32). Complications occurred in 11 patients. Accordion grades were 1 n=3, 2 n=4, 4 n=3, 6 n=1. 4 patients required re-operation (bleeding n=2, bile leak n=1, small bowel obstruction n=1). An elderly patient died following a postoperative cerebrovascular accident.

Conclusion
Our data suggest that resections for BLTs can be performed safely with minimal blood loss and transfusion requirements. Despite the low postoperative mortality rate, the risk of postoperative complications emphasizes the need for careful selection of patients for resection.
Liver surgery: Clinical
P26.05

Resection of hepatic metastatics from colorectal carcinoma. Factors related with recurrence and disease-free survival

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Background
Surgery has become the standard treatment for patients with stage IV colorectal carcinoma and liver metastasis.

Methods
From 2010-2015: 158 patients with liver metastases (142 CRC metastases that). We analyzed long-term results, actuarial survival and DFS, and compared risk factors with log-rank and chi-square (significance level p <0.05)

Results
72 metachronous (51%) and 70 synchronous metastases: 14 simultaneous resection, 14 liver-first, and colon-liver resection in 60% . With a mean follow-up of 23.7±16 months presented tumor recurrence 53(46.5%). At end, 55 patients were alive without tumor recurrence (41%). DFS at 1, 3 and 5 years is 65%, 37.9% and 32.1%, respectively, with an mean DFS interval of 33.6±2.96 months. Variables related to the recurrence: bilobar or segment I location, inverse surgery, second hepatectomies, presence of vascular invasion and R1 resection . Variables related to DFS: multicentric tumors, reverse surgery, rehapatectomies, vascular invasion and R1 resection. The use of preoperative chemotherapy, the type of resection or the need for transfusion has not been linked to long-term results.

Conclusion
Resection of CCR hepatic metastases is the treatment of choice with 5-year DFS about 32% and mean DFS of 34 months. Initial hepatic resection in synchronous metastases has been associated with worse DFS as well as second resections. Neither the type of resection (major hepatectomy or atypical resection) nor the use or not of preoperative chemotherapy have been related to recurrence
Resection of initially unresectable colorectal liver metastases offers a survival benefit similar to those achieved in initially resectable metastases


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Background
In patients with initially unresectable colorectal liver metastases (CLMs), several surgical strategies are able to achieve complete clearance of the liver. The survival benefit of these potentially curative approaches is not clearly estimated. Most authors revealed that survival rates achieved by hepatectomy in such patients were significantly lower than in patients with initially resectable CLMs.

Methods
All patients who underwent curative-intent hepatectomy for CLMs were retrospectively enrolled. In 533 patients, CLMs were initially resectable. In 45 patients with initially unresectable CLMs it was achieved complete clearance of the liver (by portal vein ligation-11 pts, two-stage liver resection-5 pts, down-sizing chemotherapy-4 pts, hepatectomy associated with radiofrequency ablation-25 pts). Postoperative morbidity, mortality and survival rates were compared between the two groups.

Results
Morbidity rate was significantly higher for initially unresectable patients (p = 0.020). Mortality rates were comparable for the two groups (p = 0.634). The 1-, 3- and 5-year overall survival rates achieved in patients with initially unresectable CLMs (92%, 48% and 20%, respectively) were similar (p = 0.429) to those achieved in initially resectable patients (88%, 51% and 31%, respectively).

Conclusion
In patients with initially unresectable CLMs undergoing complete clearance of the liver, survival rates were comparable to those achieved in initially resectable patients.
Liver surgery: Clinical
P10.02

Results of hepatic resection following breast cancer liver metastasis

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Background
Breast cancer (BC) makes up nearly 26% of malignant tumors in the world and it is the leading cause of cancer-related deaths in European women. With approximately 18000 new cases of BC diagnosed in Polish women annually, breast cancer liver metastasis (BCLM) is respectively a rising issue. Lately data found in literature points towards improved survival following liver resection with systemic therapy.

Methods
During the period 2009-2013 a retrospective study was carried at our Centre and 30 cases were analysed. From nearly 2000 liver resections performed, 11 female patients at the mean age of 59.18 years with BCLM were qualified for surgery.

Results
The median time between primary and secondary treatment was 3.5 years (1-7). One patient (9.1%) presented an extrahepatic lesion – bone metastasis. The left lobe, right lobe and both lobes of liver were affected respectively in 3 (27.3%), 4 (36.4%) and 4 (36.4%) patients. 5 patients (45.5%) presented single hepatic lesion, in contrast to the maximum number of lesions which equalled 6 – in the right lobe. Average hospitalisation period was 13.27 days and discharge was on the 11.3 postoperative day. One-year survival was 72.7% (8pts), thus three-year survival was 36.4% (4pts).

Conclusion
Oncological centres should assess BCLM patients more openly and qualify them for hepatic resection along with adjuvant systemic treatment in order to improve overall survival. This however needs to be studied in a multicentre randomized trial.
Results of portal vein and hepatic artery resection for surgical treatment of Klatskin tumor

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Background
Portal vein invasion is most often cause of portal vein resection and reconstruction combine with hepatectomy for surgical treatment of Klatskin tumor at nowadays. The reported rate of morbidity and mortality still high (more then 10%). 5-year survival is possible. Special complexity is represented by cases with a tumor invasion of a portal vein and a hepatic artery. Results of combine resection portal vein and hepatic artery still controversial.

Methods
The aim of this study to observe results of surgical treatment of Klatskin tumor with portal vein and hepatic artery invasion.
Between 2002 and 2016 major and extended resections of the liver to 183 patients with Klatskin tumor was made.

Results
183 patients underwent resection for pCCA. Median age was 61,2 ±12 years. More than in 45 % of cases there was a necessity of a separate drainage of three sections of a liver. A liver resection carried out at level of bilirubin of a blood not above 60 mcmol/l. From 183 patients in 96 cases have executed a resection of a portal vein with the subsequent reconstruction. At 13 patients it is made hepatoduodenoligamentectomy with resection and reconstruction of portal vein and hepatic artery. The postoperative mortality has made 9,3 %, 5-year survival rate – 18,8 %.

Conclusion
Aggressive surgical treatment for cholangiocarcinoma the confluence of bile duct with portal vein resection can be performed safely with acceptable mortality and long-term survival rate.
Results of surgical therapy of bilateral colorectal liver metastases

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Background
Surgery of colorectal liver metastases (CLM) may offer prolonged survival or even cure in resectable patients. However, bilateral CLM often require extended or multi-step resections to achieve complete tumor removal.

Methods
Between 2000 and 2016, 152 patients were scheduled for potentially curative resection of bilateral CLM. Among these, 130 patients (85.5%) completed surgery whereas 22 (14.5%) developed irresectable disease during planned multi-step procedure. Of the 130 patients analyzed, 105 underwent single-step surgery: 55 major resections (38 of those with additional wedge resections) and 50 multiple wedge resections. The remaining 25 patients underwent multi-step resections. Portal vein embolization was performed in 26%, intraoperative additional RFTA in 24% of all patients.

Results
Postoperative mortality was 0.8%. Free margins were achieved in 83%. 5-year survival was 34% in the entire group. In univariate survival analysis, positive margins, CLM > 30 mm, more than 3 CLM, age and colonic primaries were significantly associated with worse survival.
In multivariate survival analysis, the resection margin, size and number of metastases and age were independent predictors of survival.

Conclusion
Extended surgery of bilateral CLM provides acceptable OS and is associated with a low mortality. In our cohort, resection margin, size and number of metastases and age were independent predictors of survival.
Results of surgical treatment of hepatocellular carcinoma with portal vein and inferior vena cava invasion

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Background
A character of hepatocellular carcinoma (HCC) is the thrombosis or tumor invasion of the portal vein (PV) and the inferior vena cava (IVC). The aim of this study was to search the results of combined liver and vascular resections in the surgical treatment of HCC.

Methods
The study included 90 patients with HCC who underwent radical resection of the liver. The patients with tumor lesions of the trunk, confluence or branches PV of the 1st order (20 pers.) were the group 1 and the patients with tumor lesion IVC (14 pers.) were the group 2. The control group consisted of 56 patients without tumor lesions of PV or IVC.

Results
Patients in the control group carried out 32 major, 13 extended resections and 11 resections of two segments of the liver.
Patients in Group 1 were made 13 large and 7 extended liver resections combined with resection of PV confluence.
Patients in Group №2 were made 9 and 5 major and extended resections of the liver, which in 7 cases were combined with the marginal resection and in 7 cases with resection of the IVC segment. The 3- and 5-year survival rates were 42.6% and 25.3% in the control group, 32.4% and 11.5 in the Group 1, 34.3% and 13.5% in the Group 2.

Conclusion
Aggressive surgical approach – liver resection combine with resection of portal vein and inferior vena cava is a safe procedure with acceptable morbidity, mortality and long term survival.
Retention cyst after surgical treatment due to echinococcosis (Case Report)

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Background
Introduction: Echinococcosis is a parasitic disease of tapeworms of the Echinococcosis type. The two main types of the disease are cystic echinococcosis and alveolar echinococcosis. The disease often starts without symptoms and this may last for years. The symptoms and signs that occur depend on the cyst's location and size. The disease usually begins in the liver but can spread to other parts of the body, such as the lungs or brain. When the liver is affected the person may have abdominal pain, weight loss, and turn slightly yellow from jaundice.

Methods
Case Report: We are reporting a case of a 25-year-old woman presenting with retention cyst of the liver after surgical and drug therapy due to echinococcosis. During the period between her first surgery in May 2016 she underwent a drug therapy with Albendazole.

Materials and methods: After a control CT of the abdomen it was found that she had again two liver cyst in the same places (second and third segment of the liver) suspected for reappearance of the echinococcosis.

Results
After her second surgery in January 2017 and histological verification it occurred that she had a retention cysts on the same places were was echinococcosis found seven months ago.

Conclusion
Conclusion: The case presented is unique due to the rarity of retention cyst (without echinococcosis) after such surgery and drug therapy with Albendazole.
Liver surgery: Clinical
V2.04

Right extended hepatectomy for alveolar echinococcosis, with portal reconstruction under total vascular exclusion and liver cooling

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Background
(VIDEO) We report the case of a 43-years old men suffering of a 10cm alveolar echinococcosis of the right liver, with left portal vein involvement. A right extended hepatectomy with portal reconstruction and hepaticojejunostomy is planned, under Total Vascular Exclusion (TVE) and Liver Cooling (LC).

Methods

The first step is preparing for TVE: the liver is fully mobilized to expose and control the infra and suprahepatic inferior vena cava with a tape. The pedicle is prepared dissecting the portal vein independently from the artery and bile duct, in order to obtain a selective portal occlusion.

Results

The second step is to prepare for Extra corporeal circulation (ECC): the inferior mesenteric vein is cannulated, the right femoral and left axillary veins are cannulated using a percutaneous echo guided approach. Finally the circuit is purged by saline, and connected to the pump.

Conclusion

The third step starts with ECC: the pump flow is progressively increased, and simultaneously TVE is started, while in situ perfusion for the liver with refrigerated liver preservation solution is achieved by direct cannulation of the portal trunk. Moreover topical cooling is achieved either with crushed ice in plastic bags or cold water. The fourth step is the liver transection, followed by portal reconstruction. Liver is rewarmed, ECC is weaned and cannulas are removed. Finally, the hepatocojejunostomy is realized.
Right hepatectomy after down staging by Y90 microspheres radioembolization

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**Background**
We describe the case of an 82 year-old woman with a post C-hepatitis cirrhosis, presenting a 12 cm hepatocellular carcinoma on segment 5 associated with sectorial macroscopic vascular invasion of the right anterior sector. She had an AFP at 8 000 UI/ml with MELD score < 10 and no portal hypertension.

**Methods**
We primarily performed a microspheres yttrium-90 radioembolization. A radiological complete response (RECIST 1.1) and a hypertrophy of the left liver were observed at 4 months. The AFP decreased to 18 and the MELD was still less than 10. A right hepatectomy by laparotomy was performed 7 months later.

**Results**
She had an uneventful postoperative sequence and the pathological analysis did not retrieve any viable tumor cell.

**Conclusion**
This case adds to the growing evidence supporting the role of Y90 embolization in the treatment of CHC, the ongoing studies should precise the surgical indications after microspheres Y90.
Liver surgery: Clinical Sym9.04

Right Hepatic Vein Injury and Control during Laparoscopic Surgery.

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Background
Laparoscopic liver resection (LLR) has now been widely performed in experienced centers. One of the worse complications during this surgery, is the hepatic vein injury, because it may cause conversion, air embolization, fatal hemorrhaging, or even death.

Methods
We present the video of a 70 Years old male, with a previous history of Colon Cancer, who develops Liver Metastases in the right lobe, one of the lesions is situated close to the origin of the right hepatic vein. The patient is proposed to surgery, he Underwent Laparoscopic Right Hepatectomy.

Results
During the surgery the Right hepatic vein is injured, which cause important bleeding, in the video we can observe how to achieve temporary control of the bleeding and proceed to a definitive management, the surgery is ended and the patient recovers successfully.

Conclusion
Laparoscopic liver resection is an advanced procedure that requires skillful surgeons trained in this techniques, Hepatic Vein Injuries is one of the worst complications of this surgery. The Backflow bleeding can be minimized with fluid restriction, muscular relaxation and the effect of pneumoperitoneum, but, the experience of the surgeon permits the initial temporary control through laparoscopic, and then, proceed to the definitive management of the complication via laparoscopy or laparotomy.
**Risk Factors For Early Recurrence After Liver Resection For Colorectal Liver Metastases (CRLM): A Single Centre Study**

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**Background**  
Resectability criteria for CRLM have expanded and advances in liver surgery increased number of patients eligible for resection. Our aim to identify risk factors of early recurrence post resection for CRLM in a contemporary cohort of patients. Early recurrence was defined as evidence of recurrent disease on follow-up imaging according to the unit protocol within a year from surgery.

**Methods**  
From Jan 2012 to Dec 2016, 133 patients with CRLM underwent resection. 115 patients followed-up for at least a year were eligible. Univariate/multivariate analysis performed to identify risk factors. Parameters analysed included pre-operative variables (sex, age, BMI, comorbidities, CEA, LFTs, number/size of largest lesion, neoadjuvant chemotherapy), operative variables (anatomical vs non-anatomical, major vs minor, re-do liver surgery, use of ablation techniques, blood loss, blood transfusions, Pringle’s manoeuvre) and post-operative variables (complications, length of hospital stay, histology).

**Results**  
There were 67 early recurrences, of which 26 were liver only. Risk factors of early liver recurrence were number of metastases > 3 (OR 1.03, p = 0.037), intra-operative blood loss > 200 ml (OR 2.44, p = 0.021), major hepatectomy (OR 4.44, p = 0.053), use of ablation techniques (OR 2.92, p = 0.008), hospital stay > 10 days (OR 2.95, p = 0.037), capsular invasion (OR 4.34, p = 0.045) and microvascular invasion (OR 3.47, p = 0.012).

**Conclusion**  
It is possible to stratify patients according to the risk of early recurrence after resection of CRLM. High-risk patients might benefit from intensive follow-up.
Liver surgery: Clinical

Robot-assisted laparoscopic liver resection of the posterosuperior segments

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Background
Robotic surgery is gaining momentum in complex procedures, such as liver resection. The technique offers several advantages over conventional laparoscopy such as wristed instruments and a magnified 3-dimensional view of the operative field. The improved dexterity makes the robotic system particularly suited for liver resections that require non-linear manipulation, such as curved parenchymal transection, hilar dissection and resection of the posterosuperior segments. Therefore, the use of the robotic system might enable a larger proportion of liver resections to be performed minimally invasive.

Aim: To present a video of a robot-assisted laparoscopic liver resection of segment 7.

Methods
Between August 2014 and September 2016 20 patients underwent robot-assisted laparoscopic liver resection at our institution, from which 10 underwent a resection of a posterosuperior segment. The video demonstrates a resection of segment 7 in a 63–old male patient with a neuroendocrine tumor.

Results
The procedure was completed fully laparoscopic using 4 trans abdominal trocars. The tumor was removed radically. Postoperatively, the patient recovered quickly and did not suffer from any complications. After 4 days he was discharged from the hospital.

Conclusion
Robot-assisted laparoscopic liver resection is safe and feasible in selected patients. The use of the robotic system might be especially advantageous in resections of the posterosuperior segments.
Role of hepatic arterial infusion chemotherapy in the treatment of intrahepatic cholangiocarcinoma: personal experience and review of the literature

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Background
Most patients with intrahepatic cholangiocarcinoma (IC) are unresectable at the time of diagnosis and treatment options are often limited. The aim of this study is to analyse the outcome of patients with IC treated with systemic chemotherapy (SC), surgical resection and Hepatic arterial infusion chemotherapy (HAIC), and to compare our results with the literature, focusing in particular on the role of HAIC in a context of multimodal treatment.

Methods
We selected 62 patients with IC afferent to Ca’ Foncello Regional Hospital in Treviso between 2008 and 2015. Four groups were identified: surgery, hepatic arterial infusion, systemic chemotherapy and no treatment group.

Results
17 patients underwent surgical resection, 45 patients were unresectable at the time of diagnosis and were directed to different approaches: 16 underwent SC, 13 HAIC, 2 patients other loco-regional treatment and 3 patients radioembolization. In 3 cases HAIC was followed by surgical resection. Overall Median Survival was 39 months in surgery group, 17 months in HAIC group, 36 months in HAIC plus surgery group, 8.5 months in SC and only 3.5 months in no treatment group.
Concerning HAIC, 4 patients reported progression of the disease, 3 stable disease and 9 partial response. 3 patients were converted to hepatic resection.

Conclusion
Surgery is still the gold standard treatment for IC, nevertheless HAIC is a safety procedure and a therapeutic option for unresectable patients, with better overall survival if compared with SC (p<0.008).
Safety and efficacy of microwave ablation for colorectal metastases near a vascular vessel: short-term result of a single institute

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Background
Microwave ablation (mwa) is gaining wide acceptance. Many centers consider it as the first-line treatment for tumors less than 3 cm. RF energy is less efficient in treating tissues in high perfusion areas. A prospective study was started at our Institute to evaluate the safety and efficacy of mwa for colorectal liver metastasis (CLM) located near large vessels.

Methods
Between March 2015 and September 2016, 44 patients underwent intraoperative mwa for liver tumors. Among them, 32 patients were treated for CLM. Twenty-one patients had CLM smaller than 3 cm and located near large vessels. Liver laboratory tests and postoperative morbidity were evaluated. The results of postoperative CT scans were checked for signs of local recurrence.

Results
Surgery was performed by laparoscopy in 7 patients, by laparotomy in 13 patients and by thoracotomy in one case with CLM in segment VIII. Thirteen patients had associated mwa with minor liver resections, 4 patients had associated colorectal resections and only 4 patients had only mwa. Four patients were treated for local recurrence within a previous wedge resection or RFA. Overall morbidity rate was 19% with 4 minor complications. In the group of patients treated only with mwa, 1 case of liver hematoma occurred. The median follow-up was 6 months (4-17 months) and all patients are local recurrence-free.

Conclusion
The present study suggests that the mwa near large vessels is a safe and effective method in short term basis. Still, long term outcomes have to be assessed.
Safety and feasibility of caudate lobe resections

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Background
Surgical procedures involving the caudate lobe of the liver are characterized as some of the most demanding operations in liver surgery. The aim of our study was to report our experience with resection of tumors located in the caudate lobe.

Methods
Liver resections including the caudate lobe of the liver performed in our Institution by one senior hepatobiliary surgeon in a 2-year period of time were reviewed for the purposes of this study. Indications comprised primary and metastatic liver lesions.

Results
In a total of 60 hepatectomies, 12 patients underwent caudate resection (20%). This was either isolated resection of segment I (n=3) or combined with right, left, extended left hepatectomy or atypical resections in one, 3, one, and 4 instances, respectively. Vascular resections/reconstructions were necessary in 6 cases (3 cases each for portal vein and vena cava). All but one patient were directly extubated. Median hospital stay was 10.5 days. Surgical complications were classified as Dindo-Clavien Grades I (n=4), II (n=4), IIIa (n=1), IIIb (n=2) and IV (n=1), respectively.

Conclusion
Surgery for tumors located in the caudate lobe constitutes a surgical challenge. Nevertheless caudate lobe resections are feasible and can be safely performed by experienced teams.
Liver surgery: Clinical
FP21.05

Sarcopenia affects liver regeneration and postoperative course after a major hepatectomy. A prospective study on 125 patients using HIDA scintigraphy.

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Background
The impact of sarcopenia on liver regeneration capacities remains unknown.

Methods
Between 2011 and 2015, 125 patients undergoing major hepatectomy (≥3segments) had computed tomography and 99mTc-mebrofenin SPECT-scintigraphy performed preoperatively and postoperatively at day 7 and 1 month for measurements of total and remnant liver volume (RLV) and intrinsic function. Muscle mass measured at L3 vertebrae level identified sarcopenia. Impact of sarcopenia was analyzed on volume/function changes, 3-month morbi-mortality (Clavien) and liver failure rates.

Results
Sarcopenic patients (SP;N=69) were significantly older than non sarcopenic (NSP), with a lower BMI and more frequent malignancies, but with comparable liver function and volume. Postoperatively, SP and NSP had similar overall and severe morbidity (>3a,23.2%vs16.4%; p=0.35), and mortality (8.7%vs3.6%;p=0.3). Nevertheless, SP showed higher rates of ISGLS PHLF (24.6%vs10.9%; p=0.05), clinically-significant PHLF (Peak_Bil>7mg/dL: 14.5%vs1.8%; p=0.02), and PHLF-related mortality (10.1%vs1.8%; p=0.075). After matching patients on the extent of resection (RLV/body weight ratio ±0.03%; 40 patients each), SP had comparable intrinsic function at D7 but a lower volumetric gain (+305cc±170cc vs.+372cc±199cc for NSP; p=0.044). These differences were less markedat 1M.

Conclusion
This prospective study using first sequential SPECT-scintigraphy showed that sarcopenia is associated with a slower liver regeneration, resulting in higher PHLF-related morbi-mortality.
Search for a new dynamic formula to predict the liver volume: the energy expenditure model.

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Background
The assessment of liver volume (LV) is of paramount importance before surgical resection or transplantation to reduce the risk of postoperative hepatic insufficiency. It is usually measured with computed tomography and/or with some formulas, which are static methods. The aim of this study was to develop a new dynamic metabolic formula to predict the LV.

Methods
Using computed tomography LV was calculated in 101 adult patients without liver diseases. LV was then correlated with the patients' metabolic status calculated with the Harris-Benedict equation for the basal energy expenditure (BEE). The activity energy expenditure (AEE) was also calculated considering major surgery as an activity that require at least 10% more of BEE. Using linear regression analysis, a new formula was derived and was compared with the Heinmann, Urata, Emre, Vauthey, and Yoshizumi formulas.

Results
A new basal formula was established: $LV = 0.789 \times BEE + 272$. It was found to be most accurate among those tested ($R^2 = 0.39$, $P < 0.001$). The model indicated that Heinmann’s, Emre’s, and Vauthey’s formulas overestimated the LV, while Urata’s and Yoshizumi’s formulas underestimated the LV. Similarly, a new activity formula was established: $LV = 0.789 \times AEE + 272$.

Conclusion
The new formulas here derived give a dynamic perspective of the LV, which might be influenced by the actual patients' metabolic status. Using the AEE is possible to estimate an increased value of LV, which may contribute to reduce the risk of postoperative hepatic insufficiency.
Liver surgery: Clinical
P10.07

Short and long-term results of surgical treatment of non-colorectal liver metastases.

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Background
Surgical treatment of CRC liver metastases has become the treatment of choice. This has led in recent years to expand surgical indications in metastases from other sources.

Methods

Results
Tumor origin: 3 NET, 2 ovarian, 2 breast, 3 sarcomas, 3 renal, 1 small bowell carcinoma, 1 carcinoid, 1 GIST. 1 second resection, 1 preoperative portal embolization. Resection: 1 not resectable due dissemination, 8 major hepatectomy (50%; 6 right hepatectomies, 1 left hepatectomy and 1 left lateral segmentectomy) and 7 atypical resections. 25% Operative transfusion. 4 patients (28.6%) morbidity, surgical (21.4%), but no patient required reintervention or mortality. Dindo-Clavien: 1 patient grade 2 and 3 grade 3a (21%). Mean stay: 9±5.5 days. With a mean follow-up of 23.7±16 months, 33.3% recurrence (5pts): 1 hepatic, 2 multiple, 1 mediastinal, 1 osseous; with an mean SLE of 22.3±17.1 months and SLE at 1 and 3 years of 77.3 and 57.3%, respectively. Major hepatectomy, transfusion, male, age and tumor size were significant related with recurrence. Renal origin recur 100% and 50% of ovarian tumors but without significance.

Conclusion
Surgery of patients with non-CRC LM is a good treatment option, with low morbidity and mortality and 3-y DFS close to 60%. The worst result were obtained with tumors of renal or ovarian origin.
Liver surgery: Clinical
P8.03

Short- and Long-Term Outcomes of Laparoscopic Liver Resection: a single-center, retrospective, matched-pair analysis

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Background
Laparoscopic hepatectomy has gained wide acceptance in the last few years. The aim of our study is to assess the outcomes of laparoscopic liver resection between two groups matched primarily for the type and extent of hepatic resection.

Methods
268 Patients underwent liver resection in our center between 2008 and 2014, 80 laparoscopic and 188 open. A 1:1 matching was applied, based primarily on type and extent of resection and diagnosis. Perioperative and long-term outcomes were compared.

Results
After matching, 65 patients were included in each group. The laparoscopic group showed lower intraoperative (p<0.001 for RBC, p=0.019 for FFP) and postoperative (p<0.001 for RBC, p=0.021 for FFP) transfusion rate, shorter hospital stay (p<0.001) and lower perioperative overall morbidity according to the Dindo-Clavien classification (p<0.001). There were no significant differences in ICU stay, negative margin rate and operative time. 30-day mortality was nil and 90-day mortality was 1.5% in both groups. For patients with colorectal metastases 2-year and 5-year disease-free survival rate was 52% and 31% for the laparoscopic group and 39% and 32% for the open group (p=0.947), whereas 2-year and 5-year overall survival rate was 81% and 46% to 70% and 39% respectively (p=0.948).

Conclusion
Laparoscopic liver resection:
- is safe and feasible
- offers clear advantages compared to open hepatectomy regarding perioperative transfusion rates, hospital stay and morbidity
- has comparable long-term outcomes to open hepatectomy
Liver surgery: Clinical
P53.05

Should 3 Tesla MRI be the new standard in diagnostic imaging for CRLM?

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Background
Publications focus on 3Tesla MRI with Primovist® as gold standard in detection of liver metastasis. Published results describe detection rates of 85%-95% It remains unclear, how many patients have access to this so called gold standard of diagnostic tests.

Methods
89 patients were recruited for an imaging study protocol (CEUS,MDCT,3T MRI, IOUS/CEIOUS)and Histology as reference Standard. Patients failing to fulfill protocol were excluded from study analysis. These were analyzed here to understand the reasons behind their failure to complete all diagnostics.

Results
Of 89 patients recruited for the study, just 47 were analyzed as study population (Ø 5 lesions/Patient). 23 patients (25,8%) had a contraindication to undergo 3T MRI, 4 patients were submitted to an insufficient protocol (2 wrong contrast, 2 done on 1,5T), 2 cases operated elsewhere and 9 patients were clearly unresectable. 4 patients were irresectable after exploration. Analysis of MDCT/3T MRI yielded diagnostic accuracy of 82%(κ 27%) for lesions > 5mm size IOUS/CEIOUS showed a diagnostic accuracy of 99%(κ88%)not depending on lesion size.

Conclusion
The value of 3T MRI is undisputed. Still, 3T MRI scanners are distributed scarecly – access is limited. High cost of contrast agent are a Limit. ¼ of patients cannot undergo it for limitations of a high power magnetic field (e.g. endoprothesis)The dependance of accuracy on lesion size it (exep for IOUS)makes clear that 3T MRI cannot be recommended as the diagnostic standard procedure in CRLM.
Should AAST Liver Injury scale include Hemodynamic status as criteria?

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Background
AAST has graded Liver injury based on the extent liver damage. Many studies have shown that hemodynamic status is the most reliable and critical factor for deciding on either operative or conservative management rather than the grade. Our aim was to assess the relevance of AAST liver injury scale in management.

Methods
Retrospective study (Jan2012–Dec16). All hemodynamically stable patients had CT scan to grade injury and were considered for conservative management irrespective of AAST grade. Unstable patients and those failing conservative management were considered for surgical therapy. Outcomes were compared in 2 groups in terms of transfusion requirements, need for interventions, hospital stay, complications and mortality. Results were analysed and p value <0.05 was considered significant.

Results
Of 38 patients only 8(21%) required surgical intervention. All Grade 1 and 2 patients were managed conservatively. Only 2(14%) of Grade 3 and 4(29%) of Grade 4 injury required operative intervention. 2 had Grade 5 injury and both required surgery. Transfusion requirements and Hospital stay were more in the surgically managed group. 4(21%) patients had bile leak, 3 in conservatively managed group and 1 in surgical group. Only 1 required intervention (ERCP stent). Mortality was 5.2%(2 patients) and both were Grade 5 injury.

Conclusion
Critical factor in determining the management of Liver injury is hemodynamic status rather than the grade of injury. Hence hemodynamic status should be considered in grading of Liver injury.
Simultaneous laparoscopic colorectal and hepatic resection for patients with colorectal cancer and synchronous liver metastases: a multicenter series

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Background
Laparoscopic resection is considered a viable treatment option for both colorectal cancer and colorectal liver metastases. The aim of this study was to present the results of a multicenter experience with totally laparoscopic simultaneous colorectal and liver resection.

Methods
All patients with colorectal liver metastases that underwent simultaneous resection of colorectal primary and liver metastases were selected from a retrospective database containing all laparoscopic liver resections performed in the associated centers. Patient characteristics and perioperative outcomes were reported.

Results
Sixty-three patients met the inclusion criteria. The primary tumor was most commonly located in the sigmoid (n=27, 42%). Liver metastases were mostly solitary (n=43, 67%). In most cases (n=54, 86%) a single stage minor liver resection sufficed. A conversion was necessary in 3 patients (5%). Hand-assistance was used in 6 (9%) and robot-assisted surgery was used in 2 (3%) cases. Median operative time was 206 minutes (IQR 170-310) and median blood loss was 200 ml (IQR 100-700). Major postoperative morbidity was 18% (n=11), including anastomotic dehiscence 6% (n=4) and 30 day mortality 0%.

Conclusion
Simultaneous laparoscopic colorectal and hepatic resection seems an appropriate treatment strategy in selected patients with colorectal cancer and synchronous liver metastases. The current results apply to patients with solitary or multiple small liver metastasis that require a minor liver resection only.
Simultaneous Laparoscopic Resection of Colorectal Cancer and Liver Metastases- Initial Experience

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Background
Simultaneous resection (SR) of primary CRC and synchronous liver metastases is subject of debate with respect to morbidity in comparison to staged resection. Minimally invasive laparoscopic surgery improves postoperative recovery, diminishes postoperative pain, reduces wound infections, shortens length of stay, without compromising oncological outcome. The aim of this study is therefore to evaluate our initial experiences of simultaneous laparoscopic resection of primary CRC and SLM.

Methods
Currently, laparoscopic resection of primary CRC is performed in more than 53% of all patients in our surgical department. 32 patients with primary CRC and a clinical diagnosis of SLM underwent combined laparoscopic colorectal and liver surgery. 10 of them underwent laparoscopic colorectal resection combine by major laparoscopic liver resection.

Results
Surgical approach was total laparoscopic (29p.) or hybrid technik (3 p.). The incision created for the extraction of the specimen varied between 5 and 8cm. Median operation time was 245 (range 150–320) minutes with a total blood loss of 600 (range 200–750) ml. Postoperative hospital stay was 7day (5–12). An R0 resection was achieved in all patients. Conversion rate was 3.8%(1p.), because we did not find metastasis. Complication rate was 3.8% too, 1 patient with low debit biliary fistula.(grade B).

Conclusion
SLC and LR appears to be save and feasible in selected patients with CRC and SLM, with satisfying short-term results.

References:
[3542] Nikolay Belev. (2016), Laparoscopic Combined Colorectal and Liver Resections for Primary Colorectal Cancer with Synchronous Liver Metastases, The Korean Association of Hepato-Biliary-Pancreatic Surgery, Annals of Hepato-Biliary-Pancreatic Surgery, Plovdiv, 6, 1, 2016-09-03, University Hospital for Active Treatment-Eurohospital
Simultaneous resection for synchronous colorectal liver metastases: are major hepatectomy and/or rectal surgery real contraindications?

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Background
At specialized centers, operative and perioperative management improvements made simultaneous liver and colon resections acceptable procedures. However, simultaneous major hepatectomy and/or rectal surgery still remain controversial due to the high risk of postoperative complications.

Methods
From our prospective database, we retrospectively evaluated 216 patients treated for synchronous colorectal liver metastases by dedicated HPB and colorectal surgeons between 2001 and 2016.

Results
A simultaneous procedure was performed in 70 patients (32%), while 146 (68%) received staged liver resection. Among the simultaneous procedures, 22 (32%) were major hepatectomies (3 or more segments), and 22 (32%) were rectal cancers. Between the two groups there were no differences according to demographic features and distribution of primary tumors. Post-operative complication rates were comparable among groups. The extent of hepatectomy, as well as the location of primary tumor, did not affect the complication rates. Neither disease-free nor overall survival were significantly different between the two groups.

Conclusion
At high volume centres, with dedicated HPB and colorectal surgeons, simultaneous resection of colorectal primary tumour and liver metastases is a safe procedure, even in rectal tumours or patients requiring major liver resection.
Single Center Experience concerning Surgical Treatment for Perihilar Cholangiocarcinoma in 226 patients

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Background
To report our single-center experience gathered from patients affected by perihilar cholangiocarcinoma (ph-CCA) concerning surgical treatment and influencing factors related to outcome as well as perioperative morbidity.

Methods
Between January 2006 and December 2015 a total of 226 consecutive patients with ph-CCA presented at our center. Of the 226 patients 185 underwent surgical exploration and 130 were resected. The medical records of the resected patients were analyzed retrospectively.

Results
Hepatectomy involved right trisectionectomy in 75 (57.7 %), left trisectionectomy in 15 (11.5 %), right hepatectomy in 4 (3.1 %), left hepatectomy in 24 (18.5 %) and minor resections in 12 patients (9.2 %) including resection of the extrahepatic biliary tree as well as regional lymphadenectomy. In order to minimize postoperative liver dysfunction different augmentation techniques were used such as portal vein embolization (25.4 %; 33/130) or since 2010 ALPPS procedure (6.9 %; 9/130). Overall in 60.8 % (79/130) a R0-Resection could be achieved. A total of 43.1 % (56/130) suffered severe perioperative complications according to Dindo-Clavien classification (IIa – V), thereof 10.0 % (13/130) died during hospital stay. The overall median survival for R0-resected patients were 28.0 months, for R1-resected patients 18.6 months respectively.

Conclusion
We present one of the biggest single-center series in Germany. Right trisectionectomy should be strived to reach best results in surgical treatment of ph-CCA.
Single center experience with 120 patients treated for alveolar echinococcosis

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Background
Alveolar echinococcosis is a tumor-like infection with metastatic potential. Surgical resection is the only curative treatment, but it is unknown if the resection status or a laparoscopic approach are associated to recurrence of the disease.

Methods
Retrospective analysis of 120 patients treated at the Department of Visceral Surgery of the University Hospital Bern between 1967 and 2016 for hepatic alveolar echinococcosis.

Results
Within our cohort (53% females, median age 57 years) 38 patients were treated conservatively and 84 received surgical procedures. Seventy-six patients were operated in curative intend (30 hemihepatectomies, 10 extended hemihepatectomies, 36 atypical liver resections), while 7 patients received palliative surgery. An open approach was performed in 72 cases, 12 patients were resected laparoscopically. Adjuvant treatment (benzimidazol) was performed in 89% of the patients, neoadjuvant treatment was given in 71%. Median follow-up was 37 (1-520) months. Recurrence occurred in 13% of the curatively resected patients with a median time to recurrence of 67 months. No correlation to the surgical approach or the resection Status was detected. In the last decade we operated 3.7 times more patients (n=52) than in the decade before.

Conclusion
The incidence of liver resections for alveolar echinococcosis increased exponentially in the last decade at our institution. Laparoscopic resections seem to be safe and are not associated to disease recurrence, neither is the resection status.
Single centre experience with 45 cases of ALPPS for right trisectionectomy: long term oncological results.

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Background
Although ALPPS is a well known technique to induce a rapid hypertrophy of the future remnant liver volume (FLR), to little is still known about its oncological outcomes.

Methods
We retrospectively analyzed our single center experience. Indication for ALPPS was a FLR to total liver volume ≤25% or remnant volume to body weight ratio ≤0.5. Volumetric parameters, postoperative complications according to the Dindo-Clavien classification, patient survival and tumour recurrence were analysed.

Results
Between November 2010 and November 2016 we performed 45 right trisectionectomy as ALPPS for 26 primary liver tumors (6 phCCA, 11 iCCA, 2 Gallbladder carcinoma (GB-CA), 5 HCC and 2 Klatskin-mimicking IPN) and 19 metastatic tumors (18 CRLM, 1 breast cancer). Median age was 66 years (range=39-80). The feasibility was 100%. A R0 status was reached in 37 patients. Morbidity was 82.2% (major morbidity 51.1%). 19 patients developed PHLF. The postoperative mortality rate was 13.3%. After a median follow-up of 23 months, 78% are still alive. The overall disease-free survival at 1 year was 62% (58% CRLM, 67% phCCA, 43% iCCA and 75% HCC). Twelve cases (9 CRLM, 2 phCCA, 5 iCCA and 1 HCC) developed tumour recurrences, and four of them (2 CRLM and 2 iCCA) died after recurrence. The 3-year OS was 92% for CRLM, 80% HCC, 67% phCCA, 50% iCCA.

Conclusion
Avoiding postoperative mortality, ALPPS permit to achieve excellent oncological outcomes, even though a high recurrence rate.
Liver surgery: Clinical
P7.03

SIRT for downsizing to resection

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Background
Different strategies have been developed to achieve resectability in patients initially considered as unresectable. Selective internal radiation therapy (SIRT) has emerged as an effective therapy for patients with primary non-resectable malignancies of the liver. Our group combined SIRT with liver surgery for downsizing for resection.

Methods
Starting 2010 all patients with liver malignancies were evaluated in an interdisciplinary tumor board. Patients with marginally resectable liver metastases treated by SIRT followed by liver resection were identified and prospectively documented in a database for subsequent retrospective analysis.

Results
Fifteen patients (7 female, 8 male) with marginally resectable liver metastases were planned for liver resection after SIRT. In thirteen patients (87%) liver metastases were from colorectal malignancies, and in two patients from breast cancer. After performing SIRT (90Y resin microspheres, mean administered activity 1260 MBq, range: 600 – 1990 MBq), twelve patients had potentially curative hepatic resection. In three patients liver resection after SIRT could not be performed due to the appearance of new extrahepatic metastases. Analyzing the effect of SIRT, we observed a decrease in tumor size with central scarring. Due to the selectivity of SIRT the future liver remnant was not effected in all patients.

Conclusion
The combination of SIRT with modern liver surgery enables new therapeutic options in patients with marginally resectable liver metastases.
Sixteen Years of Experience in Surgical Management after Extended Hepatectomy a Single Center Experience

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Background
Extended liver resection implies a radical procedure, invariably carrying high rates of post-operative morbidity and mortality. The aim of this study was to analyze 59 patients who underwent extended hepatectomy (EH), over a period of 16 years.

Methods
We examined demographics, pre-operative portal vein embolization (PVE), operative factors, and early post-operative complications, focusing on the results of patients who underwent EH from 1999 to 2007 (P1) and from 2008 to 2016 (P2). The Clavien-Dindo classification was used to evaluate post-operative events in the first 90 days after EH.

Results
The most common cause for EH was colorectal liver metastasis (CRLM); 24 patients underwent EH in the P1 period (1999-2007) and 35 in the P2 period (2008-2016). Fifty-four right, and 5 left, EHs were performed. Mean hospital stay was 18.1 (5-107) days, depending on the Clavien grade of complications [≥IIIa 25.4±24 vs. <IIIa 10.4±5.6, p=0.01]. Comparing periods (P1 vs. P2) we found an important increase in the number of PVEs (p 0.056), negative margins (p 0.007), and hospital stay (p 0.008), and a decrease in the need for blood transfusion (p 0.04).

Conclusion
The increase in PVE in select patients, and the lack of association between short-term complications and positive margins, particularly on colorectal liver metastasis, suggest strong consideration of this surgical option to expand selection criteria and clinical management in these groups of patients.
Liver surgery: Clinical
FP14.05

Sphincterotomy with stent may reduce post-operative bile leaks: a randomized controlled trial

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Background
Bile leakage (BL) after liver resection is an important cause of post-operative morbidity. Percutaneous drainage is the standard therapy but may be prolonged until leak cessation. This study investigates if sphincterotomy and stent reduces duration and significance of BL.

Methods
All patients with ISGLS grades A or B BL were eligible for inclusion in this randomized controlled trial. Participants were randomized to standard percutaneous drain or to drain plus sphincterotomy and main bile duct stent. Primary outcome was bilirubin output (drain volume x bilirubin concentration/day) on day 2 after intervention or the corresponding day. Secondary outcomes were BL duration, time of in-hospital stay and complications.

Results
39 patients were included. 20 were randomized to drain and 19 to stent. The groups were similar with respect to patient and surgery characteristics and bilirubin output at inclusion. There was a trend towards reduced BL output in the stent group (median 17 vs 29 µmol/day, \(p = 0.17\)), but no significant difference. There were no significant differences in leak duration, time of in-hospital stay or overall morbidity.

Conclusion
Sphincterotomy with stent is safe in BL patients. As no significant reduction in BL or clinical benefit was achieved in this study of unselected grade A and B BL patients, we cannot recommend the method for this whole patient group. The trend towards BL reduction implies substantial benefit for some patients and further selection tools are needed.
Splenic artery embolization versus endoscopic therapy for prevention of recurrent variceal bleedings in CLD patients. A non-randomized pilot trial.

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Background
The cumulative data indicate that over 70 percent of patients experience recurrent variceal hemorrhage within one year after first bleeding episode. Optimal strategy of secondary prophylaxis is still under discussion.

Methods
An open-labeled, non-randomised controlled pilot trial was performed to evaluate the feasibility and efficacy of partial splenic artery embolization (SAE) for prevention of recurrent variceal bleedings in 75 patients with CLD and portal hypertension. In control group 117 pts underwent various endoscopic therapy (ET) methods (sclerotherapy, band ligation, clips) for secondary prevention. No significant differences between demographic data, as well as Child-Pugh score and number of previous episodes was found. Original scoring system was used to evaluate the efficacy within 12 mth period: “satisfactory” result – no recurrent bleeding episodes, “stable” – less than 1, “unstable” – >2 episodes or change of prevention strategy, “unsatisfactory” – fatal bleeding episode occurred.

Results
After 12 mth 69 and 103 pts were eligible for final analysis (6 and 14 patients were lost to follow-up), respectively, “satisfactory” and “stable” results were achieved in 52 of 69 pts of SAE group versus 37 of 103 in control group, “unstable” – in 5 and 38. Fatal recurrent bleeding occurred in 11 and 27 patients, death not related to bleeding was proved in 2 and 1 pts, respectively.

Conclusion
SAE is found to be an effective life support modality in patients with CLD and portal hypertension complications.
Stage adjusted therapy of HCC – Influence of liver function on therapeutic outcome after surgical treatment or TACE

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Background
Stage adjusted therapy of HCC is guided by the BCLC Guidelines. Here tumor stage, underlying disease and liver function are of special significance. In this regard we evaluated the HCC patients treated in our center over the last 15 years.

Methods
Between 2001 and 2016 732 HCC patients were treated. Of these 348 (48%) patients underwent surgical treatment and 176 received TACE (24%). Retrospectively we examined the influence of MELD score on therapeutic outcome with respect to overall survival depending on surgical procedure or TACE. For this purpose the therapeutic subgroups LTX (51; 7%), resection (159; 22%), surgical ablative procedure (RFA, MWA) (138; 19%) and TACE (176, 24%) were divided according to their liver function. A MELD of 15 or higher was chosen as a cut off to compare groups with good and impaired liver function.

Results
The 2-year overall survival in patients with good versus impaired liver function resulted as follows: resection 60% versus 58%, surgical ablative procedure 58% versus 57%, for TACE the difference was more pronounced 35% versus 20%. As expected liver transplantation showed the best overall survival in our collective (2-year 78%; 5-year 58%).

Conclusion
Surgical procedures are the first choice treatment for HCC patients regarding to overall survival. According to the presented data surgical treatment is superior even in moderately impaired liver function. Surgical ablative procedures showed similar 2-year results as resection regardless of liver function.
Staging surgical resected peri-hilar cholangiocarcinoma: comparison of the 7th and 8th ed. of the American Joint Committee on Cancer staging systems

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Background
We aimed to compare the performances of the AJCC 8th and 7th ed. staging systems using a multi-institutional cohort of patients undergoing hepatectomy for perihilar cholangiocarcinoma (PHCC)

Methods
The AJCC 7th and 8th ed. staging systems were used to classify 183 patients who underwent hepatectomy with curative intent for PHCC at two tertiary hepatobiliary centers. The performances of the two staging systems were compared using the concordance index (c-index)

Results
While the 7th ed. of AJCC T-category (c-index:0.595) performed better than the 8th ed. (c-index:0.580), c-index for AJCC N-category 7th and 8th ed. was 0.592 and 0.599, respectively. Using the AJCC 7th ed. staging system, the 5-year OS for stages I, II, and IVa was 71.4%, 36.3%, and 34.7%, while no patients in stages IIIa, IIIb, and IVb survived 5 years. In comparison, when the AJCC 8th ed. staging system was used, the 5-year OS was 71.4% and 37.4% in stages I and II, while resulted 25.8%, 19.1%, and 22.9% in stages IIIa, IIIb, and IIIc, respectively. Of note, no patients in stages IVa and IVb survived 5 years. The AJCC 8th ed. staging system had a slightly better discriminatory ability with a c-index of 0.609 compared with 0.595 for the AJCC 7th ed.

Conclusion
We applied the newly released AJCC 8th ed. staging system to a multicentric cohort of patients and we observed that its performances were slightly better than the previous version. However the presence of other additional prognostic factors should be investigated in further studies
Stress test of liver function using $^{99m}$Tc-mebrofenin Hepatobiliary Scintigraphy (HBS)

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Background
HBS is a quantitative liver function test and is used to assess liver function in patients scheduled for major liver resection. Normally it is performed after a 4 hours fast which corresponds with the resting liver function. Knowledge of the stimulated liver function could be of interest for optimal patient selection since the total liver function (TLF) might be underestimated in fasting patients. We aim to investigate the hepatic functional reserve capacity by assessing the change in TLF after stimulation with a fatty food challenge.

Methods
Healthy volunteers (n=12) aged 50-60 years underwent sequential HBS with 100 MBq $^{99m}$Tc-mebrofenin. The first scan was performed after an overnight fast, the second scan after an overnight fast followed by the administration of 250 mL full fat chocolate-milk prior to the scan. Hepatic $^{99m}$Tc-mebrofenin uptake rate was calculated as an increase of $^{99m}$Tc-mebrofenin uptake over a time period of 150 s. TLF was represented by the $^{99m}$Tc-mebrofenin uptake rate as a percentage of the injected dose per minute (%/min).

Results
TLF with and without a food challenge was 21.45 ± 3.01 %/min and 25.00 ± 4.26 %/min, respectively. There was a significant increase in the $^{99m}$Tc-mebrofenin uptake rate after a fatty food challenge; i.e. 3.55 ± 2.51 %/min, 95% CI [2.10 – 5.00], P < 0.0001.

Conclusion
TLF increased after administration of a fatty food challenge which may reflect hepatic functional reserve capacity. Future studies should determine which factors account for this difference.
Subdiaphragmatic peritoneal implants secondary to "retroconversed" immature ovarian teratoma mimicking liver metastases

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Background
Immature ovarian teratomas are germ cell tumors that rarely metastasize to distant organs. Isolated liver metastasis of ovarian teratoma is also very rare. Herein, a retroconversed recurrent ovarian teratoma is presented, without any chemotherapy history.

Methods
Case Presentation

A 29-year old female was evaluated as a living liver donor candidate. Abdominal MRI and CT scans revealed two masses with cystic as well as solid areas sized 40x37mm and 23x7mm in liver segments 7 and 8, respectively.

Results
Owing to the liver masses detected by abdominal imaging, she was found unsuitable for liver donation. Due to her history of unilateral oopherectomy with the diagnosis of grade-I immature teratoma four years ago, she was thought to have recurrent disease. However, laparotomy confirmed peritoneal implants with deep indentation on liver surface, mimicking parenchymal liver metastases. The two masses were histopathologically reported to be mature teratomas.

Conclusion
Recurrences of immature teratomas may present as mature teratomas. This process, known as “retroconversion”, has only been observed in patients receiving chemotherapy. On the contrary, this patient had not received chemotherapy. Due to this fact, coupled with the wrong interpretation of subdiaphragmatic peritoneal implants as parenchymal liver metastases, a decision was given to perform laparotomy rather than laparoscopy. Laparoscopic exploration should be considered in recurrent ovarian teratomas regardless of any chemotherapy treatment.
Liver surgery: Clinical
FP10.03

Superselective Transarterial Chemoembolization as an Alternative to Surgery in Symptomatic/Enlarging Liver Hemangiomas

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Background
Transarterial embolization of liver hemangiomas has not been considered to be consistently effective.

Methods
The charts of 25 patients who underwent superselective transarterial chemoembolization (TACE) with the bleomycin-lipiodol emulsion were evaluated retrospectively.

Results
Twenty-two patients had abdominal pain; asymptomatic/vaguely symptomatic enlargement was the indication in 3 patients. A single session was conducted in 17 patients, two sessions in 7 and three sessions in one. After the first session, lesion volume decreased from median (range) 634 (226-8435) to 372(28-4710) cm³ (p< 0.01), after a median period of 4 months (range: 2-8). A second session was performed in 8 patients (median(range) initial volume: 1276 (441-8435) cm³) with persistent complaints and/or large lesions receiving feeders from both right and left hepatic arteries (staged treatment). Median(range) lesion size decreased further from 806(245-4710) to 464 (159-2150) cm³ (p<0.01). Three patients experienced a postembolization syndrome that persisted after the first week. Seventeen of the 22 symptomatic patients (77%) reported resolution or marked amelioration of complaints. Regrowth after initial regression was not observed during median (range) 14(8-39) months of follow up (n:18).

Conclusion
Transarterial chemoembolization with the bleomycin-lipiodol emulsion is a potential alternative to surgery for symptomatic/enlarging liver hemangiomas. Volume reduction is universal and symptom control is satisfactory.
Surgical management of advanced hepatic alveococcosis using transplantation technologies

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Background
Hepatic alveococcosis is extremely aggressive disease

Methods
We examined 41 patients from 2008-2017, 36 were operated: 31 hepatic resections, 4 liver transplantation (OLT), 1 portosystemic shunting. Among all the cases of hepatic resections (n=1067) alveococcosis accounts for 3.28% Extrahepatic alveococcosis 2(lungs) The complications: 9 obstructive jaundice, 4 portal hypertension, 1 viral hepatic cirrhosis. The size of a parasitic node in the liver varied 9.3-21.7 cm

Results
35 radical operated: 31 R0-resections, 4 OLT, 1 portosystemic shunting. 6 were not operated: 2 due to marked comorbidity; 2 chronic infection+biliary fistulas; 1 biliary ducts stenting; 1 suggested transplantation. Among the surgeries: 4 right hepatectomy, 16 right extensive hepatectomy, 2 left extensive hepatectomy, 1 left hepatectomy, 1 hepatectomy with reverse autotransplantation of the left lateral segment, 1 left hepatectomy “ex situ” with 1 and 8 segmentectomy, 1 three-segmentectomy, 3 bisegmentectomy, 2 segmentectomy. 14 patients have IVC ingrowth: 9 IVC prosthetic: 4 one-stage left hepatic vein plastic, 5–IVC resection. 13 portal vein resection, 7 resection of extrahepatic ducts, 7 resection of diaphragm. 11 cases of bile leakage (ISGLS): grade B–4, C–7. Postoperative complications: 16 (Clavien-Dindo): type II–4, IVb–1, IIIb–8, V–3. The long-term results: 1 recurrent case, 2 fatal cases.

Conclusion
Liver resection is a treatment of choice, characterized by large extent of resection, and accompanied by resection plastic operations on major vessels and bile ducts.
Surgical outcomes and prognostic factors for survival for colorectal liver metastases: a 10-years single center experience

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Background
About 50% of patients with colorectal cancer develop liver metastases in the course of the disease. Advances in surgical techniques and chemotherapeutic regimens allowed increasing the number of curative treated patients.

Methods
Between 2005-2015 at the Clinic of hepatobiliary, pancreatic and transplant surgery, MMA-Sofia 298 curative liver resections (LR) on the occasion of colorectal liver metastases (CRLM) were performed. Metachronous were 142 patients and synchronous 156.

Results
103 major liver resections were performed, 50% in the synchronous group. The median survival of the entire group was 48.8 months, with a median of 20.63 months; synchronous - 46.5 months, with a median of 27.3 and metachronous 42.28 months and 31.77 (p = 0.179). Five-year survival calculated by Life table is 33% for metachronous and 22% for synchronous (p = 0.225). In patients with synchronous metastases Cox analysis confirmed importance for the survival of the following factors: the volume of LR (p <0.003), distribution in the liver (p <0.015), volume of blood loss (p <0.013) and lymphovascular invasion (p <0.004). For operated with metachronous LM important factors for survival are the number and size of LM (p <0.022), distribution in the liver (p <0.019), the volume of LR (p <0.003), anatomic LR (0.012).

Conclusion
Treatment of CRLM requires precise selection and individual approach undertaken by a multidisciplinary team. Applying advanced multimodal approach allows increasing the number of radically operated patients
Surgical Strategies and Selection Criteria for Patients with Liver Metastasis from Neuroendocrine Tumors: personal experience.

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Background
The role of surgical treatment of liver metastasis from neuroendocrine neoplasm (NET) is still a debated issue, and the management of these patients is entrusted to the practical experience of single centers. The main problem is that there are not available randomized trials comparing surgical resection to untreated patients or other liver directed therapy. The aim of this work is to resume the main surgical strategies and selection criteria adopted and compare the results to our experience to achieve a flow chart for a personalized management of these patients.

Methods
Between 2005 and 2015, 284 patients with histologic diagnosis of NET afferent to Ca’Foncello Hospital in Treviso were collected. In this group, 119 cases of gastro-entero-pancreatic NET (GEP-NET) were identified, 37 of them with liver metastasis.

Results
Among 37 patients with NET liver metastasis, 9 underwent surgical resection. Statistical analysis demonstrated a better overall survival of resected patients (p = 0.035). Furthermore, poor differentiated NET (G3) presented worse prognosis than well differentiated (G1/G2) NET, and the same results were obtained considering Ki67 values alone (p = 0.0001).

Conclusion
Data evaluation suggests that surgery has so far the best results in the treatment of NET liver metastasis, especially when associated to ablative procedures. Patients with advanced NEN are highly heterogeneous, and can benefit from a wide panel of therapeutic strategy, with different modality based on grading, metastatic pattern and clinical features.
Surgical treatment of cyst hydatid disease of the liver in the era of percutaneous treatment

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Background
Cystic echinococcosis is an endemic disease in certain parts of the world. Although certain types of hydatid cysts are successfully treated by percutaneous aspiration, injection and reaspiration (PAIR), surgical therapy is still choice of treatment for some patients. In this study we evaluated the indications and long term results of open surgery in cyst hydatid disease of the liver.

Methods
We retrospectively reviewed the data of patients operated for cyst hydatid disease of the liver between January 2005 and December 2016 at our center.

Results
55 patients were operated for cyst hydatid disease of the liver. Mean age of the patients was 41.5. The most common indication for open surgery was high risk of cystobiliary fistula (67.2%) and second was previously performed unsuccessful PAIR (14.54%). Mean follow-up of the patients was 31.7 months. Surgical procedures performed for these patients were partial cystectomy (89%), hemihepatectomy (3,6%), sectorectomy or segmentectomy (7,2%). 23 patients had a history of preoperative intervention. In these patients, post operative ERCP was required for only one patient, whereas patients without a history of preoperative intervention, ERCP and papillotomy became necessary in 28% of the patients in postoperative period.

Conclusion
Although PAIR is the current treatment modality for some types of cyst hydatid disease of the liver, surgeons are still dealing with cyst hydatid disease of the liver but with complicated ones.
Survival after breast cancer liver metastasis treatment in Sweden

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Background
The benefit from surgery for breast cancer liver metastasis (BCLM) remains unclear. The aim with this study was to analyze complications, prognostic factors and survival among patients receiving surgical or medical treatment for BCLM in Sweden.

Methods
The Swedish liver registry (Sweliv) and the National Breast Cancer Registry was used to include women with unilateral breast cancer and metastasis exclusively to the liver. Kaplan-Meier and log-rank test was used to compare survival.

Results
32 operated women were identified and compared to 237 patients with medical treatment. 6 patients (19%) had a complication after surgery but 90-day mortality was 0%. Among the operated patients, the only significant prognostic factor was HER2 status of the primary tumor. The mean overall survival time was 63 months after BCLM diagnosis for the operated patients, compared to 22 months for the medical cohort (p<0.001). The operated group had a lower TNM-stadium but more HER2 positive tumours. When comparing only the HER2 positive or negative cases, there was still a significant survival benefit after surgery.

Conclusion
Liver surgery for patients with BCLM is safe and may provide a survival benefit, although case selection might affect the result of this retrospective study. Prognostic factors and criteria to select patients are not yet clear. To determine this, and to confirm a survival benefit after surgery, an extended prospective study is planned.
Survival after hepatectomy for combined hepatocellular-cholangiocarcinoma: a case-match analysis with hepatocellular carcinoma and cholangiocarcinoma

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Background
Combined hepatocellular carcinoma and mass-forming cholangiocarcinoma (cHCC-MFCCC) is a rare tumor. The aim of this study was the survival analysis comparing such tumor with classic hepatocellular carcinoma (HCC) and mass-forming cholangiocarcinoma (MFCCC).

Methods
Our prospectively maintained database was queried, and 20 patients with cHCC-MFCCC were identified. A 2:1 match was performed with 40 patients operated in the same period for HCC, and with 40 operated for MFCCC. Only T1 or T2 patients N0 M0 were considered. Primary endpoint was the overall survival (OS) and disease-free survival (DFS).

Results
Median tumor diameter of cHCC-MFCCC group was 3.8 cm (range 1.3-5), and single tumor was detected in 13. After a median follow-up of 26 months (range 6-77), the 1-, 3-, and 5-year OS rates were 95%, 71%, and 71% respectively. The 1-, 3-, and 5-year DFS rates were 70%, 46%, and 35% respectively. Both OS and DFS did not differ significantly among the three histotypes.

Conclusion
Patients with cHCC-MFCCC showed similar rates of OS and DFS to those patients with classic HCC and MFCCC. Further evaluations of differences in tumor features and biology are necessary to better characterize the prognosis of patients with cHCC-MFCCC.
Liver surgery: Clinical
P53.01

Suspected major vessel involvement in patients with colorectal liver metastases (CRLM): Single Center Experience of 13 Cases

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Background
The role of major vessel involvement in the treatment of CRLM still remains unclear.

Methods
From Jan. 2008 to Oct. 2016, 650 liver resections (LR) for CRLM were performed. 13 cases included resection of major vessel with reconstruction because of suspect tumor infiltration. The portal vein (PV) was resected in 2 and the inferior vena cava (IVC) in 10 cases. Combined resection and reconstruction of the PV and IVC was performed in 1 case.

Results
All PV-patients (n=2) received a segmental resection. PV resection was combined with 2 major LR. Regarding the IVC, tangential resection was performed in all cases (n=10). Minor and major LR were accomplished in 5 cases each. The patient with combined vessel resection received a segmental resection of the PV and a tangential resection of the IVC. Median hospital stay was 17d and major postoperative complications Grade III-IV, occurred in 3 patients. In-hospital-mortality was 0%. R0-resection was achieved in all cases. Histopathological examinations approved in each group 1 case of microscopic invasion. The patient with invasion of the IVC is still alive, receiving chemotherapy because of intrahepatic recurrence. The patient with invasion of the PV died after 33 months.

Conclusion
Microvascular invasion is a rare event in CRLM (2 of 650 liver resections). Even in cases of macroscopic radiological adherence, microscopic invasion was rarely observed in 15%. Therefore, radiologic diagnosis of CRLM adjacent to major vessels is not a contraindication for surgery.
Symptomatic portal hypertension – portosystemic shunt surgery or TIPS?

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Background
Since the advent of transjugular intrahepatic portosystemic shunts (TIPS), portosystemic shunt surgery (SS) has seldom been used in the management of portal hypertension, leading to an unclear role of SS in adult patients.

Methods
All the patients who underwent SS between 1998 and 2016, and all the patients who underwent TIPS between 2008 and 2016 were included. Following retrospective data collection, the 10 patients in the SS group were matched 1:2 with patients in the TIPS group based on demographics, presence of cirrhosis, Child-Pugh, MELD, and indication for procedure.

Results
A total of 30 patients (mean age 57 years, 70% female) were involved in the study. The two groups were comparable for demographic characteristics, Child and MELD score; cirrhosis (p<0.001) was more common in the TIPS group, and portal vein thrombosis in the SS group (p=0.02). The main indication for the procedure was variceal bleeding in both groups. Procedure related mortality and morbidity were similar in the two groups (30% in the SS group vs 15% in the TIPS group and 30% vs 40% respectively, p=ns). At univariate analysis there was no difference in the risk for shunt dysfunction between the two groups; the only significant risk factor was the procedure being performed as an emergency (p=0.023, OR=11.3).

Conclusion
SS can, in selected cases, achieve a similar rate of shunt patency and rebleeding rate compared to TIPS, with comparable mortality and morbidity. SS can be considered as a valid alternative to TIPS.
Liver surgery: Clinical
FP6.02

Systematic cysts aspiration facilitating extended Right Hepatectomy for Isolated Polycystic Liver Disease

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Background
Isolated Polycystic Liver Disease (PLD) (not associated with kidney disease) is a rare disease that in some cases lead to invalidating symptoms and poor quality of life. The optimal surgical strategy is still debated. Liver resection (LR) or liver transplantation can be indicated according to the extent, distribution and anatomy of the cysts.

Methods
A 68 years old man with PLD with massive hepatomegaly complicated by jaundice, and history of cyst fenestrations by laparotomy and multiple needle aspirations for infected cysts was referred to our Center. Renal function was normal. Estimated liver volume was 24000 cm\textsuperscript{3}. He had a relatively preserved left liver lobe.

Results
An extended right hepatectomy plus cyst fenestrations in the left lobe was performed. During operation a systematic aspiration of cystic content with multiple needles facilitated the detachment of the liver from adhesions and the right liver mobilization. Twenty liters of cristalloids were infused to replace the amount of liquids aspirated during surgery. Postoperative course was complicated by ascitis that required abdominal drain left in place for 22 days. The weight of the patient was reduced 20 kg after surgery with optimal symptoms relief.

Conclusion
LR represent a good indication in selected cases with invalidating PLD especially if kidney function is preserved. Systematic cysts aspiration during surgery helps the mobilization of the liver and the recognition of distorted anatomy thus decreasing the chance of postoperative morbidity.
Systematic review of transarterial embolization in the management of hepatocellular Adenomas

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Background
Hepatocellular adenoma (HCA) is an indication for resection, if there is a risk of haemorrhage and malignant transformation. Transarterial embolization (TAE) is used to manage bleeding HCA and occasionally to reduce tumour size. TAE may have potential as elective therapy, but its current role in this context is uncertain. This systematic review provides an overview of clinical outcomes after TAE, in bleeding and non-bleeding HCA. Additionally, 3 treated patients from our own center will be discussed in detail.

Methods
A systematic search in PubMed and Embase was performed. Outcomes were change in tumour size, avoidance of surgery, complications and malignant transformation after TAE. The CASP tool for cohort studies was used for quality assessment.

Results
From the 320 retrieved records, 20 cohort studies and 20 case reports including 851 patients met the inclusion criteria. TAE was performed in 151 of 851 (18%) patients, with 196 embolized HCA, of which 96 (49%) were non-bleeding. Surgical treatment was avoided in 73 of 151 (48%) patients. Elective TAE was performed in 49 patients with 66 HCA; (84%) of these patients did not require further surgical management. Major complications occurred in 8 of 151 patients (5%) and no mortality was reported. Among cohort studies, complete tumour disappearance was observed in 9% of patients, and regression in 76%.

Conclusion
Acute or elective TAE in the management of HCA can be considered safe. In the elective setting, TAE provides a potential alternative to surgery.
Liver surgery: Clinical
P7.07

TACE prior to laparoscopic liver resection of hepatocarcinoma on cirrhotic liver. Propensity score matching with open surgery

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Background
Laparoscopic liver resection in hepatocarcinoma is more difficult in cirrhotic liver because of a higher risk of hemorrhage. We indicated transarterial chemoembolization (TACE) prior to liver resection in these patients. The aim is to compare laparoscopic (LS) vs open surgery (OS) after TACE doing a propensity score matching (PSM).

Methods
We have resected 52 patients with HCC on cirrhosis liver (22 by LS and 30 by OS). After PSM (age, gender, preoperative comorbidity, etiology of cirrhosis, Child and BCLC classification, number of nodules, surgical technique), we included 22 patients in each arm.

Results
There were not differences in number of Pringle maneuver. Laparoscopic group had a shorter surgical time than open surgery (120 vs 150 min; p=0.042) and less blood loss (100 vs 250 cc; p=0.042). There were no differences in postoperative morbidity (0% vs 19%; p=0.091) and mortality (0% vs 2.7%; p=0.549). Mean hospital stay in LS was lower than in OS (5 vs 8 days; p<0.001). There were not statistically significant differences between both groups in overall survival (p=0.453) and disease free survival (DFS) (p=0.105) at 3 and 5-years.

Conclusion
LS with prior TACE get less surgical time, blood loss and hospital stay than OS, with similar DFS and overall survival.
Technical challenges in major liver resection for alveolar echinococcosis

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Background
Alveolar Echinococcosis (AE) is a potentially fatal, often multifocal infection of the liver with malignancy mimicking growth and potential metastasis. Currently the only curative treatment option is radical resection, which is often complicated by parasitic involvement of adjacent organs or hilar structures of the liver.

Methods
We retrospectively analyzed the chart of eight patients who underwent major liver resection for EA at our center between ’06 and ’16. We looked at surgical procedures, post-op complications as well as follow-up.

Results
Eight patients (pts) with a mean age of 46y were included. 5/8 pts underwent trisectionectomy (4R/1L) and three a standard hepatectomy (1R/3L). 5 ptshad resection of extra hepatic bile ducts with a complex hepaticojejunostomy in two cases. Two had partial resection and reconstruction (R&R) of the IVC. Two had R&R of the portal vein. One had reconstruction of the right HA. Two had partial R&R of the diaphragm. The median length of hospital stay was 16d

Four patients experienced complications >= Dindo 3a.
To date all pts are alive, with no signs of recurrent disease and no need of liver transplantation with a mean follow-up of 35 months.

Conclusion
Due to its long incubation period patients with EA are often diagnosed late when biliary symptoms arise and the disease is already advanced locally. Yet we believe that resections with complex reconstructions are a feasible alternative to liver transplantation in tertiary centers for HBP surgery.
Ten year experience of re-resection of recurrent liver-only colorectal metastases

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Background
Resection is the only curative treatment for patients with metastatic colorectal cancer (mCRC). Over half of patients undergoing liver resection will develop recurrent disease, but a second liver resection may offer the possibility of prolonged survival in some patients.

Methods
Prospective data were obtained from 2006 to 2016. Patients having 2 or more liver resections for mCRC and 12 months of follow-up were included. Cases with two-stage resections or extra-hepatic disease were excluded. Standard pre-operative staging comprised of a CT scan of chest, abdomen and pelvis and a liver MRI scan. Post-operative surveillance was with 6 monthly CT and serum CEA for 2 years, and then annually. Operative outcomes, disease recurrence and survival were analysed.

Results
899 liver resections were carried out over 10 years. 62 patients underwent 1 or more re-resection for mCRC. 3 patients were unresectable at laparotomy. In total 70 redo liver resections were performed on 62 patients. Mortality was 1.4% (1/70) and all-cause morbidity was 35%. Median survival from the date of first re-resection was 42 months (95% CI 32 – 71 months), with a recurrence rate of 66% (41/62) and estimated 5-yr survival of 37%.

Conclusion
Repeated liver resection is an aggressive but safe strategy for dealing with recurrent CRLM. Recurrence rates of 37% and 60% at 1 and 2 years respectively justify intense surveillance. Overall survival is comparable with single resection series.
The Albumin-Bilirubin (ALBI) score stratify short-term and long-term outcomes within Child-Pugh A patients undergoing surgery for HCC

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Background
The ALBI score has been recently proposed to predict prognosis in HCC patients. The aim of the study was to verify the ability of ALBI score to stratify short and long-term outcomes in HCC Child-Pugh A patients undergoing surgery.

Methods
A retrospective analysis of 180 Child A patients with HCC who underwent surgery from 2006 to 2016 was carried out. The patients were further classified according to the ALBI score.

Results
A total of 124 (68.9%) were ALBI-1 (good liver function) and 56 (31.1%) were ALBI-2 (less good liver function). Major hepatectomy was performed in 43 (23.9%) patients. ALBI-2 patients had a higher rate of liver related morbidity compared with ALBI-1: liver failure in 10.7% vs. 2.4% (p=0.027) and ascites in 28.6% vs. 13.7% (p=0.016), respectively. ALBI-1 and ALBI-2 patients had a 5-years OS rate of 55.7% and 35.3%, respectively (p=0.004). Other factors related with OS were BCLC (p<0.001), AFP >200 ng/mL (p=0.008), size of tumor>10cm (p<0.001), multiple nodules (p=0.001), absence of peritumoral capsula (p=0.028), vascular invasion (p<0.001). At the multivariate analysis ALBI score (p=0.036), multiple nodules (p=0.014) and size of tumor >10cm (p<0.001) confirmed to be independent prognostic factors.

Conclusion
The ALBI score is a simple tool to stratify the liver related morbidity in Child-Pugh A HCC patients undergoing surgery. Moreover, it efficiently predicts the long-term survival and it may be considered in the treatment allocation.
The ALPPS approach for colorectal liver metastases: impact of KRAS mutation status in survival

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Background
Background: KRAS mutations influence survival after hepatectomy for colorectal liver metastases (CRLM). However, their prognostic significance has never been evaluated in patients who undergo Associating Liver Partition and Portal vein occlusion for Staged hepatectomy (ALPPS).

Methods
Methods: Between June 2011 and March 2016, twenty-six patients underwent ALPPS for CRLM. Complications were classified according to the Dindo-Clavien classification. Bi- and multivariate cox analyses were performed to evaluate variables potentially associated with survival.

Results
Results: Overall, morbidity grade ≥3a and 90-day mortality were 38.5% and 0%, respectively. Median follow-up from the time of discharge was 21.5 months (IQR 9.6-35.6). One and 3-years overall survival (OS) was 83.4 and 48.9 %, respectively. Patients with mutated KRAS had a median OS of 15.3 months versus 38.3 months for those with wild-type KRAS (p<0.0001). Median disease-free survival was 7.9 months, 5.6 versus 12.3 months for mutated and wild-type KRAS, respectively (p=0.023). KRAS mutation was found to be an independent risk factor for OS (HR 7.15, 95% CI 1.50-34.11;p=0.014).

Conclusion
Conclusion: KRAS mutation is an independent predictor of poor survival after ALPPS. This finding will help to optimize patient selection, both avoiding futile surgical indication and maximizing the benefit for patients with extensive disease who are subjected to high-risk aggressive surgery.
The behavior of colorectal liver metastases in the interval between the end of chemotherapy and liver resection. A new criterion to select patients

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Background
Not all the patients with resectable colorectal liver metastases (CLM) benefit from liver resection (LR). Patients with disease progression during chemotherapy are excluded from surgery. To elucidate if the tumor behavior in the interval between the end of chemotherapy and LR (stable disease vs. progression) impacts prognosis.

Methods
All the consecutive patients undergoing LR between 2006 and 2015 after tumor response or stabilization at chemotherapy were considered. The 128 patients with two imaging modalities after chemotherapy and an interval between the two >3 weeks were retained. Any variation of CLM size was registered. Progression was defined according to RECIST criteria.

Results
32 out of 128 (25%) patients had disease progression after chemotherapy, 17% if the interval chemotherapy-surgery was <8 weeks. The risk of progression was independent of the response to chemotherapy. Patients with progression after the end of chemotherapy had lower survival than patients with stable disease (3-year overall survival (OS) 23.0% vs. 52.4%; 3-year recurrence-free survival (RFS) 6.3% vs. 21.6%, p<0.001 for both). Survival was extremely poor in case of early progression (<8 weeks) (0% 2-year RFS and OS). Progression was an independent prognostic factor of OS and RFS (HR=2.949, p=0.001 and HR=2.350, p<0.001).

Conclusion
Early disease progression between the end of chemotherapy and LR occurs in ~15% of patients. It is associated with extremely poor survival and should be considered a contraindication to surgery.
Liver surgery: Clinical
P51.07

The choice of surgical treatment of malignant liver lesions, depending on the functional state future liver remnant

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Background
To improve the results of treatment the patients with malignant liver lesions by determining the functioning future liver remnant (FLR) prior to an extensive liver resection (ELR).

Methods
Since 08/07 to 09/12 the ELR (3 or more segments) were performed under the condition that the amount of FLR is determined by MSCT was more than 30% in the absence of cirrhosis and more than 40% if available. If FLR was less a two-step treatment had been used (portal vein embolisation (PVE), followed by resection). These patients were included in the 1 study group. Since 09/12 the ELR were carried out under the condition that the volume functioning FLR, defined in SPECT/CT was more than 30% (without cirrhosis), or more than 40% (in case of cirrhosis). If the functional FLR was less these values, a two-step treatment had been used. These patients were included in the 2 study group.

Results
In the 1 group of patients (n = 69) 15/69 patients underwent the two-stage treatment. In 54/69 patients the ELR was performed without PVE. Acute post-resection liver failure (LF) was in 13/69 patients. Postoperative mortality rate was 7.24% (5/69) patients. The 2 group included 31 patients. Two-stage treatment was performed for 11/31 patients, for 20/31 patients the ELR was performed without PVE. Acute post-resection LF was at 1/31 patients (P=0.049). There was not the postoperative mortality in the 2 group (P=0.32).

Conclusion
SPECT/CT allows to identify patients at high risk for acute post-resection liver failure, to carry out its prevention.
Liver surgery: Clinical
P52.02

The comparative analysis of the treatment efficacy in patients with primary and secondary cancer of a liver with the use of RFA and MWA.

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Background
This research included 108 patients who had the diagnosis the colorectal cancer and liver metastases I, II & III lesion stages (by Gennari) and 18 patients with the diagnosis the hepatocellular cancer.

Methods
RFA (a radiofrequency ablation) with the use of the ELEKTROTOM HiTT 106 system by Berhtold firm, Germany, Cool-tip, Covidien, which has an operating frequency 375 kilohertz and a power 0-60 Watt.
MWA (a microwave ablation) with the use of the device Ave Cure MWG 881 (Med Waves), which has a power of exposure 32 watt± of 2 watt, output frequency microwave :902-928 Megahertz and a set of various catheters (antennas), which have a thickness from 12 to 16 Gedg and the length of a core from 2,0 to 4,0.

Results
RFA: the lethal outcome was in 2 observations. The overall survival of patients was: one-year - 73,5%, two-year - 53,3%, three-year - 32,1%.
MWA: the overall survival of patients was: one-year - 78,5%, two-year-old - 63,3% & three-year - 58,3%.

Conclusion
The application of MWA method is less traumatic if we compare it with RFA one. It allows us to expand the indications in groups of patients with primary and secondary cancer of a liver. Percutaneous microwave ablation (MWA) reduces any risk of complications at somatic burdened patients, due to minimally invasive and the result of it is much higher survival.
Liver surgery: Clinical
P26.01

The current limit for resection rate for colorectal liver metastases

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Background
Thirty percent of patients with colorectal cancer will develop liver metastases. There has been a steady improvement in the resection rate for colorectal liver metastases over the last decades. Where previously less than 10% were deemed treatable there are now series with 25% being resected. With the acceptance of tissue sparing techniques, with the development of effective ablative procedures, with the development of manipulations of the future liver remnant and with resections of extrahepatic metastases in lungs, peritoneum and accessible lymph nodes being routinely made; where is the limit for treatment with a curative intent?

Methods
A population based survey was made in the greater area of Stockholm with a population of 2 million, where all 1026 patients who in 2008 had a new diagnosis of colorectal cancer were reviewed regarding metastatic patterns and survival. All radiological exams were examined and all patients were followed for 5 years or until date of death.
Patients were categorized as resectable if all metastases could be removed with resection or ablation leaving an acceptable liver remnant and no extrahepatic unresectable manifestation.

Results
272 patients developed liver metastases.
70 had unresectable widespread liver metastases of which 62 were detected synchronously with the colon cancer.
55 patients had more than three lung metastases or inoperable extrahepatic disease.
147 (54%) remained resectable disregarding comorbidities and age.

Conclusion
Resectability rates of 45-50% are reachable.
The effect of histopathological growth patterns on recurrence after resection of colorectal liver metastasis.

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Background
Colorectal liver metastases (CRLM) grow in three distinct histopathological growth patterns (HGPs) [1]. HGPs describe the morphological interaction of the tumour border with its surrounding healthy liver tissue. A desmoplastic, replacement and pushing type HGP can be distinguished. Recent studies suggest that HGPs have impact on both survival and recurrence surgery for CRLM [2] [3]. The current study aims to validate HGPs as a new risk factor for recurrence after resection of CRLM.

Methods
All patients who underwent surgery between January 2000 and March 2015 were evaluated and the HGP type was determined. Only patients with resection of the first occurrence of CRLMs, without neoadjuvant chemotherapy, were included.

Results
In total 392 patients were included, with a median follow-up time of 37 months. Replacement type HGP was observed in 232 patients (59%), while desmoplastic and pushing type HGP were observed in 152 (39%) and 8 patients (2%) respectively. Median disease-free survival (DFS) was 22 months in patients with desmoplastic HGP, compared to 9 and 3 months in patients with replacement and pushing type HGP (p<0.001). In a multivariable Cox regression analysis, correcting for several well-known risk factors, patients with replacement (hazard ratio: 1.5) and pushing type HGP (hazard ratio: 5.4) had HGPs had a significantly worse DFS.

Conclusion
The current study shows that replacement and pushing type HGPs significantly increase the risk of recurrence after resection for CRLM.

References:
The efficacy of new intraoperative real time fusion imaging ultrasound system for hepatectomy

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Background
In recent years, we have been able to perform hepatectomy safety and certainly with contrast enhanced CT, EOB-MRI and intra-operative ultrasound (IOUS). However, in poly hepatectomy patient or in patient with small tumor, it will be difficult to detect the tumor and to locate relation between tumor and Grison’s sheath intraoperatively.

Objective: To evaluate the efficacy of intraoperative real time fusion imaging ultrasound system called ‘Smart Fusion’ in hepatectomy.

Methods
For Smart fusion, the DICOM volume data set from pre-acquired thin slice CT is loaded into the ultrasound machine (Aplio 500, Toshiba, Japan).
Next, positioning sensor box was placed on precordium of patient with cleanliness.
After registering the live ultrasound image to the according image area of the CT data, both images can be synchronized by positioning sensor and we can see the corresponding images contained in real time adjacent to the live ultrasound display.
We could perform hepatectomy (colon cancer metastases) and radiofrequency ablation therapy (colon cancer metastases) for safety using the ultrasound system with Smart Fusion.

Results
We could be sure the same liver tumor in the live ultrasound image synchronized to CE-CT data.
We could not detect the liver tumor in B-mode IOUS and CE-IOUS, but could detect the same liver tumor with Smart fusion

Conclusion
We could perform liver surgery for safety and certainly with real time fusion imaging ultrasound system (Smart fusion).
The Efficacy of Radiofrequency Ablation in the Management of Liver Tumours (Systematic Review)

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Background
Hepatocellular carcinoma (HCC) is also currently the 5th most prevalent cancer in men globally and the ninth most common in women. Treatment ideals have varied across the turn of the century, and some trials have reported conflicting evidences across different therapeutic modalities. The efficaciousness of Radiofrequency ablation (RFA) versus resection for HCC are relatively unclear.

Methods
Comparative studies assessing RFA with Surgical resection, Microwave ablation (MWA), PEI and PCA that fulfilled the inclusion criteria were selected. Data on 1, 2 and 5-year and overall survival was collected.

Results
A total of 16 studies matched the inclusion criteria, with 2602 participants included. 4 Randomized Control Trials (RCTs) were identified comparing surgical resection and RFA, the results were generally homogenous across all 4 studies, agreeing that RFA is generally quite similar to the standard surgical resection modality in terms of efficacy and long-term survival.
6 RCT’s were found comparing RFA and PEI (and Percutaneous Acetic Acid Injection (PAI)), all 6 trials presented evidence supporting the superiority of RFA, with improved overall survival.

Conclusion
Currently, EASL and EORTC guidelines indicate that the therapeutic of choice in patients unsuitable for resection is RFA, and if RFA is not feasible than PEI is next in line. No evidence found in this review poses any serious challenges to the current guidelines, with most trials supporting these guidelines.
The European experience of laparoscopic vs open liver resection for hepatocellular carcinoma: a meta-analysis

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Background
Laparoscopic liver resections for hepatocellular carcinoma (HCC) are increasingly performed with acknowledged safety and efficacy. The aim of our meta-analysis of European studies is to evaluate outcomes of LLR on short- and long-term outcomes compared to open liver resection (OLR) in patients with HCC.

Methods
Short-term outcomes evaluated included operative time, blood loss, need for transfusion, R0 resection, resection margin width, length of hospital stay, morbidity and 30-day post-operative mortality. Long-term outcomes included 1-year, 3-year, 5-year overall and disease-free survival as well as tumor recurrence rate.

Results
Ten European studies were included in the present meta-analysis reporting for short- and long-term results for both LLR and OLR for HCC. LLR were found to be strongly associated with lower blood loss as well as need for blood transfusion, shorter hospital stay, lower 30-day mortality and morbidity and finally improved 1-year overall and 5-year disease free survival. Operative time, R0 resection, resection margin width, tumor size, 3- and 5-year overall survival as well as 1- and 3-year disease free survival were not found significantly different among the two groups.

Conclusion
The present meta-analysis demonstrates the superiority of laparoscopic over open approach for same size tumors. Cirrhotic patients benefit from laparoscopy in terms of shorter hospital stay, complication rate and long-term oncologic outcomes.
The extraglissionian approach for laparoscopic right hemihepatectomy

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Background
Different techniques are used in laparoscopic liver surgery. While these techniques are mainly determined by the lesion itself (location, size) there are choices for standard anatomical resections such as right hemihepatectomy. In selected patients the extraglissionian approach can be used in order to facilitate laparoscopic resection.

Methods
This video shows a fully laparoscopic right hemihepatectomy using the extraglissionian approach avoiding the time consuming individual dissection of the hilar structures: right bile duct artery and portal vein branch as used in the intraglissionian approach.

Results
The extraglissionian approach requires a good visualization of the entire right pedicle which must be encircled before devascularizing the entire right hemiliver using one stapler. If the secure identification of the right pedicle cannot be obtained this technique can not be used.

Conclusion
Similar to the technique used in left lateral resection, the entire right pedicle may be transsected using a stapler during laparoscopic right hemihepatectomy (extraglissionian approach).
Liver surgery: Clinical
P50.03

The imaging features in ultrasonography of cholangiolocarcinoma: correlation with pathological findings.

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Background
Cholangiolocellular carcinoma (CoCC) is rare primary liver cancer and currently considered to originate from hepatic progenitor cells. The purpose of this study was to evaluate the imaging features in ultrasonography of cholangiolocellular carcinoma of the liver.

Methods
Six cases of surgically resected cases of CoCC from 2 institutions were retrospectively evaluated. All of the six patients underwent contrast-enhanced ultrasonography (CEUS), dynamic CT, Gd-EOB-DTPA MRI and angio-CT including CT during arterioportography (CTAP) and CT during hepatic arteriography (CTHA). Histological evaluation was also performed and was correlated with imaging findings.

Results
In the early vascular phase of CEUS, the lesions presented diffuse and homogeneous enhancement in 2 cases with less than 2cm in tumor diameter, but in 4 cases with larger than 2cm, the lesions presented heterogeneous enhancement. From the late vascular phase to Kupffer phase, the continued existence of portal veins or tiny spots of portal flow was identified in the tumors. This feature, portal venous penetration within the tumor, was also observed in Angio CT, but not observed in dynamic CT and Gd-EOB-DTPA MRI.

Conclusion
The absence of a fibrous capsule, the absence of tumor necrosis and the presence of portal venous penetration within the tumor also appear to be characteristic features in CEUS. But it may be some difference in the enhancement pattern in vascular phase with tumor size. CEUS is considered to be useful in the diagnosis of CoCC.
The impact of radiofrequency-assisted transection on local hepatic recurrence after resection of colorectal liver metastases

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Background
After resection of colorectal liver metastasis, the incidence of local hepatic recurrence (LHER) ranges from 7 to 17% or even higher in some laparoscopic non-anatomical laparoscopic resections in some series. The aim of this study is to determinate if a RF-assisted transection device (RFAT) has any effect on (LHER) compared to conventional technologies

Methods
A study population of 103 patients who had undergone a hepatic surgical resection was analysed. Two groups were considered: RFAT group (n=45) and conventional technique group (n=58). LHER was defined as any growing or enhancing tumour in the margin of hepatic resection during follow-up. Cox proportional models were constructed and variables were eliminated only if p>0.20 to protect against residual confounding. To assess the stability of Cox’s regression model and its internal validity, a bootstrap investigation was also performed

Results
Baseline and operative characteristics were similar in both groups. In patients with positive margins, we demonstrated 0% of LHER in RFAT vs 27% in control group (p=0.03). In the multivariate analysis, factors with significant influence on LHER were: RFAT group, size of the largest metastases, number of resected metastases, positive margin and usage of Pringle-manoeuvre

Conclusion
Parenchymal transection using a RFAT able to create deep thermal lesions may reduce LHER especially in case of margin invasion during transection. This could be especially relevant in some difficult laparoscopic non-anatomical resections
The influence of gender on frailty syndrome in surgical patients undergoing major hepatic resections

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Background
Sarcopenia is a surrogate for frailty and a limiting factor for postoperative outcome but the postoperative course of sarcopenia was never assessed. We depicted sarcopenia throughout operation and follow up after major hepatic resection (HR).

Methods
Records of patients who underwent HR were reviewed and frailty was defined as sarcopenia using the skeletal muscle index (SMI) preoperatively, 6 and 12 months after operation. Threshold values for sarcopenia were SMI < 41 cm²/m² for women, SMI < 43 cm²/m² for men with BMI less than 25 kg/m², and SMI < 53 cm²/m² for men with BMI of 25 kg/m² or greater.

Results
966 patients (2005-2016, female: 51.4%, male: 48.6%, median age 66, 62% major resection) were included. SMI differed significantly between men and women and decreased significantly throughout the follow up (preoperative SMI: 23.55± 19.15 cm²/m², 6 months: 18.31±7.3 cm²/m², 12 months: 13.23±18.41 cm²/m² p=0.001). This decrease was more pronounced in men than women (men: preoperative SMI: 25.54± 17.31 cm²/m², 6 months: 20.17± 13.45 cm²/m², 12 months: 14.36± 12.23 cm²/m²; women: preoperative SMI: 21.71± 13.25 cm²/m², 6 months: 16.58± 11.32 cm²/m², 12 months: 12.18± 14.76 cm²/m², both p=0.0001). Postoperative complications did not differ between males and females neither did length of stay, ICU stay or preoperative comorbidities, age and disease severity (all p>0.5).

Conclusion
The increase in frailty syndrome overall in the patients requires close further investigations and monitoring.
The influence of the I Go MILS (Italian group of minimally invasive liver surgery) registry on the implementation of MILS programs in a single center

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Background
In 2014 the I Go MILS registry was established with the aim to collect MILS experience and to promote it in Italy. The primary endpoint of the present study was to evaluate the recent trends in MILS diffusion and to analyze its correlation with the registry establishment in a single, tertiary referral center.

Methods
2230 liver laparoscopic resections were performed between 2004 and 2016: 506 of them were performed laparoscopically. The MILS/Total Series (TS) ratio was evaluated to analyse the correlation between laparoscopic activity and registry establishment.

Results
The overall MILS/TS ratio was 22.7% in the study period, ranging from 5.8% in 2005 to 56% in 2016. The cut-off point for spread of MILS activity (>30%) was determined after 2014 (Registry). The median number of laparoscopic procedures before and after 2014 was 35 and 81 respectively (p<0.05). Registry establishment resulted among factors significantly associated with MILS approach. After 2014, the median number of major hepatectomies and complex liver resections per year significantly increased (respectively 6 and 11 before 2014 and 25 and 38 after 2014, p<0.05). After 2014, outcomes in terms of blood loss, morbidity, mortality and length of stay did not significantly differ from the previous period. Conversion rate was 11.8% before and 15.7% after 2014.

Conclusion
The birth of I Go MILS registry promoted the diffusion and implementation of MILS programs, witnessing the role of MILS as mandatory in a liver surgery program.
The liver-first approach for synchronous colorectal liver metastasis: outcomes of a ten-year experience

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Background
The feasibility of the liver-first approach for synchronous colorectal cancer and colorectal liver metastases (CRLM) has been established. We sought to assess the short-term and long-term outcomes for these patients.

Methods
Outcomes of patients who underwent a liver-first approach for CRLM between 2005-2015 were evaluated from a prospective database.

Results
Of the 92 patients planned to undergo the liver-first strategy, most were male (n=70; 76%) and had their primary tumor located in the rectum (n=68; 74%). Most patients had a T3 (n=41; 45%) tumor and were node positive (55%). The CRLM were bilobar in 51 patients (55%); with a median number of three lesions [1-9]. While 58 patients (63%) underwent a minor resection, 28 (30%) underwent a major resection and six (7%) had irresectable disease. An additional 12 patients (13%) did not undergo resection of their primary tumor; in 71 (77%) patients the paradigm was completed.

Post-operative morbidity and mortality were 29% (Clavien >3 = 20%) and 3% following liver resection and 30% (Clavien >3 = 19%) and 0% after colorectal surgery, respectively. On an intention-to-treat basis, overall 3- and 5-year survival was 54% and 35%, respectively. However, 78% of patients who completed the treatment had recurred at the last follow-up.

Conclusion
The liver-first paradigm was completed in approximately three-quarter of patients. Overall survival in the present cohort was considerable, but the majority of patients did recur, stressing the importance of a tailor-made approach for this group.
The presence of lung metastases does not influence survival in liver metastatic colorectal cancer

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Background
The indications for liver resection of colorectal cancer liver metastases (CRCLM) are continuously expanding and the presence of extra-hepatic metastases are no longer a contraindication for hepatic resection. The aim of the study was to investigate factors influencing survival among patients with CRCLM.

Methods
Patients diagnosed with CRC during 2008 in the region of Stockholm, Sweden, were identified through the Swedish Colorectal Cancer Register and followed for 5 years. Additional information on liver and lung metastatic pattern were retrieved from patient electronic charts. Factors influencing overall survival (OS) were examined using Cox proportional hazards model with 95 per cent confidence interval (c.i.).

Results
In this population-based study of 1026 patients with CRC, liver and lung metastases were diagnosed in 26.5% and 16.9%, respectively. Lung metastases were more likely diagnosed in left-sided and rectal cancer as compared to right-sided cancer (19.7% vs. 13.2%, p=0.010). The presence of lung metastases did not significantly influence OS in multivariate analysis, neither in the entire CRC cohort (HR 1.23, c.i. 0.93 to 1.62) or in patients with liver metastatic CRC (HR 1.11, c.i. 0.80 to 1.53).

Conclusion
Based on these results, one could speculate in wheatear a subset of patients with inoperable lung metastases – excluding the patient from liver resection of concomitant liver metastases – still could benefit from hepatic surgery.
The role of functional liver tests in liver cancer surgery

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Background
The aim of this study was to sum up our experience on the most clinically relevant and novel liver function tests used for the assessment of hepatic function before liver surgery with the ultimate goal to design a method to identify patients at risk of liver failure (and hence mortality) following liver resection.

Methods
ICG-test, methacetin breath test and 99mTc-technephryt hepatobiliary scintigraphy (HBS) were performed prior to major resection in 30 high-risk patients with primary and metastatic liver tumors. Liver function determined with HBS was compared with 13C-methacetin breath test by unified scale.

Results
ICG test is more accurate as it measures the elimination process of a substance that is cleared and metabolized all most exclusively by the liver. Nuclear imaging techniques such as 99mTc-technephryt HBS can measure both total and FLR function. 13C-methacetin breath test measures the microsomal capacity of the liver. A strong positive association ($r = 0.73$, $p<0.01$) was found between 13C-methacetin test determined with 99mTc-technephryt HBS, a positive moderate uphill relationship between results of ICG & breath test ($r = 0.53$, $p<0.01$) and ICG & HBS($r = 0.6$, $p<0.01$).

Conclusion
Presently, combination of 99mTc-technephryt HBS, ICG and 13C-methacetin breath test seems to be the most valuable liver function estimate, as it can measure multiple aspects of liver function in specifically the future remnant liver.
The role of genetic instability in stimulation of angiogenesis in liver metastases of sporadic colorectal cancer

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Background
The genetic abnormalities could affect the course of colorectal carcinoma. The study objective was to study whether the microsatellite instability of colorectal carcinoma has impact on the angiogenesis activity in the liver metastases.

Methods
In a cohort of 80 randomly selected patients in stage IV of carcinoma, 30% were recognized as microsatellite unstable. The endothelial progenitor cells fraction (CD309+) was enumerated within the subpopulation of CD34+CD45⁻ cell and CD34+CD45⁻- cells by flow cytometer in the blood samples. VEGF and TGF factors were quantified in the serum samples by ELISA. A control group consisted of 36 healthy volunteers. The impact of genomic instability on activity of angiogenesis was evaluated by multivariate analysis in compare to the controls, adopting a P-value < 0.05 as significant.

Results
The expression of EPCs and VEGF was significantly higher in MSI compared to both MSS patients and controls (P<0.008). There was no significant difference in the TGF-b1 concentration between the groups. Multiparametric analysis showed angiogenesis nine times more active in MSI patients (OR=9.1, P<0.01), those with meta in both liver lobes (OR=32.8 P<0.001) and those with meta outside the liver (OR=8.3 P<0.01).

Conclusion
The MSI colorectal cancers are characterized by the overexpression of circulating EPCs and VEGF which may facilitate their growth and metastases. In view of such difference genetic component of CRC should be tested at the time of the primary tumor treatment.
Liver surgery: Clinical  
FP27.03

The role of liver resection in patients with intermediate and advanced stage hepatocellular carcinoma. Retrospective study from two Greek HPB centers

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Background
The indications for liver resection in patients with intermediate (BCLC B: single tumor >5 cm or multiple tumors >3 cm each) or advanced stage (BCLC C: presence of macrovascular thrombosis) hepatocellular carcinoma (HCC) are not clear yet. Liver resection is not recommended for this group of patients in the European and the American Association for the Study of Liver Disease guidelines. The aim of this retrospective study was to present the experience of two Greek HPB centers in the surgical management of patients with HCC.

Methods
Data from patients with HCC who underwent surgical resection from 01.01.2007 till 30.06.2016 were analyzed.

Results
70 patients were included in the study, with a median age of 69 yrs (range: 21-82). There were 54 male and 16 female patients. The majority of the patients developed HCC on a background of liver cirrhosis (59%) and the most common causes were alcoholic liver disease (ALD) (39%), Hepatitis B (HBV) infection (31%) and hepatic steatosis (23%). The majority of the patients (38/70, 54%) were in intermediate or advanced stage. The 90-day mortality rate was 0. The overall morbidity was 39%. The 1-, 3- and 5yrs overall survival was 89%, 60% and 40 % for all patients and 82%, 50% and 39 % for the patients with BCLC B and BCLC C stage HCC.

Conclusion
This study shows that liver resection has a clear role in the management of patients with non-early HCC as is was used widely with acceptable short and long term results.
Liver surgery: Clinical
P43.06

The role of splenic artery ligation as inflow modification in major hepatectomies

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Background
The role of splenic artery ligation (SAL) in recipients of partial liver grafts to decrease the portal vein flow and minimise the chance of small for size syndrome has been well described. No clinical data exists on the use of SAL as a technique to reduce the portal venous pressure (PVP) following major hepatectomy.

Methods
Retrospective single center study of patients who underwent major hepatectomy with SAL between 2013 and 2016. Clinicopathological data and perioperative outcomes were collected.

Results
25 patients were identified with a median age of 64 years. Surgical procedures included 5 right hemihepatectomies, 10 right extended hepatectomies and 10 right hemihepatectomies with wedge resection or radiofrequency ablation of the left lobe. Portal vein embolization was performed in 8 patients prior to surgery. Neoadjuvant chemotherapy was administered in twenty patients. Intraoperative measurements of postresectional PVP were available in 13 cases. PVP reduction after SAL ranged from 6.2% to 17%. There was no perioperative mortality and no SAL related complications. Four patients developed postresectional liver failure and were treated conservatively. The incidence of major postoperative complications (Clavien-Dindo III-IV) was 24% (n=6). Median length of stay was 13.7 days.

Conclusion
SAL is a safe inflow modification technique that could be used in selected patients to reduce postresectional portal hypertension and improve outcomes following major hepatectomies.
Thermoablation for neoplasms of the hepatic caudate lobe under CT guidance

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Background
The goal of this study was to demonstrate the safety and efficacy of transdermal thermoablation (TTA) of the caudate lobe of the liver (CLL) with radiofrequency (RFA) and microwave ablation (MWA).

Methods
From 2010-2013 14 consecutive patients were retrospectively included; 8 were male and 6 female of ages 60-80 years. Five patients suffered from primary hepatocellular carcinoma and nine from metastatic colorectal cancer. All of them had either inoperable tumors or had a poor performance status that precluded surgery. 3D-mapping of the lesions was done[1]. Efficacy was determined by changes in serum tumor markers and by consecutive CT scans at one month post-procedure and at 3-month intervals afterwards.

Results
RFA was performed in all patients and in combination with MWA in two patients with metastases. Median lesion diameter was 27mm (18-42mm). The approach was right in 12 and posterior in 2 patients. Median procedural time was 70min. Median hospitalization time was 1 day (1-3 d). In all cases an objective response was found and a complete necrosis was noted in 71.4% (10/14). Over a follow-up of 3 years, overall survival rate at 1- & 3-years was respectively 100% and 78.6% whereas disease-free survival was respectively 92.8% and 57.1%. There was no peri-procedural mortality or injury to major vascular-biliary structures.

Conclusion
TTA of lesions in CLL under CT-guidance after 3D-mapping, is despite challenges an alternative and in experienced hands a safe [2] method of treatment in poor surgical candidates.

References:
Total laparoscopic pericystectomy for non complicated hydatid cyst

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Background
Laparoscopic total pericystectomy is not a widely used approach for surgical treatment of liver hydatid cyst (LHC). When laparoscopic surgery is performed, less than 10% of patients had a radical procedure.

Methods
We present a case of previously healthy 61 y/o man, who was diagnosed of LHC of segment VI by an abdominal US and CT scan. After serological analysis a LHC was confirmed. A preoperative treatment based in Albendazole was prescribed for 2 months.
Under left lateral decubitus position, a four trocars approach was used. After a partial liver mobilization, isolation of field with gauze and hypertonic saline solution was done. Hydatid membranes was removed in a bag and complete pericystectomy using bipolar and ultrasonic scalpel was performed. Intraoperative bleeding was 50ml. A Jackson-Pratts drainage was left at surgical site.

Results
Postoperative was uneventful and discharge at 2º postoperative day. Pathological study shows an inactive echinococcus with hyaline degeneration. After 10 months of follow-up are asymptomatic and no recurrence.

Conclusion
Laparoscopic total pericystectomy is feasible and could be performed as method of choice to non complicated LHC.
Liver surgery: Clinical
V4.01

Totally Laparoscopic ALPPS Procedure and Extended Right Liver Resection

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Background
Associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) was introduced as a concept to improve the size and functionality of the future liver remnant (FLR). Since a second step liver resection is needed, the development of adhesions are of concern. It has been shown that laparoscopic procedures induce significantly less adhesions than open procedures.

We evaluated if the first step of the ALPPS procedure is feasible for a laparoscopic approach followed by a laparoscopic extended right liver resection.

Methods
A 73 years old male patient was diagnosed to have multiple liver metastases 18 months after rectum resection. MRI revealed involvement of the liver segments 6, 7, 8 and 4a. An extended right hepatectomy seemed indicated. On volumetry segments 2 and 3 were less than 20% of the total liver volume. We decided for an ALPPS procedure to induce hypertrophy of the FLR.

Results
Great emphasis was put on intraoperative ultrasound: in this particular case, how far the tumor extended into segment 4a and how much space was left to segment 2 leaving enough room for the split in between.

After significant hypertrophy of segments 2 and 3 a totally laparoscopic extended right liver resection was carried out uneventfully.
The degree and amount of adhesions present at the second step were much less than after open liver surgery.

Conclusion
The ALPPS procedure and the second step liver resection can be carried out laparoscopically with very good results.
Tourniquet ALPPS: minimizing the risk of the first stage of ALPPS

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Background
ALPPS is related with high morbidity and mortality, even after the first stage. The aim of this study is to present the results of a variant of the classic ALPPS known as "tourniquet ALPPS" in an attempt to minimize the risk of the first surgery.

Methods
Our original "tourniquet ALPPS" consists of placing a tourniquet to occlude the vascular communications between both lobe instead of divide completely the liver parenchyma during the first stage. For the patients operated on with this approach we analyze operative and post-operative data of both interventions and volumetric data.

Results
Since September 2011 we performed 46 tourniquet ALPPS, the most frequent indication was colorectal liver metastases (31 cases, 64%). Median age was 61.7 (± 12.1). First stage: surgical time was 150 min (90-240), we didn’t use Pringle's maneuver in any case, median blood loss was 90 ml (40-900 ml) and only one patient needed blood transfusion (2.2%). Only 2 patients (4.3%) had severe complications (≥IIIB) and we performed 22 (47.8%) right trisectionectomy. The increase of the future liver remnant was 82.3% (±39.7) in 13 days (8-167 days).

Second stage: surgical time was 175 minutes (90-360) and we performed 22 right trisectionectomy (52%). Median blood loss was 425 ml (80-1500), 12 patients (26%) were transfused. Six patients (13%) had severe complications, and three of them died (6.5%)

Conclusion
Tourniquet ALPPS obtains a fast hypertrophy with low rate of complications especially during the first stage.
Transarterial Embolization of Symptomatic Giant Liver Hemangiomas

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Background
In the present study, the clinical and radiologic results of transcatheter transarterial embolization (TAE) for the treatment of symptomatic giant cavernous hemangiomas of the liver were evaluated.

Methods
Eleven patients (5 males, 6 females) with giant hemangiomas of the liver were treated by TAE. Hepatic angiography revealed hemangiomas up to 21.57 cm in diameter. Indications for TAE were abdominal pain (n=10) and rapid tumor enlargement (n=6). Two patients had Kasabach-Merritt syndrome (KMS). The percutaneous transarterial access was performed. The common femoral artery was punctured and the hepatic artery was catheterized under fluoroscopic control. Embolization was performed with polyvinyl alcohol (PVA) particles of 500 - 900 micron

Results
No treatment-related deaths were registered and morbidity was minimal. Post embolization syndrome (abdominal pain, fever, and leukocytosis) occurred in 7 patients within 1 – 4 days after TAE lasting for 3 - 7 days and was has been treated conservatively. Symptomatic improvement was documented in all patients. The haematological disorders normalized in both patients with KMS during 1 – 3 month after TAE. The mean size of the tumor did not show significant change on follow-up radiologic examinations. In two patients, the tumor significantly regressed in size after embolization. Two-year follow-up showed no recurrence of the clinical symptoms and hematological abnormalities in any patient.

Conclusion
TAE is an effective procedure for the therapy of symptomatic hemangiomas
Transient elastography is an effective method of predicting posthepatectomy outcomes in patients undergoing hepatectomy for hepatocellular carcinoma

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Background
Invasive measurement of hepatic venous pressure gradient (HVPG) is needed to diagnose clinical significant portal hypertension (CSPH) preoperatively in hepatectomy. Effectiveness of liver stiffness measurement (LSM) in predicting persistent posthepatectomy hepatic decompensation (PHD), an important complication of CSPH was investigated.

Methods
Consecutive patients with resectable hepatocellular carcinoma (HCC) were recruited prospectively. LSM of non-tumoral liver was measured using FibroScan® preoperatively and HVPG was measured peroperatively. HVPG ≥ 10 mmHg was defined as CSPH. PHD was defined as the presence of at least one of the following unresolved ascites, jaundice, and/or encephalopathy beyond 3 months following hepatectomy.

Results
Study included 106 hepatectomies for HCC in Child-Pugh A/B patients (84 men and 22 women; median age 67.5 years) including right hepatectomy (20.8%), central hepatectomy (1.9%), left hepatectomy (8.5%), bisegmentectomy (14.1%), unisegmentectomy (28.3%) and partial hepatectomy (26.4%). Nine patients (8.5%) developed PHD. Bootstrapped multivariate logistic regression identified LSM (P = 0.001) as the only preoperative predictor of PHD. Area under ROC curve for LSM and HVPG was 0.807 (95% CI = 0.506 - 0.907) and 0.712 (95% CI = 0.646 - 0.917) respectively. LSM ≥ 12 kPa had 85.7% sensitivity and 66.7% specificity. HVPG ≥ 10 mmHg had 28.6% sensitivity and 96.3% specificity.

Conclusion
In patients undergoing hepatectomy for HCC, LSM is an effective test to predict PHD pre-operatively when compared to HVPG.
Liver surgery: Clinical
P55.04

Transition from open to laparoscopic ALPPS: The initial experience

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Background
Laparoscopic ALPPS (Associating Liver Partition and Portal vein ligation for Staged hepatectomy) has only been reported in individual reports, but laparoscopic ALPPS has been the authors’ default option since 2015.

Methods
A retrospective analysis of all consecutive patients undergoing ALPPS at a single referral center was performed using a prospective database from July 2011 to June 2016. Feasibility was studied by assessing conversions. The 90-day mortality and complications were analyzed using Dindo-Clavien score and the comprehensive complication index. Operative time, blood loss, volumetric growth, and hospital stay were examined. The CUSUM statistic was measured.

Results
There was no mortality and no complication Dindo-Clavien grade ≥3A observed in laparoscopic ALPPS. In open ALPPS, one patient died after the procedure and 10 out of 20 patients (median CCI=21) experienced complications grade ≥3A (p=0.006). No liver failure was observed after laparoscopic ALPPS, and two patients in the open ALPPS developed complications that precluded the second stage. The hospital stay was shorter in the laparoscopic ALPPS group (11 vs 14 days; p=0.011).

Conclusion
Laparoscopic ALPPS is feasible as the default procedure for patients with very small FLR, and it is not inferior to the open approach. The use of laparoscopy in ALPPS should be encouraged to surgeons experienced with complex laparoscopic HPB surgeries.
Treatment of blunt liver injuries after the paradigm shift in liver trauma management

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Background
The results of contemporary tailored management of blunt liver trauma in a tertiary liver and trauma center are presented.

Methods
Retrospective analyses of consecutive patients treated for blunt liver injury between 1.1.2008 and 1.1.2015. Patients with other than blunt injury were excluded. The Organ Injury Scaling (OIS) as documented by the initial emergency spiral-Ct scan was used for the classification of the liver trauma. OIS 1 or 2 values were considered as low grade injuries whereas values from 3-6 were considered as high grade injuries.

Results
49 patients [18 to 86 years] with blunt liver trauma were treated. The mean AIS and ISS value was 6.4 (+/-2.9) and 22.2 (+/-14.7), respectively. 8 / 36 (22.2%) patients with high grade liver injuries underwent emergency laparotomy immediately upon admission and 3 others (8.4%) after initial conservative management. One patient (2.8%) was treated by interventional embolization. 2 / 13 (15.4%) patients with low grade injuries underwent emergency laparotomy and another 2 (15.4%) after failure of initial conservative treatment. 2 patients died due to high grade injuries and two more patients due to other injuries.

Conclusion
In the era of conservative treatment of blunt liver injury, expertise in emergency liver surgery is still mandatory for the treatment of severely injured patients. The liver associated mortality of high grade liver injuries is 5.6%.
Liver surgery: Clinical  
P49.07

Treatment of the focal nodular hyperplasia of the liver. Is there any place for surgical indication?

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Background  
Focal nodular hyperplasia (FNH) is a very common benign liver tumor, which occurs in the vast majority of the cases in young women. FNH is characterized by local vascular abnormalities and is a truly benign lesion.

Methods  
A retrospective single institution analysis of 227 FNH patients, treated from 1990 to 2016 and a review of studies reporting surgical therapy of overall 293 patients with FNH was performed. Indications for resection with a focus on diagnostic workup, patient selection, surgical mode and surgical morbidity and mortality have been analysed.

Results  
Ninety three patients underwent elective hepatectomy and 134 patients observation alone, where median follow-up was 107 months. Postoperative complications were recorded in 14 patients, 92% of patients reported an improvement with respect to their symptoms.  
Overall among 293 patients underwent surgery in the series, included to this review, there was a morbidity of 13%, where median follow-up was 53 months.

Conclusion  
Systematic follow-up remains the gold standard in asymptomatic patients with FNH. However elective surgery should be considered in symptomatic patients, in those with marked enlargement and in case of uncertainty of diagnosis. Surgical treatment for FNH is a safe procedure with low morbidity and very good long term results as far as quality of life after surgery is concerned and surely an integral part of the modern management of FNH.
Use of the liver maximum function capacity test (LiMAx) - a case of pharyngeal cancer metastasis in a cirrhotic liver

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Background
Liver cirrhosis goes along with a higher chance for the need of liver resection in the course. As established laboratory parameters underestimate the degree of cirrhosis there is an increased risk for postoperative liver failure. Several of the known liver function tests are unlikely to be performed in daily use because of high cost or expenditure of time. Liver maximum function capacity test (LiMAx) provides surgeons with an alternative tool for measurement of liver function.

Methods
A 63-year old male patient presented with a large, solitary liver metastasis from pharyngeal cancer in segments VII/VIII with infiltration of the diaphragm. Liver resection was unsuccessful in a peripheral hospital 10 months before due to considerable macroscopic liver cirrhosis. Upon presentation laboratory parameters revealed sufficient liver function with INR and cholinesterase at norm. LiMAx was performed and showed regular liver function (354µg/kg/h).

Results
Atypical liver resection (R0) was performed resulting in a postoperative LiMAx value of 281µg/h/kg (cut-off for safe resection >150µg/kg/h). Apart from prolonged production of ascites and an episode of gastrointestinal bleeding, the patient showed an uneventful postoperative course without any signs of liver failure with discharge from hospital after 37 days.

Conclusion
LiMAx enables determination of liver function at a so far unavailable metabolic level and hence might provide crucial diagnostic information to allow for safe liver resection in cirrhotic patients.
Vascular complications following selective portal venous embolisation - Is postinterventional extended liver resection still possible?

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Background
Planning strategy for extended liver resection in patients with intrahepatic malignomas is usually based on 2 dimensional(2-D) CT-Scans. In selected cases extension of 2-D scans with virtual 3 dimensional(3-D) liver reconstructions to improve the presentation of the intrahepatic vascular topography, tumor burden and the suspending segmental volumes is necessary to maintain a functional suitable "remnant liver volume" (RLV). If RLV is insufficient portal venous embolization (PVE) is one of the most common procedures to improve liver function reserve.

Methods
We report about a 60 y old male patient suffering from colon carcinoma with synchronous bilateral liver metastases. After rectal resection and completing adjuvant chemotherapy restaging CT scan showed downsizing of the remainig right sided liver metastases. During liver resection additional metastases in segment I, II and III were found and resected. As LRV was to small operation was terminated and a PVE of the right portal branch was initiated with accidental spread of embolization fluid into the left portal venous branch as well.

Results
Finally 3-D CT-Scans showed progredient volume growth with sufficient LRV to perform extended right hemihepatectomy including segment I. Complete tumor resection was achieved.

Conclusion
Eventhoogh a major complication during PVE with an almost complete occlusion of the left sided portal venous branch occured. We recommend extended virtual 3-D reconstruction to evaluate RLV for proper resection planning.
Video-laparoscopic MW ablation in a European high volume center: safety and efficacy of 970 procedures

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Background
Video-laparoscopic (VLS) MW ablation (MWA) is not considered in the guidelines as a standard therapy for HCC patients. Our center evaluated safety and efficacy of VLS MWA as a therapeutic option for the treatment of HCC patients not suitable for resection or percutaneous ablation

Methods
A population-based analysis of a prospective database on HCC patients treated with VLS MWA from January 2009 to July 2016 at our institution was performed. Data collected were: Child-Pugh, MELD, CT/MRI, ECOG performance status (PST), HCC aetiology, BCLC, previous therapies, I.O and P.O variables. Statistic analysis was performed to identify 6-months predictors of mortality

Results
970 VLS MWA were performed; mean age was 64.4 yrs. Mean MELD was 9; 25.8% of patients were Child B, 11% Child C. No perioperative mortality was observed. Six-months mortality was 10.5%. Overall morbidity was 33.6% with Clavien complications >2 in 2%; median LOS was 2 days. In 485 cases VLS MWA was the first line therapy. In this subgroup overall 1, 3, 5-yrs survival was 78%, 57% and 40%. Complete ablation was achieved in 74% of the treated nodules. PST>1, Na+, portal hypertension, ascites, CPT>7, Milan out, AFP predicted 6-month mortality

Conclusion
In a high volume center VLS ablation resulted safe and effective in the mininvasive treatment of HCC. Improvements in middle-term results may be achieved through an increased accuracy in patient selection with particular reference to performance status, liver function and tumor stage evaluation
Warm humidified insufflant reduces inflammatory response in patients undergoing laparoscopic liver resection.

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Background
Heated, humidified CO₂ insufflation results in decreased post-operative pain & analgesia requirements following laparoscopic surgery. Laparoscopic liver surgery can be technically demanding resulting in above average exposure to dry CO₂ insufflation. A warming & humidification system (HumiGard™) was introduced for patients undergoing liver resection at our centre. The aim of this audit was to determine if the introduction of HumiGard™ insufflation have led to reduction in inflammatory response.

Methods
Prospectively collected data was retrospectively analysed before and after introduction of HumiGard insufflation for liver surgery. The peak CRP and WBC in the post-op period were compared.

Results
From Oct 2013 to Dec 2016 one surgeon carried out 39 laparoscopic liver resections. 22 of these cases were before the introduction of warm insufflation. In the pre HumiGard™ era 14 liver resections were minor resections and 8 were major. In the post HumiGard™ era 9 liver resections were major and 8 were minor. The peak CRP and WBC in the post operative period were reduced in the patients undergoing laparoscopic liver resection with HumiGard™ insufflation. (Median WBC 14.6 vs 13.0, Median CRP 49 vs 69). But this did not reach statistical significance.

Conclusion
Humidified insufflation may have contributed to the reduction in inflammatory markers in patients undergoing laparoscopic liver surgery. This is an encouraging trend. Further larger studies are needed to evaluate this in laparoscopic liver resection.
What percentage of patients is considered for a 2-Stage/ALPPS procedure to face their disease?

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Background
PVE and ALPPS are offering a chance for resectability. ALPPS initial high M&M rates caused dispute. After tailoring selection criteria and modifying the procedure M&M decreased to acceptable figures in recent publications. The role of PVE/ALPPS in a high-volume centre is unclear. Referring to our own experience we aim to clarify this.

Methods
We searched our own hospitals prospective database for ALPPS and PVE. Data for ALPPS were split in 2 groups (before and after world expert meeting February 2015).

Results
From 01/2010 to 12/2016 we performed 1021 liver resections – 142 patients (14%) underwent left and right trisegmentectomies (50 after ALPPS, 48 after PVE). Number of yearly resections reached 200/year from 2015. PVE as stage 1 was used in 75 patients, 48 patients went to step 2. ALPPS Stage 1 was performed in 57, Stage 2 in 52 patients. Overall 132 patients were submitted to a hypertrophy concept resembling 13% of our patients. There was only a slight rise in the utilization of ALPPS concept from 2015 levelled out by the rise of total operations performed.

Conclusion
2 stage procedures are useful for 13% of patients in a high-volume centre. Still, they mark the high-end level of complex procedures with higher M&M than expected in liver surgery. The fact of > 140 publications for ALPPS in the last 2 years doesn't resemble the rise in the application of hypertrophy concepts in our data. Our data also show that PVE and ALPPS are not competing therapies – their use is rather complementary.
When laparoscopic liver resection is preferred to liver biopsy - a case of a neuroendocrine metastasis

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Background
Liver tumors can sometimes be a difficult diagnostic. Without specific imagistic findings and with negative tumor markers,

Methods
We present the case of a 63 years old man who presented with a liver tumor in segment 2 with no specific findings on MRI and negative tumor markers. Colonoscopy and upper GI endoscopy were negative for any lesions. A laparoscopic liver resection was performed - segment 2-3 resection with a smooth postoperative course. The pathology result was a neuroendocrine tumor metastases.

Results
Two month after the operation the gastroscopy was repeated and a small tumor was endoscopically excised from the gastric antrum. The pathology result was a gastrointestinal non-secretant neuroendocrine tumor.

Conclusion
Due to an increase in the expertise in laparoscopic liver resections, a minimally invasive hepatectomy was the first step in this case.
Worldwide trends in volume and quality of published protocols of randomized controlled trials

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Background
Publishing protocols of randomized controlled trials (RCT) facilitates a detailed description of study rationale, design, and related ethical and safety issues. Little is known about how the practice of publishing protocols developed over time. Therefore, this study describes the worldwide trends in volume and methodological quality of RCT protocols.

Methods
PubMed and EMBASE were searched, identifying 596 protocols published over a decade. Data were extracted on quality characteristics. Methodological quality was stated as high if adequate generation of allocation, concealment of allocation and intention-to-treat analysis were used. A comparison was made by publication period, geographical region and medical specialty.

Results
The number of published RCT protocols increased from 69 in the first, to 390 in the third period (p<0.0001). Internal medicine and paediatrics were the most common topics. Whereas most protocols in the first period originated from North America (n=30, 44%), in the second and third this was Europe (respectively, n=65, 47% and n=190, 48%) (p=0.02). Quality of protocols was higher in Europe compared to North America. Surgical protocols had the highest quality among the three specialty topics used in this study (OR=1.94, CI=1.09-3.45, p=0.02).

Conclusion
A five-fold increase in RCT protocol publication was observed. Although quality of protocols improved, it varied between geographical regions and across medical specialties. Improving training in RCT methodology is therefore important.
Worse survival in liver metastatic right-sided versus left-sided colorectal cancer

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Background
Colorectal cancer (CRC) is the third most common cancer and a quarter develop liver metastases (LM). Differences in epidemiological and molecular patterns between right- and left-sided colon cancer are emerging suggestive of a worse prognosis for right-sided cancer. The aim of the study was to describe the liver metastatic patterns and survival as a function of site of primary tumour.

Methods
Patients diagnosed with CRC during 2008 in the region of Stockholm, Sweden, were identified through the Swedish Colorectal Cancer Register and followed for 5 years. Additional information on liver metastatic pattern were retrieved from patient electronic charts. Factors influencing overall survival (OS) were examined using Cox proportional hazards model with 95 per cent confidence interval (c.i.) and OS was compared using log-rank test.

Results
LM were more often diagnosed in hindgut cancer (28.4% versus 22.1%, p=0.029) but the number and segmental involvement of LM were less extensive compared to midgut cancer (p=0.001). 5-year OS were significantly worse in liver metastatic midgut cancer compared to hindgut cancer (6.5% vs. 21.6%, p<0.001), still significant in the multivariate analysis of patients with LM (HR=0.56, c.i. 0.39 to 0.79).

Conclusion
Detailed population-based data on the metastatic pattern of CRC and survival could assist in more structured and individualized guidelines for follow-up. The results are in agreement with previous publications on the worse prognosis for right-sided cancers.
Liver surgery: Experimental

A new possible therapeutical approach to the toxic acute liver failure: portal vein arterialization.

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Background
Acute Hepatic Failure (AHF) is a deadly condition in which liver regeneration (LR) is suppressed. Imbalance between growth factors and inflammatory cytokines play a pathogenetic role. Portal vein arterialization (PVA) is a technique employed in the field of transplantation (LT) or hepatic surgery to replace arterial flow and to enhance LR. Experimental and clinical reports support the effectiveness of PVA to reverse apoptosis.

Methods
We Report a case of a 24 years man with AHF from drug assumption, leading to deep coagulopathy (INR: 6.23) and coma (Glasgow Coma Score: 3). Because of the unavailability of LT, he underwent PVA anastomosing the inferior mesenteric vein and artery end to side. A liver biopsy was taken.

Results
Liver function tests (LFT) improved after PVA. The AST level dropped from 2840 U/l to 1 U/l in the 1st postop day. The INR value from 6.2 arrived to 1.5 after 5 days. The bilirubin from 278 mmol/l to 192 mmol/l. The ammonia value from 367 to 165 mmol/l. Ultrasound showed mixed arterovenous flow in the portal trunk. Unfortunately the patient developed bilateral pneumonia and died from sepsis 6 days after PVA but with progressively improving LFT.

Conclusion
PVA is a simple technique that could help to restore liver function in toxic AHF. Changes in the quality of flow can enhance the mitogenic stimulus and reverse the apoptosis. Induced portal hypertension is the major concern after PVA, but the fistula can be easily interrupted by interventional radiology. Further experiences are required.
A new technique for accelerated liver regeneration. An experimental study in rats.

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Background
ALPPS is used to accelerate growth of the future liver remnant (FLR). We investigated alternative methods for increasing the FLR.

Methods
152 rats were randomized: 1) Sham; 2) Portal vein ligation (PVL); 3) PVL/surgical split (ALPPS); 4) PVL/RFA-SPLIT; 5) PVL/RFA of the deportalized liver (PVL/RFA-DEPOR); 6) PVL/RFA of the FLR (PVL/RFA-FLR); and 7) Controls. Animals were evaluated on postoperative days (PODs) 2 and 4.

Results
HRR indicated a steady incline in all intervention groups compared with sham (p<0.001). At POD 2, HRR was sign. higher in the PVL/RFA-DEPOR group than in the PVL group (p=0.039). On POD 4, we found sign. difference between the PVL group and the ALPPS (p=0.015), PVL/RFA-SPLIT (p=0.010), and PVL/RFA-DEPOR (p=0.046) groups. Hepatocyte proliferation was sign. higher at all times compared with sham. On POD 4, we found a sign. higher proliferation in groups 3, 4, 5 and 6 compared to PVL. Gene-analysis revealed up-regulation of genes involved in cellular proliferation and down-regulation of genes involved in cellular homeostasis in all intervention groups.

Conclusion
Surplus regeneration after ALPPS is probably mediated by parenchymal damage and release of growth stimulators, which up-regulates genes involved in cellular regeneration and down-regulates genes involved in cell homeostasis. Growth of the FLR, comparable to that seen after ALPPS, could be achieved by RFA treatment of the deportalized liver, i.e. a procedure in which the initial step in humans can be performed percutaneously.
Liver surgery: Experimental
FP26.05

ALPPS "Associating Liver Partition with Portal vein ligation for Staged Hepatectomy" (ALPPS) does not promote colorectal tumor growth

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Background
The effect of ALPPS on tumor proliferation, remains a concern. This study investigated the impact of ALPPS on growth of colorectal metastases in mice and human.

Methods
The effect of ALPPS and 90% portal vein ligation (PVL) on colorectal liver and lung metastases was investigated in mice. In vivo tumor progression was assessed by magnetic resonance imaging (MRI), histology and survival experiments. The effects of ALPPS, PVL and control sera on colorectal cancer cells (MC38 and CT26) were tested in vitro. Additionally, the international ALPPS registry enabled to identify patients with remaining tumor in the future liver remnant (FLR) after ALPPS stage 1.

Results
Two and three weeks after ALPPS stage 1, PVL or sham surgery, liver MRI showed similar intrahepatic tumor numbers ((p=0.14/0.82), sizes (p=0.45/0.98) and growth kinetics (p=0.58/0.68). Tumor growth was not different between ALPPS and PVL groups after completion of stage 2. Survival after tumor cell injection was similar after sham surgery and completion of ALPPS and PVL (36 days (IQR 32-40) vs. 42 days (IQR 36-48) vs. 39 days (IQR 35-42), p=0.237). Pulmonary metastases progression and in vitro cell proliferation were comparable among groups.
Observations in humans failed to identify accelerated tumor growth in the FLR within the regenerative phase after ALPPS stage 1.

Conclusion
The accelerated regeneration process associated to ALPPS does not enhance the growth of residual colorectal liver metastases.
ALPPS procedure in an experimental colorectal liver metastases model: hero or villain?

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Background
Associated liver partition and portal vein ligation for staged hepatectomy (ALPPS) has been raised as a potential therapy for bilobar metastatic liver disease, although the potential tumor progression (TP) that this technique may induce is still not well established.

Methods
The aim of this report was to study tumor hepatic progression induced by the first step of ALPPS in a WAG/Rij rat syngenic model of metastatic colorectal carcinoma by subcapsular inoculation of CC531 cell line. We analyzed the effect of hypoxia and immune response induced by ALPPS on liver metastases.

Results
ALPPS seems to induce not only tumor progression, but also metastases independently of the site of inoculation. Immunohistochemical analyses revealed that ALPPS induced expression of hepatic vasculogenic factors and a dramatic increase of intrahepatic macrophages in comparison with non-operated groups. Interestingly, hepatic macrophages strongly expressed COX-2, while tumor-infiltrating macrophages expressed mainly arginase-1. ALPPS also induced a decrease of tumor-infiltrating lymphocytes and increase of intrahepatic T-lymphocytes.

Conclusion
ALPPS technique may induce hypoxic environment which enhance hepatic HIF1alpha and VEGF expression. Additionally, the regenerative stimulus seems to be driven by a pro-inflammatory environment, in which M1 intrahepatic macrophages, which expressed COX-2 may develop a key role. These facts may be related with the tumor progression observed in inoculated and operated animals.
Analyses of mitochondrial biogenesis and function after Associating Liver Partition and Portal vein Ligation for Staged hepatectomy (ALPPS)

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Background
ALPPS is a novel 2-staged surgical procedure for liver tumors, which induces an unprecedented degree of liver regeneration. Despite the ALPPS induced accelerated regeneration, the postoperative mortality is relatively high, due to the frequently occurring postinterventional liver failure. Our goal was to assess the background of this increased vulnerability via examination of mitochondrial biogenesis and function after ALPPS.

Methods
Male Wistar rats (n=100) underwent ALPPS or portal vein ligation (PVL). The animals were sacrificed before (0) and 24-48-72-168h after the operations and the regeneration rate was calculated. Mitochondrial respiration and ATP production were determined, as well as peroxisome proliferator-activated receptor gamma coactivator 1α (PGC-1α). Nuclear respiratory factor 1– and 2 (NRF1, NRF2) expression and mitochondrial morphology were assessed.

Results
After 48h in the ALPPS group the regeneration ratio was significantly higher, while mitochondrial respiration and ATP production decreased significantly compared to the PVL group. The PGC1α and NRF1 concentration was significantly decreased after 48h in the ALPPS group (p=0.004, p<0.001 vs. PVL, respectively), while the NRF2 concentration showed no significant differences. The ratio of smaller than 0.24µm² mitochondria elevated significantly in the ALPPS group compared to the PVL group (p=0.023).

Conclusion
According to our results ALPPS causes major failures in mitochondrial biogenesis and function.
Animal models of Associating Liver Partition and Portal veinLigation for Staged hepatectomy (ALPPS)

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Background
In the recent years many animal models of ALPPS were introduced. These are important to develop patient safety and understand its background physiology. Our aim was to compare and assess the animal models developed by our research group.

Methods
Wistar rats, sheep and swine were used. The rats underwent portal vein ligation (PVL) including the branches feeding the right and left lateral, right medial and caudal lobes, the liver was partitioned according to the falciform ligament. In swine, the PVL included the left lateral and medial lobes (55-60% of the liver) and medial part of the medial lobe, the right lateral lobe (20-24% of the liver) was partially resected. Medial lobe was transected in the midline. In sheep, the left branch of the portal vein was ligated and the liver was partitioned alongside the gallbladder’s bed, 20% remnant livervolume (RLV) was reached by the partial resection of the right lobe.

Results
Using rats and pigs results in less accurate ALPPS models, as their livers need “humanization” by series of PVLs because of the lobular build and short on interlobular porto-portal anastomoses. The sheep liver is the most human-like in its proportions and vascular anatomy, and can be split with ease, unfortunately the animal’s extrahepatic anatomy states disturbances.

Conclusion
Rat models are suited for basic research, with poor translational capability. Large animal models have more translational potential, but currently no suitable one exists.
**BRG1 Promotes Hepatocarcinogenesis by Modulating CyclinB, D, E and Matrix Metalloproteinase 7**

**Background**

The chromatin remodeler complex SWI/SNF plays an important role in physiological and pathological processes. The role of BRG1, a catalytic subunit of the SWI/SNF complex, that is known to be mutated in hepatocellular carcinoma (HCC) remains unclear. The aim of this work is to investigate the role of BRG1 on cell growth, cell invasion and its effect on the expression of target genes.

**Methods**

We examined the expression of BRG1 in human tissue samples and HCC cell lines by qRT-PCR and Western Blot. We used siRNA to down-regulate BRG1 in human HCC cell lines. Cell growth and cell invasion of siRNA-treated cells was analysed by growth curves, colony formation assay and invasion assay. The expression of target genes after BRG1 downregulation was investigated by qRT-PCR.

**Results**

BRG1 was found to be significantly increased in HCC samples compared to non-HCC samples. After BRG1 downregulation by siRNA, cell growth and cell invasion decreased in HuH7 and HepG2 cell lines. A positive modulating effect by BRG1 was shown for the expression of CyclinB, D, E and MMP7 in either HepG2 or HuH7 cell lines.

**Conclusion**

Our results support the hypothesis that overexpression of BRG1 increases cell growth and cell invasion in HCC. Furthermore, the data highlight genes promoting proliferation and invasion that are being regulated by BRG1 during hepatocarcinogenesis. In particular, CyclinB, D, E and MMP7 appear to play a major role in this context and might be an important link between BRG1 expression and HCC development.
Cancer-associated circulating large extracellular vesicles in cholangiocarcinoma (CCA) and hepatocellular carcinoma (HCC)


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Background
Here, we assess the diagnostic value of tumour-associated microparticles (taMPs), for the detection and therapy monitoring of hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCA).

Methods
FACS was applied to detect various taMP populations in patients’ sera that were associated with the presence of a liver tumour. In total 172 patients with liver cancer, 54 with cirrhosis and no liver neoplasia, 202 control subjects were enrolled and in 27 liver cancer patients a R0 resection was performed.

Results
AnnexinV+EpCAM+ASGPR1+CD133+ taMPs allowed the distinction of liver malignancies and cirrhosis from tumour-free individuals and, more importantly, from patients carrying other non-liver cancers. AnnexinV+EpCAM+ASGPR1+ taMPs were increased in liver cancer-bearing patients (HCC or CCA) by 3.05-fold (p< 0.0005). ROC values, sensitivity/specificity and positive/negative predictive values (>78%) indicated a potent diagnostic accuracy. In addition, AnnexinV+EpCAM+ASGPR1+ taMPs decreased from 26.7 (pre-R0 resection) to 16.1 AnnexinV+EpCAM+ASGPR1+ taMPs per 103 AnnexinV+ MPs (day 2 post-R0 resection, p<0.005), and remained low at day 10 post-OP (7.7, p<0.05). The smallest size of successfully detected liver tumours were ranging between 11-15 mm.

Conclusion
Our results demonstrate that taMPs-based liquid biopsy might represents a novel accurate tool that will improve diagnostics and therapy in patients with primary liver cancers. Additionally, taMPs could be suitable to monitor anti-tumoral therapy response.
Description of a recovery experimental general anesthesia model in rabbits for the study of the late phase of liver ischemia-reperfusion injury

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Background
Experimental research on the pathophysiology of the early (<2hrs) and late phase of liver ischemia-reperfusion (I/R) injury and the study of possible protective strategies is important in several clinical settings (liver surgery, shock). Rabbits have advantages compared to rats due to their bigger size. However, there is difficulty to use them in recovery experiments, when endotracheal intubation is required, mainly due to the difficult airway access. Our aim is to describe a model of liver I/R in rabbits including recovery and follow-up for 24 hours.

Methods
Ten male New Zealand rabbits were allocated to two groups: 1) Sham laparotomy (n=5), and 2) Control (n=5), with 45 min of partial hepatic ischemia. After anesthesia induction, rabbits were intubated. Anesthesia was maintained through mechanical ventilation with an oxygen-sevoflurane mixture for 2 hrs post reperfusion. Analgesia was administered during anesthesia induction and recovery. Blood and tissue samples were collected at baseline, 2 and 24 hrs post reperfusion.

Results
Endotracheal intubation offered hemodynamic stability with avoidance of hypoxia and acidosis. Partial liver ischemia of 45 min led to significant liver injury as indicated in ALT, AST values and histology.

Conclusion
Study of the existing literature suggests that this successful recovery general anesthesia model with endotracheal intubation is applied for the first time in the study of liver I-R injury in rabbits.
Description of an experimental model of two-stage hepatectomy in different extents of cholestasis

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Background
Current liver surgery demands for complex surgical procedures such as two-stage hepatectomy especially in patients with Klatskin tumours III° and IV°. The impact of cholestasis on liver regeneration and the postoperative morbidity is discussed controversially. We established a model of two-stage hepatectomy in rats with biliary obstruction of various extent (70% or 100%) to investigate the impact of cholestasis on histopathological alterations of the remnant liver.

Methods
15 rats were randomised into 3 groups: no obstruction (Sham), 70% biliary obstruction (sBDL), 100% biliary obstruction (BDL). Portal vein ligation (70% liver) was performed at POD14 followed by a 70% PH at POD21. At POD28 we assessed routine liver parameters and liver weight-volume-recovery, remnant-liver-body-weight-Ratio (RLBWR) and histopathological alterations (portal fields, hepatic parenchyma, biliary convolutes) and the proliferative activity of hepatocytes and cholangiocytes.

Results
Cholestasis led to significantly enlarged portal fields and increased number of biliary convolutes. BDL showed a significantly increased RLBWR (BDL 4%, sBDL 3.5%, Sham 3%) and a significant reduction of the hepatocellular compartment. Proliferative activity of cholangiocytes and hepatocytes were significantly increased after BDL compared to sBDL and Sham.

Conclusion
We successfully established a novel surgical model suitable to mimic the complex pathophysiological situation of two-staged hepatectomy in different extents of cholestasis.
Developed operation method for patient-driven orthotopic xenograft model of hepatocellular carcinoma.

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Background
Patient-derived xenograft(PDX) model is a biological organized platform and a patient substitute. Recent studies use the ectopic model for hepatocellular carcinoma(HCC) but this model don’t reflect likewise the tumor state of patient. For exact prognosis, it is need to establish patient-derived orthotopic xenograft(PDOX) mouse model of HCC using direct injection technique. Additionally, secretion of growth factor from bone marrow stem cells is promoted after partial hepatectomy. Based on former PDX research, we develop the new protocol using direct injection technique.

Methods
From January 2015 to June 2016, consent about getting tumor pieces to the patient of HCC. The pieces is stored in RPMI1640 and moved from operation room to research room immediately. For PDOX, 8~10weeks old NOD SCID and NSG male mouse is used. The tumor pieces cutted to the 1mm cube. For stop the bleeding, inferior vena cava is blocked using Bulldog Clamp and the cube is directly injected median lobe to 3 places randomly. After clear the Bulldog Clamp, a left lobe is removed using tie. After 3 months, the PDOX mouse is checked for cancer growth using MRI or PET-CT. Successful PDOX model is sacrificed and succeeded a generation to another Balb/C-nude male mouse.

Results
The rate of success of PDOX model is about 10% respectively. Formed tumor is verified by H&E staining.

Conclusion
Based on protocol established, further study plan is required for improving on the rate of success to establish PDOX model and clinical application.
Electrochemotherapy: new treatment approach for Hepatocellular Carcinoma: Results of phase I study

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Background
Incidence of Hepatocellular Carcinoma (HCC) is rising across the world and it is one of the commonest causes of cancer-related deaths in the world but only 20% of patients are candidates for curative treatment. When radical treatment is not indicated, transarterial chemoembolization (TACE), radiofrequency ablation (RFA), and other methods are being used for disease control [1] [2]. The data on effectiveness of electrochemotherapy (ECT) in cutaneous and some other tumors are numerous but there are limited data on feasibility and efficacy of ECT for liver tumor [3] [4] [5].

Methods
For the treatment of patients with HCC with ECT, a phase I study was designed and concluded in 10 patients who fulfilled inclusion criteria. The primary goal of study was to assess the feasibility and effectiveness of ECT in HCC. Effectiveness was evaluated by mRECIST criteria using CT and/or MRI as a diagnostic tool. After multidisciplinary meeting included patients into study, a pretreatment plan was made. The treatment was performed during open surgery using electrodes with variable or fixed geometry guided by ultrasound. After their insertion, BLM was injected and the electric pulses was applied after 8 minutes. A CT scan or MRI was done according to the study protocol.

Results
Our study shows high rate of complete responds lesions that were treated by mRECIST criteria without higher morbidity or mortality rate.

Conclusion
Study proved that ECT is in some patients with HCC safe and effective treatment option.

References:
Evaluation of an augmented reality based image guidance system for laparoscopic liver surgery

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Background
Use of augmented reality (AR) based image guidance systems (IGS) has been proposed as a method to improve anatomical orientation during laparoscopic liver surgery (LLS) with potential benefits for patients. In this study, an AR based IGS (SmartLiver) was evaluated intraoperatively for the first time. In addition enhanced visualisation methods with the potential to improve mental integration between surgeons and AR environment will be presented.

Methods
Patients scheduled for staging laparoscopy or LLS were recruited. During surgery a 3D liver model was manually overlayed onto the laparoscopic screen (registration) to create an AR environment. Surgeons scored IGS performance and accuracy on a scale (1-10). Objective accuracy was calculated by measuring distances of anatomical landmarks between 3D model and in-situ liver (mm RMS).

Results
Ten patients were recruited to the study. Ease of use, mental integration and accuracy were rated positively (8 each). Length of setup time was rated negatively (2). Objectively measured accuracy was 137±39. A consensus was reached to integrate depth fogging, outlining and plane clipping as enhanced visualisation features into SmartLiver (video).

Conclusion
The findings of this study demonstrate that SmartLiver is easy to use and capable of creating an AR environment that integrates well into the surgical workflow. Enhanced visualisation methods may improve the interpretation of AR data. An automatic registration method is needed to improve accuracy and setup time.
Liver surgery: Experimental
P41.02

Exercise improves outcomes of surgery on fatty liver and can be substituted through AMPK activation - an experimental study

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Background
Steatosis is a serious risk factor for liver surgery and transplantation, mostly because of its impact on ischemic tolerance (IT) and regenerative capacity (RC) of the liver. Exercise is most effective in counteracting steatosis, but how it affects IT and RC is unclear. Compound mimetics of physical activity are of major interest for patients who are unable to comply with exercise.

Methods
A standardized mouse model of diet-induced steatosis was used. Obese mice were subjected for four weeks to regular exercise or treatment with AICAR, an activator of the key energy sensor induced through exercise, AMPK (adenosine monophosphate kinase). Mice were then exposed to hepatic ischemia or hepatectomy.

Results
Exercise activated AMPK, normalized metabolic parameters, and improved IT and RC of fatty liver. Similar, albeit smaller, improvements were noted for lean liver, indicating steatosis-independent effects of exercising. AICAR treatment had an impact on fatty liver akin to exercise. The power of AMPK activation in improving surgical outcomes was demonstrated in an established model of the small-for-size-syndrome, with exercising raising survival from 20 to 80%.

Conclusion
Any safe intervention reducing hepatic fat accumulation and improving IT and RC is most welcome in liver surgery. Exercising is powerful but its application is limited. Our findings suggest that pharmacological AMPK activation is a promising strategy to sustain the surgical benefits of exercise in the absence of compliance issues.
Liver surgery: Experimental
P26.03

First long-term follow-up study of near-infrared fluorescence-guided resection of colorectal liver metastases

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Background
Several studies show that intraoperative near-infrared fluorescence imaging (FI) with indocyanine green identifies colorectal liver metastases (CRLM) missed by other techniques. It is unclear if this results in any survival benefit. This study is the first to evaluate long-term follow-up.

Methods
Patients undergoing resection of CRLM with or without FI were analyzed. Perioperative details and liver specific recurrence-free interval were compared.

Results
Between 2010 and 2016 a total of 67 patients underwent resection with FI and 87 without. Baseline characteristics were similar. In significantly more patients of the FI group additional metastases were identified during surgery (25% vs 13%, p=0.04). Tumors identified solely by FI were significantly smaller compared to those identified also by inspection, palpation or intraoperative ultrasound (3.2±1.7 mm vs 7.2±2.6 mm, p<0.001). Liver specific recurrence-free survival at 4 years was 47% with FI and 39% without (hazard ratio at multivariate analysis 0.69, 95%CI 0.39-1.21, p=0.20). No liver recurrence occurred within 3 years follow-up in 3 out of 8 patients in whom additional metastases were identified by FI only.

Conclusion
This study suggests that FI identifies significantly more and smaller CRLM during surgery, preventing recurrences in a subset of patients. Due to the safe, inexpensive and easy nature, standard implementation of this technique can be advised.
Gene expression in the liver remnant is significantly affected by the size of partial hepatectomy - an experimental rat study

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Background
Extended hepatectomies may result in post-hepatectomy liver failure. This condition is associated with a high mortality. The main purpose of the present study was to investigate and compare the gene expression profiles in rats subjected to increasing size of partial hepatectomy.

Methods
40 Wistar rats were subjected to 30%, 70%, or 90% partial hepatectomy, sham operation or no operation. 24 hours following resection liver tissue was harvested and genome wide expression analysis was performed.

Results
Cluster analysis revealed 2 main groupings, one containing the PH(90%) and one containing the remaining groups (baseline, sham, PH(30%) and PH(70%)). Categorization of specific affected molecular pathways in the PH(90%) group, revealed a downregulation of cellular homeostatic functions degradation and biosynthesis, whereas proliferation, cell growth, and cellular stress and injury were upregulated in the PH(90%) group. After PH(90%) the main upregulated pathways were mTOR and ILK. The main activated upstream regulators were hepatocyte growth factor and transforming growth factor.

Conclusion
With decreasing size of the future liver remnant, the liver tended to prioritize expression of genes involved in cell proliferation and differentiation at the expense of genes involved in metabolism and body homeostasis. This prioritizing may be an essential molecular explanation for post-hepatectomy liver failure.
Hyperammonemic encephalopathy in patients with fibrolamellar hepatocellular carcinoma: a new physiopathological pathway

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Background
Hyperammonemic encephalopathy (HE) may be a fatal condition usually associated to liver failure and portosystemic shunting. [1] However, there are rare conditions that may lead to HE, such as fibrolamellar hepatocellular carcinoma (FHC). [2] Awareness of the possibility of HE in patients with normal liver function is fundamental to timely diagnosis and treatment. We describe a new physiopathological pathway to HE in this clinical scenario that allowed adequate treatment and full clinical recovery of a patient that did not respond with standard medical approach.

Methods
A young male with large FHC and peritoneal carcinomatosis that developed rapid onset HE. With usual treatment to this condition, hyperammonemia aggravated with coma. A different physiopathological pathway to HE was suspected and investigated: overexpression of Aurora Kinase A, c-MYC and ornithine descaboxylase resulting in ornithine transcarboxylase dysfunction and urea cycle disorder. Adequate treatment was initiated.

Results
With adequate treatment to urea cycle disorder ammonia blood levels decreased normal levels. Patient presented full clinical recovery. He was submitted to chemotherapy with sorafenib and GEMOX, and blood ammonia levels remained normal. After eight months hepatic tumors and peritoneal carcinomatosis are significantly reducing.

Conclusion
We identified a new physiopathological pathway to HE in patients with large growing hepatic tumors. This allowed adequate treatment of this condition and complete clinical recovery.

References:
Liver surgery: Experimental
P14.04

Inhibitory effect of targeted therapies of different signalling pathways in DEN-induced hepatocarcinogenesis in C57BL/6 mice.

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Background
We describe the successful DEN-induced hepatocarcinogenesis in C57BL/6 mice and investigate the impact of 2 different waiting periods (10 and 12 months), and targeted therapies.

Methods
In 60 male mice C57BL/6 DEN-induced hepatocarcinogenesis was achieved. DEN, 5mg/kg bw, was administered intraperitoneally on their 15th day of life. We divided the 60 mice in two major categories according to the post hepatocarcinogenesis waiting periods (10 and 12 months). We then allocated 6 groups with 10 experimental subjects. Group A (10 months) control HCC group, group B (10 months) with administration of anti-Aurora Kinase (PHA-739358, Danusertib), group C (10 months) with administration of anti-WNT1, group D (12 months) control HCC, group E (12 months) with administration of anti-HDAC (Romidepsin) and group F (12 months) with administration of anti-TOPK (HI-TOPK-32). Group G served as control. All animals were sacrificed on the 10th or 12th month of their life according to the protocol. Liver, lungs and serum were retrieved for analyses.

Results
Histopathology analysis showed achievement of HCC genesis in the DEN group and administration of targeted therapies intervened in the development of HCC and the cell signaling.

Conclusion
DEN-induced hepatocarcinogenesis proved to develop HCC successfully in mice. Targeted therapies for HCC demonstrated an inhibitory effect in the development of HCC and intervened in the HCC development cell signaling.
Laparoscopic Microwave Ablation and Portal Vein Occlusion for Staged Hepatectomy (LAPS)

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Background
Laparoscopic Microwave Ablation and Portal Vein Occlusion for Staged Hepatectomy (LAPS) is a new surgical technique based on ALPPS principle.

Methods
Ten patients with primary or secondary malignant liver limited unresectable disease (median follow-up: 17 months - range= 1-33). Preoperative FLR/BW ratio < 0.8% was considered insufficient for resection in patients with cholestasis or chemotherapy-induced injury.

Results
FLR hypertrophy of 288 cc (range 194-407) and 71.2% (range 43 to 132%) was evidenced with a median daily volume increase of 30.29 cc/day (range = 16.27 - 43.29). All patients completed Step2, on average 15.5 days after Step1 (range= 13-21). No ICU stay was required after Step1. R0 resection was achieved in 7/10 patients (70%). Post-operative morbidity revealed 19 events in 8 patients (80% with at least 1 complication – only 1 grade IIIb and no biliary complicantions). The morbidity rate after Step1 seems minimized (40% of patients; 6 events in 4 different patients - 32% of the total events, grade from I to IIIa), compared to Step2 (70% of patients; 13 events in 7 patients - 68% of events). The OS at 12 months was 88% with a mortality rate of 12% (one death for liver progression), with a median survival of 17 months (range= 1-33); no 90-days mortality was evidenced.

Conclusion
LAPS technique was effective and relatively safe in preoperatively unresectable patients, proposing an inversion of the classical "ALPPS paradigm" with Step1 surgery minimization.
MicroRNA-203a is a crucial regulator of self-renewal and tumorigenicity of human hepatocellular carcinoma by directly targeting BMI1

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Background
Hepatic stem cells (HSCs) participate in a wide range of liver diseases, including hepatocellular carcinoma (HCC). We have previously shown that Bmi1 promotes malignant transformation of ratHSCs. This study aims to investigate the biological function of miR-203a and BMI1.

Methods
Expression of miR-203a and BMI1 in HCC tissues were evaluated by qPCR, and prognostic significance was assessed by using Kaplan–Meier survival estimates and log-rank tests. A luciferase reporter assay was used to validate BMI1 as a direct target of miR-203a. The effect of miR-203a on human HCC progression was studied in vitro and in vivo.

Results
QPCR revealed that a significant down-regulation of miR-203a was observed in 79.4% of HCC tissues, BMI1 was significantly up-regulated in 73.5% of HCC tissues. miR-203a was an independent predictor for overall survival ($P = 0.002$) and disease-free survival ($P = 0.002$) of HCC patients. The results of the luciferase assay confirmed BMI1 as a direct target gene of miR-203a. Moreover, forced expression of miR-203a not only resulted in decreased proliferation, colony formation and invasion of HCC cells but also led to impaired the tumor formation of HCC cells in vivo. In addition, an aldehyde dehydrogenase (ALDH) assay revealed that a significant decrease in the number of ALDH positive cells after the upregulated of miR-203a in HCC cells.

Conclusion
Our findings indicated that miR-203 is a crucial regulator of self-renewal and tumorigenicity of human HCC by directly targeting BMI1.
Multi-Operational Selective Computer-Assisted Targeting of Hepatocellular Carcinoma - Evaluation of a novel approach in an animal model

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Background
We evaluated accuracy and efficiency of a novel technique for precise ablation of HCC, combining a transarterial approach for intrahepatic tumour tracking and electomagnetic (EM)tracked navigation for percutaneous placement of ablation probes, in a porcine model.

Methods
A prototype of a catheter with integrated EM-tracked reference sensor was placed via inguinal access into an intrahepatic artery. Intrahepatic tumour models were targeted percutaneously with a tracked ablation probe using EM navigation. Total positioning error (=TPE) was measured when aiming for the intrahepatic reference sensor (baseline targeting) and at defined distances relative to the sensor (offset targeting, accounting for the expected distance between the tumour and the sensor when placed in peritumoural vessels).

Results
505 targetings were performed in 6 swines. Mean TPE for baseline targeting: 2.6 ± 1.6mm. Mean TPE for offset targeting with reference sensor closest to tumour: 3.1 ± 1.6mm. No correlation between offset distance and TPE was shown (p=0.62), if the sensor was placed intrahepatically. TPE increased when placing the sensor externally (p<0.01). Mean time for navigated targeting: 13.6 sec. TPE did not differ when targeting under continuous breathing versus in apnoe (p=0.08).

Conclusion
This technique allows continuous intrahepatic tumour tracking and accurate and efficient targeting of liver lesions in an animal model. It might represent a simple approach for combined ablation and TACE in a single treatment session.
Portal inflow restriction enhances liver regeneration and decreases liver injury after major liver resection

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Background
Extended liver resection leads to acute hyperperfusion of the remnant liver associated with structural and functional changes in the remaining liver tissue. In this study, we explored if reduction of the hepatic hyperperfusion impacts on liver injury and regeneration.

Methods
Extended partial hepatectomy was performed in pigs and mice. Liver regeneration was assessed in mice and alterations of hemodynamic parameters, oxygen uptake and mitochondrial function was assessed in pigs. A vascular occluding device was designed to keep portal flow at 70% of the preoperative flow (intervention group) and compared to animals where portal flow was not manipulated (control group).

Results
In pigs without portal inflow restriction, extended (70%) partial hepatectomy led to a persistent portal hyperperfusion with an increase in relative portal flow from 75ml/min/100g to 250ml/min/100g.
In the intervention group, AST and ALT levels were reduced after portal inflow restriction compared to the control group.
Hepatocellular proliferation was assessed in mice in which markers of proliferation were higher after partial portal vein ligation compared to untreated controls. Electron microscopy revealed reduced sinusoidal injury after portal inflow restriction.

Conclusion
Liver injury after major liver resection is at least in part mediated by portal hyperperfusion. Portal inflow restriction reduces liver injury and increases liver regeneration after extended liver resection.
Portal vein collaterals correlate with liver hypertrophy in a pig model of ALPPS

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Background
Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy (ALPPS) induces more hypertrophy than portal vein ligation alone (PVL). The aim of this study was to determine in a large animal model if formation of collaterals correlates with the degree of hypertrophy.

Methods
Models of ALPPS and PVL, using the right posterior lobe as the growing liver sector, were established in 12 pigs. Animals were randomized to undergo ALPPS (n=4), PVL (n=4) or “partial ALPPS” by varying degrees of transection of the parenchyma (n=2). Hepatic volume was measured by fluid displacement method after 7 days. Portal blood flow and pressure were measured using an ultrasonic flow meter and manometry, respectively. Portal vein collaterals were examined from epoxy casts. Liver histology was examined in hematoxylin-eosin and Ki-67 staining.

Results
PVL, partial ALPPS, and ALPPS led to different volume increases of the posterior lobe by 40% (IQR33-45), 128% (IQR78-178), and 207% (IQR196-273) respectively (p<0.005). In PVL and partial ALPPS, substantial new portal vein collaterals were found. The number of collaterals correlated inversely with the growth rate. Development of collaterals allows decompression of the hyperperfused growing liver into all hepatic vein territories.

Conclusion
Liver hypertrophy following PVL is inversely proportional to the development of intrahepatic collaterals during the first week. Hypertrophy after ALPPS may be caused by the suppression of portal vein collaterals.
Liver surgery: Experimental
P14.01

Prognostic Impact of OPN and DKK1 in Patient of Hepatocellular Carcinoma after Hepatectomy.

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Background
The new biomarkers are essential for improving the survival and prognosis of hepatocellular carcinoma(HCC) patients. Alpha-fetoprotein(AFP) is the most widely used biomarker. But the low sensitivity and specificity limits its clinical application. Recent study assessed the combination of AFP, DKK1, and OPN as a panel for the diagnosis of HCC. Based on these previous studies, we hypothesized that combination of OPN and DKK1 can be used to as a marker for prognosis to patient of HCC after hepatectomy.

Methods
From January 2006 to December 2008, patients undergoing hepatectomy for HCC were screened serum that has been stored in the Bank of tumor. To target the selected patient, it was confirmed that the remaining tissue specimen is stored after diagnosis. Serum of the patients was used to investigate the OPN and DKK1 by ELISA. In the paraffin block were prepared unstained slide and OPN and DKK1 level checked by IHC. It examined the correlation between prognosis and biomarkers through statistical analysis.

Results
AFP, OPN(serum level) and DKK1(serum level) are an independent prognostic factor for overall survival(OS) in HCC after hepatectomy(n=60, P=0.0204, 0.0167 and 0.0455 respectively). New biomarkers combinations based on the AFP existing biomarker are showed a falling curve of the overall survival(OS) and disease-free survival(DFS) in Kaplan Meier curve.

Conclusion
In conclusion, combination of OPN, DKK1 and AFP as a biomarker could support the correct diagnosis for HCC after hepatectomy.
The absence of the adaptor proteins CARDIF/STING negatively regulates the proliferation of liver regeneration after partial hepatectomy in mice

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Background
Nucleic acid sensors are known to play a major role during liver regeneration, however, there is only limited knowledge on the role of central adaptor proteins, such as CARDIF and STING. Our hypothesis states that these modulators of the innate immune system have an influence on liver regeneration.

Methods
We use a newly established CARDIF/STING knockout mouse model and a C57BL/6 control cohort. A 2/3 partial hepatectomy (PH) was performed in both groups (n=60 mice in total). Liver regeneration was quantified by liver-to-body weight ratio, proliferation was determined by BrdU staining, RNA- and protein levels of proliferation markers were analyzed in resected tissues and pro-inflammatory cytokines were measured in murine serum.

Results
CARDIF/STING knockout mice showed a significantly impaired liver regeneration after PH. Expression analysis of Interleukin-6 revealed a significant decrease in the wild type cohort after PH. In CARDIF/STING knockout mice, the proliferation marker Cyclin D1 was decreased until 24 hours after surgery, while p21Cip1 expression was increased 8h post-PH.

Conclusion
Together, these data provide the first experimental evidence that CARDIF/STING knockout mice show a delayed liver regeneration. In the absence of these two proteins, we observed a modulated immune response which lead to a negative regulation of the proliferative capacity after partial hepatectomy. This finding could impact on the future development of molecular therapies making use of the innate immune system.
The possibility of using resection and cryoablation procedures in the treatment of liver

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Background
To improve treatment outcomes in pts with liver alveococcosis.

Methods
Since 2010 we have an experience of surgical treatment of 87 pts with liver alveococcosis. In the period 2010-2012 relapse was detected in 16(18.3\%) pts, a second relapse in 2(2.3\%). Since 2012 we have begun to use cryoablation (CA) on the remainder of the parasitic tissue after liver resection. This surgical intervention was performed in 22(25.3\%) pts. The procedure of CA lasted from 2 to 5 min. of freezing from -175 to -186°C. All pts subsequently undergone appropriate worming chemotherapy.

Results
Liver resection was performed with additional nephrectomy(2), additional resection of the portal vein(1). CA of adjacent affected infected tissues was performed in all cases. CA was performed on the remaining part of the parasite on the right dome of the diaphragm(2), in the gate of the liver(7), the remaining parenchyma of the contralateral lobe(8), in the para-aortic tissue(4), in the course of the right urether(1). All pts are alive. Comprehensive survey, including the results of US, CT, MRI/MRCP showed no signs of continuing parasitic growth. Manifestations of liver failure after CA of the gate area observed in 2 pts, which required medical treatment with the ERCP+endoscopic drainage(1), PTBD(1).

Conclusion
Using a combination of liver resection+CA, especially after repeated surgical procedures can be considered a radical treatment for liver alveococcosis. The risk of liver failure in the immediate p/o period is not a reason to reject the radical treatment.