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**Preliminary results of the randomised phase III PREOPANC trial: potential improvement in outcome after preoperative chemoradiotherapy for patients with (borderline) resectable pancreatic cancer****Presenting Author:** Drs Eva Versteijne

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**Abstract**

**Background:** For patients with (borderline) resectable pancreatic adenocarcinoma standard treatment is resection followed by adjuvant chemotherapy. We conducted a multicentre, randomised trial to test that median overall survival improves with preoperative chemoradiotherapy.

**Methods:** Patients with (borderline) resectable pancreatic cancer were randomised between immediate surgery (arm A) and preoperative chemoradiotherapy (arm B). Preoperative treatment consisted of gemcitabine, 1,000 mg/m<sup>2</sup> on days 1, 8 and 15, combined with 15 daily radiotherapy fractions of 2.4 Gray, preceded and followed by modified gemcitabine courses. Primary endpoint was overall survival (OS), secondary endpoints were (R0) resection rate, disease free survival (DFS), distant metastases free interval (DMFI), locoregional recurrence free interval (LRFI) and toxicity, by intention to treat. Accrual completed on July 25, 2017.

**Results:** A total of 127 patients were randomised in arm A and 119 in arm B. With currently 149/176 events observed, median OS showed a trend (13.5 vs. 17.1 months in arm B (p=0.074)). Resection rate was 72% vs. 61% in arm B (p=0.087). Other endpoints significantly improved in arm B: R0 resection rate (31% vs. 63%), median DFS (7.9 vs. 9.9 months), median DMFI (10.6 vs 18.4 months) and median LRFI (11.8 vs. not reached). No significant difference was observed in adverse events between both groups (p= 0.28). A subgroup analysis of patients who underwent a resection and started adjuvant gemcitabine showed significant difference in mOS (19.1 vs. 42.1 months).

**Conclusion:** These preliminary results suggest a benefit in outcome of preoperative chemoradiotherapy in patients with (borderline) resectable pancreatic cancer.

## AB02

### Laparoscopic versus open pancreatoduodenectomy (LEOPARD-2): a multicentre, patient-blinded, randomised controlled trial

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#### Abstract

**Background:** There are concerns regarding the considerable learning curve of laparoscopic pancreatoduodenectomy (LPD), and its benefits compared with open pancreatoduodenectomy (OPD) are unknown. We aimed to assess time to functional recovery for LPD vs. OPD.

**Methods:** This multicentre, patient-blinded, randomised controlled trial was performed in four Dutch centres that each perform  $\geq 20$  pancreatoduodenectomies annually, completed a LPD training programme, and performed  $\geq 20$  LPDs prior to trial participation. Patients with a pancreatic head or periampullary tumour without signs of vascular involvement were randomly assigned to LPD or OPD (1:1 ratio, stratified for case volume and preoperative estimated pancreatic fistula risk). Analysis was according to intention-to-treat. The primary outcome was time to functional recovery (days).

**Results:** Between 05- 2015, and 11- 2017, 105 patients were randomised. Six patients did not receive surgery and were replaced according to study protocol. The trial was prematurely terminated by the data safety monitoring board because of a difference in 90-day complication-related mortality (LPD 5/50 (10%) vs. OPD 1/49 (2%),  $p=0.20$ ). Time to functional recovery was 10 days (95% CI 5–15) after LPD vs. 8 days (95% CI 7–9) after OPD ( $p=0.80$ ). Clavien-Dindo grade  $\geq 3$  complications (25/50 (50%) vs. 19/49 (39%),  $p=0.26$ ), and grade B/C postoperative pancreatic fistulas (14/50 (28%) vs. 12/49 (24%),  $p=0.69$ ) were comparable for LPD and OPD, respectively.

**Conclusions:** Laparoscopic pancreatoduodenectomy was, compared with open pancreatoduodenectomy, not associated with improved time to functional recovery, but with safety concerns regarding complication-related mortality.

(Registered at [www.trialregister.nl](http://www.trialregister.nl), number NTR5689. Investigator-initiated funding by Johnson&Johnson Medical Limited.)

**Endoscopic versus percutaneous biliary drainage in patients with resectable perihilar cholangiocarcinoma: a multicentre randomised controlled trial****Presenting Author:** drs Eva RoosAmsterdam UMC, University of Amsterdam, Cancer Center Amsterdam, Mijbergdreef 9 1105 AZ, the Netherlands  
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*Background:* In patients with resectable perihilar cholangiocarcinoma (PHC) biliary drainage is recommended to treat obstructive jaundice and optimise clinical condition before liver resection. Evidence is lacking on whether endoscopic (EBD) or percutaneous transhepatic biliary drainage (PTBD) is the preferred initial method of biliary drainage.

*Methods:* A multicentre randomised controlled trial was performed assigning patients with potentially resectable PHC requiring major liver resection, and a bilirubin level above 50 µmol/L (2.9 mg/dL), to undergo either EBD or PTBD. The primary outcome was the number of severe complications occurring between randomisation and surgery. Secondary outcomes included 90-day mortality.

*Findings:* The study was prematurely closed after randomising 54 out of 106 patients (51%) to EBD (27 patients) or PTBD (27 patients) because of higher mortality in the PTBD group (41%, 11/27) compared to the EBD group (11%, 3/27) (relative risk, 3.7; 95%CI, 1.1-11.7; P=0.03). Three of the 11 deaths in the PTBD group occurred before surgery. The rate of severe preoperative drainage-related complications was comparable between the PTBD (63%) and EBD (67%) groups (relative risk, 0.9; 95%CI, 0.6-1.4). Preoperative cholangitis occurred in 16 patients (59%) in the PTBD group and 10 patients (37%) in the EBD group (P=0.1). Fifteen patients (56%) required additional PTBD after EBD, while only one patient (4%) required EBD after PTBD.

*Interpretation:* The study was terminated halfway because of higher all-cause mortality in the PTBD group. Post-drainage complications were comparable between groups. Data show no advantage for PTBD, but should be interpreted with caution.

## 3D matrices: engineered growth factors and morphogens for the induction of endothelial like cell signalling in liver regeneration

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### Abstract

*Introduction:* Tissue engineering is an emerging novel technology using cells with regenerative capacity, 3D scaffolds or synthetic materials, growth factors and morphogens to induce tissue regeneration in the end-stage liver failure.

Our study aimed to engineer of extracellular matrix (ECM)-mimicking scaffolds for effective growth factor and morphogen delivery that can act as an inductive template for functional 3D tissue and organ reconstruction after recellularisation with autologous stem cells or differentiated cells.

*Methodology:* We collected tissue intraoperatively from patients undergoing partial hepatectomy. Single cell and 3D □-tissue cultures derived from livers were generated. Eph receptors and their cognate ligands ephrins which are both membrane-bound and require direct cell-cell interactions for receptor activation were used as morphogens for incorporation into functional 3D fibrin gels.

*Results:* We expressed Eph receptors and ligands as secreted Fc-fusion proteins in mammalian cells or in E.coli as engineered proteins suitable for covalent incorporation into 3D matrices. In addition, we designed short peptides that are enzymatically bound to 3D matrices and are engaged in Eph receptor signal modulation. All these approaches were successfully used to induce cell signaling, cell migration and morphogenesis in 3D cultures.

*Conclusions:* Our study provides a proof-of-concept that functional 3D matrices could be generated using engineered morphogens and might provide the insights into how such matrix-bound molecules activate the cells and used for subsequent regeneration of vital liver tissue.

## AB05

### CD11b+Ly6g+ myeloid derived suppressor cells promote liver regeneration in a murine model of major hepatectomy

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#### Abstract

**Background & Aims:** Liver regeneration depends on sequential activation of multiple pathways and cell types involving the remaining organ in recovery of mass. Proliferation of parenchyma is dependent on angiogenesis. Understanding liver regeneration associated neovascularization may be useful for future development of clinical interventions. Myeloid Derived Suppressor Cells (MDSCs) promote immune suppression and tumour angiogenesis, and play a role in normal developmental processes that necessitate rapid vascularization. The role of MDSCs in liver regeneration has not been studied.

**Methods:** The proportion of MDSC populations was assessed within remnant livers following major hepatectomy (Hx). The effect of CD11b+Ly6G+ MDSCs (G-MDSCs) depletion on post-operative mortality, liver regeneration, and angiogenesis was evaluated. Transcriptional and functional characterisation of regenerating liver-derived G-MDSCs was performed.

**Results:** G-MDSCs were enriched within regenerating livers, and their depletion led to increased post-operative mortality and reduced liver weights, decreased hepatic vascularization, and hepatocyte proliferation, and to aberrant liver function indices in peripheral blood. Global gene expression profiling of regenerating liver-derived G-MDSCs demonstrated a large-scale transcriptional response, involving key pathways related to angiogenesis and immune suppression. Functionally, enhanced reactive oxygen species production and angiogenic capacities of regenerating liver-derived G-MDSCs were confirmed. A comparative analysis revealed that the transcriptional response of G-MDSCs during liver regeneration highly resembled that of peripheral blood G-MDSCs during progression of abdominal tumours, suggesting a common G-MDSC gene expression profile promoting angiogenesis.

**Conclusions:** This study provides the first evidence that MDSCs contribute to early stages of liver regeneration by exerting pro-angiogenic functions using a unique transcriptional programme.

**Thoracic muscle radiation attenuation for the prediction of postoperative pneumonia following partial hepatectomy for colorectal metastasis**

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**Abstract**

*Background:* Low skeletal muscle radiation attenuation (SM-RA) is indicative of myosteatorsis and diminished muscle function, and is predictive of poor outcome following oncological surgery in some cancer types. Postoperative pneumonia has been shown to increase postoperative morbidity, prolong hospital admission, and increase in-hospital mortality following a range of surgical interventions. Patients undergoing partial hepatectomy for the treatments of colorectal liver metastasis (CRLM) develop reactive pleural effusion which increases the risk of post-operative pneumonia to incidences above 10%. We hypothesised that low SM-RA at the 4th thoracic vertebrae (T4 SM-RA) is predictive for postoperative pneumonia following liver surgery.

*Methods:* Prospective infection control data of 180 patients who underwent elective CRLM resection were used to identify postoperative pneumonia. Body composition was assessed using CT-scans at the 3rd lumbar vertebrae (L3) and 4th thoracic vertebrae (T4) to determine: (i) SM-RA; (ii) total skeletal muscle area (SMA); (iii) and muscle index (muscle area corrected for patient stature). Body composition variables were corrected for known confounders and related to postoperative pneumonia and admission time by multivariable logistic regression analysis.

*Results:* Twenty-one patients suffered postoperative pneumonia (11.6%). Univariate analysis showed that low T4 SM-RA was significantly associated with postoperative pneumonia ( $p=0.01$ ), whereas L3 SM-RA, L3-index and T4-index were not ( $p=0.05$ ,  $p=0.10$  and  $p=0.62$  respectively). In multivariate analysis, low T4 SM-RA remained significantly associated with an increased risk of postoperative pneumonia ( $p=0.04$  (OR 2.92, 95% CI 1.08-7.91), but not increased admission time.

*Conclusion:* Low T4-(SM-RA) is associated with a higher risk of postoperative pneumonia following CLRM resection.

## AB07

### Model for accelerated liver regeneration in ALPPS: Hypoxia of Hepatic stellate cells increases VEGF-dependent angiogenesis

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#### Abstract

In ALPPS livers hypoxia inducible factor-1-alpha(HIF-1-alpha) is increased. Dimethyloxalyglycine(DMOG) given with portal vein ligation (PVL) accelerates regeneration by upregulating HIF-1alpha. This study aims to clarify how HIF-1-alpha accelerates growth examining the role of hepatocytes(HC), stellate-cells(HSC) and liver-sinusoidal-endothelial-cells(LSEC).

Four experimental scenarios were examined in rats(Fig.A): (1)PVL (Fig.B) (2)ALPPS(Fig.C) (3)intraperitoneal injection of DMOG(Fig.D) and (4) PVL+DMOG(Fig.E). After 72h, liver volume was determined. HC proliferation was examined by Ki-67/DAPI staining, LSEC density by von-Willebrand-Factor(vWF) and HSC activation by desmin-staining.

In vitro, the HSC line LX-2 was exposed to DMOG. The supernatant was then transferred to the HC cell line HEP3B and to the LSEC cell line TRP3. Proliferation was measured by RTCA-iCELLigence system. Vascular endothelial growth factor (VEGF) was measured in supernatant.

PVL induces slow liver regeneration, ALPPS and DMOG added to PVL accelerates it. DMOG alone has no impact. The observed volume increase is paralleled by pronounced staining for Ki-67 in ALPPS and PVL+DMOG. DMOG alone induces no proliferation(Fig.F). However, DMOG alone leads to increased vascular density by vWF staining, similar to ALPPS and PVL+DMOG(Fig.G). Also, desmin staining is stronger in DMOG alone animals(Fig.H), also in ALPPS and PVL+DMOG(Fig.H).

In vitro, incubation of HC with DMOG is ineffective. However, supernatant of DMOG-treated HSC(Fig.J)induces proliferation of LSEC(Fig.K). VEGF is increased in supernatant of DMOG-treated HSC(Fig.L).

Accelerated liver regeneration of ALPPS is associated with increased endothelial density and HSC hypoxia. HSC may be stimulated by hypoxia to induce angiogenesis via VEGF, which leads to more trophic portal blood supply of growing hepatocytes.

#### *Additional Documents:*

<https://www.jotform.com/uploads/acsglobal/81782668577375/4160504695815860589/Figure.docx>

**The impact of surgical experience and frequency of training on perioperative outcomes in pancreatic surgery**

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**Abstract**

**Objective:** We aimed to determine the impact of surgical experience and frequency of training on perioperative morbidity and mortality in pancreatic surgery training.

**Summary Background Data:** The impact of the surgeon's level of experience and frequency of training on perioperative outcomes has not been sufficiently evaluated in the context of pancreatic surgery training.

**Methods:** In total, 1281 patients undergoing pancreatic resections from 1993 to 2013 were included. All cases were stratified according to the surgeon's level of experience, which was defined as the total number of previously performed pancreatic resections (novice:  $n < 20$ , intermediate:  $n = 21-90$  and expert  $n > 90$ ). Pancreatic surgery novices received consistent supervision by expert surgeons. Additional stratification was based on the recent frequency of training. Using logistic regression models, we examined the relations between postoperative outcomes and the surgeon's level of experience as well as recent frequency of training.

**Results:** The levels of beginner and expert experience were related to a decreased risk of postoperative pancreatic fistulas (OR 0.46, 95% CI 0.26-0.82 and 0.54, 95% CI 0.36-0.82) and in-hospital mortality (OR 0.45, 95% CI 0.17-1.16 and 0.42, 95% CI 0.21-0.83) compared to the results of surgeries performed at the level of intermediate experience. Independent from the level of experience, a frequent work routine was associated with a significantly lower risk of delayed gastric emptying (DGE) (OR 0.56, 95% CI 0.38-0.83), postpancreatectomy hemorrhage (OR 0.64, 95% CI 0.42-0.98) and in-hospital mortality (OR 0.45, 95% CI 0.24-0.87).

**Conclusions:** Our results emphasise the importance of prolonged supervision of surgeons with intermediate experience in pancreatic surgery.

**Additional Documents:** <https://www.jotform.com/uploads/acsglobal/81782668577375/4155150287386024150/Table 2.docx> <https://www.jotform.com/uploads/acsglobal/81782668577375/4155150287386024150/Table 3.docx> <https://www.jotform.com/uploads/acsglobal/81782668577375/41551502873860>

## AB09

### Predicting the risk of not receiving adjuvant chemotherapy after pancreatic cancer surgery: a nationwide analysis

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#### Abstract

**Background:** Although factors for not receiving adjuvant chemotherapy after pancreatic ductal adenocarcinoma (PDAC) resection have been reported in smaller and older retrospective studies, conclusive evidence is lacking, especially for postoperative complications.

**Methods:** All patients who underwent a pancreatic resection for PDAC between 2014-2017 were registered in the Dutch Pancreatic Cancer Audit and included in this analysis. The association between patient, tumour and centre characteristics, postoperative complications, and omission of and time to adjuvant chemotherapy were analysed with multivariable logistic regression models.

**Results:** Overall, 1306 patients were included, of whom 312 patients (23.9%) experienced major postoperative complications (Clavien Dindo  $\geq 3$ ) and 46 (3.5%) died during hospital admission. Of 1260 patients without in-hospital mortality, 387 patients (30.7%) did not receive adjuvant chemotherapy. Major postoperative complications (OR 0.439), especially grade B/C pancreatic fistula (OR 0.516) and post-pancreatectomy hemorrhage (OR 0.541), were independent predictors for not receiving adjuvant chemotherapy. Other predictors were older age at resection (OR 0.957), ECOG performance status grade 2 (OR 0.598), annual volume  $<40$  (OR 0.507) and poor tumour differentiation grade (OR 0.623), see Table.

**Conclusions:** Almost a third of patients will not receive adjuvant chemotherapy after pancreatic cancer surgery. Postoperative complications are the strongest predictor for not receiving adjuvant chemotherapy, followed by elderly age, and lower annual volume of the surgical centre. Given the nature of most predictors, with the known difficulty to prevent surgical complications, neoadjuvant treatment may be the best strategy to increase the use of chemotherapy in pancreatic cancer surgery and, thereby, improve treatment outcome.

**Additional Documents:** [https://www.jotform.com/uploads/acsglobal/81782668577375/4156148491019465087/Mackay-complications and adjuvant chemotherapy PDAC - Table ALPS 2019.pdf](https://www.jotform.com/uploads/acsglobal/81782668577375/4156148491019465087/Mackay-complications%20and%20adjuvant%20chemotherapy%20PDAC-Table%20ALPS%202019.pdf)

## AB10

### **Pancreatoduodenectomy in the German DGAV StuDoQ|Pancreas and Dutch Pancreatic Cancer Audit: differences in patients, indications, surgery, centralisation and outcome**

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#### **Abstract**

*Background:* Nationwide audits facilitate quality and outcome assessment of pancreatic surgery. Differences may exist between countries but studies comparing nationwide outcomes of pancreatic surgery based on audits are lacking. This study aimed to compare the German and Dutch audits for external data validation.

*Methods:* Anonymised data from patients undergoing pancreatoduodenectomy (2014-2016) were extracted from the German DGAV StuDoQ|Pancreas and Dutch Pancreatic Cancer Audit.

*Results:* Overall, 4495 patients (2489 German, 2006 Dutch) were included, see Table. In the Netherlands, adenocarcinoma was more often the indication for pancreatic resection. German patients had higher ASA class but Dutch patients had more pulmonary comorbidity. Dutch patients underwent more minimally invasive surgery and venous resection, but less multivisceral resection. No difference was found in rates of postoperative pancreatic fistula grade B/C, post-pancreatectomy haemorrhage grade C and in-hospital mortality. There was more centralisation in the Netherlands (1% versus 13% PD in very low volume centres,  $P = 0.001$ ). After multivariable analysis, both hospital stay (2.5 days difference, 95% CI 1.17-3.80) and the odds of reoperation (OR 1.54, 95% CI 1.21-1.95) were higher in the German audit, whereas the odds of postoperative pneumonia (OR 0.56, 95% CI 0.37-0.86) and readmission (OR 0.39, 95% CI 0.31-0.49) were lower. Several baseline and surgical characteristics, including hospital volume, but not country, predicted mortality.

*Conclusion:* Although in-hospital mortality, rates of pancreatic fistula and haemorrhage are similar, noteworthy differences exist between patients, indications, surgical technique and centralisation for pancreatoduodenectomy between Germany and the Netherlands.

*Additional Documents:* <https://www.jotform.com/uploads/acsglobal/81782668577375/4156152311015942018/Mackay-DPCA-StuDoQ-Table-ALPS-2019.pdf>

## AB11

### "Radiomics" features in body composition imaging associated with muscle wasting and poor survival after pancreatic cancer resection

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#### Abstract

*Introduction:* Skeletal Muscle radiation attenuation (SM-RA) is associated with myosteatosis and mortality following pancreatic cancer surgery. Computerised radiological image analysis enables investigation of image-derived phenotypes by extracting large numbers of quantitative features (radiomics). We identified radiomics features that correlated strongly with SM-RA and evaluated their association with mortality after surgery for head of pancreas cancer.

*Methods:* This was a retrospective multicentre study of 330 patients who underwent elective oncological pancreatic head resection. Computed tomography images were manually segmented into muscle, visceral-, and subcutaneous adipose tissue compartments. In total, 339 radiomics features were extracted from all three compartments. Radiomics features associated with SM-RA were identified using Pearson correlation coefficients and tested for mortality association. Multivariate logistic regression with LASSO penalty was used to investigate predictive value of SM-RA-correlated radiomics features for 90-days and 2-year mortality. Three models were created containing, 1) clinical variables, 2) clinical variables and SM-RA, 3) clinical variables, SM-RA and radiomics features. ROC and AUC analysis was used to evaluate the model performances.

*Results:* Eighteen radiomics features were strongly correlated to SM-RA ( $r > 0.8$ ,  $p < 0.001$ ). Radiomics features slightly improved the Area-Under-receiver-operator Curve (AUC) metric relative to SM-RA alone, both for 90-day mortality (0.71 vs. 0.77, respectively) and 2-year mortality (0.55 vs. 0.64, respectively) prediction.

*Conclusion:* Eighteen radiomics features were found to be strongly correlated to SM-RA. Radiomics features were associated with a slight improvement in 90-day and 2-year mortality prediction. We propose that radiomics features contain more information than SM-RA alone, leading to slightly improved discrimination.

## AB12

### **POstopeRative Standardisation of Care, tHe implementation of best practice after pancreatic resection (PORSCH): design and rationale of a nationwide stepped-wedge cluster randomised trial**

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#### **Abstract**

**BACKGROUND:** Pancreatic fistula can, if not recognised and treated early, turn into a life-threatening complication after pancreatic resection. The aim of the randomised PORSCH trial is to evaluate if implementation of a best-practice algorithm for postoperative care focusing on early detection and standardised step-up minimally invasive management of postoperative pancreatic fistula results in a lower rate of major complications and death after pancreatic resection.

**DESIGN:** This is a nationwide stepped-wedge cluster randomised trial. All 17 participating centres cross over from current practice to the best-practice algorithm in a randomised order in a predefined time period of 22 months (start January 2018). Outcomes of all patients undergoing pancreatic resection will be evaluated, for statistical analysis outcomes before and after implementation of the best-practice algorithm will be compared (i.e. current practice vs. best-practice).

**ALGORITHM:** The best-practice algorithm was based on systematic literature analyses, data from Dutch cohort studies and an inventory of current guidelines on care following pancreatic surgery. The algorithm was validated in a multicentre cohort and further revised at consensus meetings with pancreatic surgeons and interventional radiologists from all centres of the Dutch Pancreatic Cancer Group. The algorithm was finalised after reviewing by an advisory committee of pancreatic surgeons from international expert centres.

**ENDPOINTS:** The primary endpoint of the PORSCH trial is a composite of the most severe complications associated to pancreatic fistula (i.e. late postpancreatectomy bleeding, organ failure and death) as evaluated by a blinded adjudication committee. Secondary endpoints include clinical outcomes and number of patients receiving adjuvant chemotherapy.

**Additional Documents:** <https://www.jotform.com/uploads/acsglobal/81782668577375/4160311553312180299/SWdesign.jpg>

**Novel models of human pancreatic cancer cachexia heterogeneity by tumour organoids transplantation into mice**

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**Abstract**

*Introduction:* The poor survival of pancreatic cancer patients is largely attributable to cachexia, a syndrome of severe weight loss and muscle wasting. To investigate the systemic effects of tumour-derived factors on host metabolism, we developed new pancreatic tumour organoid-based mouse models. *Methods:* Organoids were established from pancreatic ductal adenocarcinomas from two patients of whom cachexia severity was assessed pre-operatively [body weight loss, body composition (skeletal muscle/adipose tissue mass using L3 level CT-scans) and inflammation (CRP)]. Organoids were dissociated into single cells; 20,000 cells or PBS were injected subcutaneously into the flanks of 9-weeks old NMRI-nude mice (n=8/group). Body weight was monitored until sacrifice at 14 weeks. *Results:* Patients CL09 vs. CL12 showed 13.4% vs. 1.2% weight loss and a CRP of 20 vs. 1 mg/L respectively. Transplantation of tumour organoids into mice resulted in tumour takes of 88% vs. 50% respectively, and similar average tumour weight (34 vs. 33 mg resp.). Alpha-smooth muscle actin staining of tumour tissue revealed extensive stromal reaction in both groups. Surprisingly, body weight gain of CL09-transplanted mice did not differ from controls, whereas CL12-transplanted mice displayed a significantly lower weight gain (0.7 gr. vs. 2.9 gram). However, wet weight of various muscles and liver weight did not differ between groups. *Conclusion:* Cachexia parameters in mice transplanted with human tumour organoids are distinct from the clinical phenotype of the organoid donor. Nevertheless, ongoing analyses of the inflammatory response and adipose tissue characteristics will shed light on additional relevant cachexia-related parameters in these novel avatar models.

## AB14

### An ex vivo spleen perfusion as a model of bacterial sepsis

**Presenting Author:** Dr. Wen Chung

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#### Abstract

*Background:* Bacterial septicaemia is major causes of serious disease and death. Our aim is to establish an ex vivo porcine spleen perfusion model to study the early events occurring in the spleen prior to the onset of bacterial sepsis. In this study we assess splenic macrophages in the early event of bacteria invasion. *Methods:* Seven porcine spleens were harvested and perfused for 6 hours. *Streptococcus pneumoniae* was inoculated into the circulation of four spleens with three control spleens. The serial samples of both blood and spleen biopsies were collected and analysed. The arterial blood-gases were collected to analyse glucose, acid-base, pH and electrolyte levels. *Results:* We observed full clearance of bacteria from the blood and an increase in bacterial counts in the spleen. Classical histology and immunohistochemistry on biopsies also confirmed no major damages in the organ architecture and changes in the immune cell distribution, other than the presence of clusters of pneumococci. The lactate increased in the infected group. TNF-alpha levels were also significant increase in the infected group. *Conclusion:* The model proposed - in line with the 3Rs (replacement, reduction, refinement) principles - has utility in the replacement of experimental animals in infection research. A clinical trial has commenced studying human spleens.

**Aetiology of acute pancreatitis in a multi-ethnic population: a retrospective cohort study****Presenting Author:** Trisha Kanani

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## AB16

### Effects of hospital volume on in-hospital mortality and failure to rescue following hepatobiliary surgery in Germany

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#### Abstract

*Objective:* We aimed to determine the unbiased mortality rates for hepatobiliary resections at the national level using hospital discharge data of every inpatient case in Germany. In addition, we intended to examine the effect of hospital volume on in-hospital mortality, and failure to rescue.

*Methods:* We studied all inpatient cases of hepatobiliary surgery (n = 31,114) in Germany from 2009 to 2015, using national hospital discharge data. Minor resections and major resections were examined separately. We evaluated the association between hospital volume and in-hospital mortality following major hepatobiliary resections by using multivariate regression methods. In addition, we analysed rates the failure to rescue across hospital volume categories.

*Results:* Minor hepatobiliary resections were associated with an overall mortality rate of 3.9% and no significant volume-outcome effects. In contrast, overall mortality rate of major hepatobiliary resections was 10.3%. In this cohort, risk-adjusted in-hospital mortality following major resections varied widely across hospital volume categories, from 7.4% (95% CI 6.6–8.2) in very high volume hospitals to 11.4% (95% CI 10.4–12.5) in very low volume hospitals (OR 0.59, 95% CI 0.41–0.54). Moreover, rates of failure to rescue were lower in higher volume hospitals (eg, mortality in patients with at least one complication in very high volume hospitals: 36.2% vs. very low volume hospitals: 40.6%).

*Conclusions:* In Germany, patients who undergo major hepatobiliary resections have improved outcomes if they are admitted to higher volume hospitals. Volume-outcome associations are not present in minor hepatobiliary surgery.

*Additional Documents:* <https://www.jotform.com/uploads/acsglobal/81782668577375/4143021777385435519/Table1-3.pdf>

## AB17

### **R0-resection following chemotherapy or chemoradiation improves survival of primary inoperable pancreatic cancer patients. Interim results of the CONKO-007 prospective randomized multicenter trial.**

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#### **Abstract**

*Introduction:* It remains unclear whether patients with initially unresectable pancreatic cancer can achieve resectable status and, if so, whether surgery provides them any additional benefit.

*Methods:* CONKO-007 is a multicenter, phase III randomized clinical trial which examines the effectiveness of chemoradiotherapy compared to chemotherapy alone after induction chemotherapy in patients with non-metastatic, initially locally advanced unresectable pancreatic cancer. The present analysis was based on data from the first 180 patients recruited from 2013 to 2015.

*Results:* Induction chemotherapy consisted of gemcitabine in 43 cases and of FOLFIRINOX in 137 cases. After induction chemotherapy, 126/180 patients (70.0%) were randomized to further treatment. The main reasons for non-randomization were distant metastasis (29.6%), patient request (24.1%), local progression (13.0%) and side effects (13.0%). After completion of study treatment 36 patients (20.0%) underwent surgery and 87 (48.3%) received no surgical treatment. R0 resection was achieved in 25 cases (13.9%) versus exploration or R1/R2/Rx resection in 11 cases (6.1%). Five patients (13.9%) developed postoperative major complications: bleeding (n=1), pancreatic fistula (n=1), wound healing disturbance (n=1), ileus (n=1), and insufficiency of gastric anastomosis (n=1). Mortality was 5.5%. Overall survival was significantly better in the R0 resection group (26.5 months) than in the non-operated patients (16.5 months) or patients in the exploration or R1/R2/Rx resection group (16.9 months) (p=0.003).

*Conclusion:* Even if pancreatic cancer is staged as locally advanced unresectable at primary diagnosis, resectability should be reassessed after neoadjuvant treatment. Patients with a good probability of R0 resection should undergo surgery as this significantly improves their prognosis.

**Histopathologic predictors of survival and recurrence in resected ampullary adenocarcinoma: international multicentre cohort study****Presenting Author:** MD Alma Moekotte

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**Abstract**

**Objective:** The aim of the study was to define histopathologic characteristics that independently predict overall survival (OS) and disease-free survival (DFS), in patients who underwent resection of ampullary adenocarcinoma (AAC) with curative intent.

**Background:** A broad range of survival rates have been described for AAC, presumably due to morphological heterogeneity which is a result of the different epitheliums AAC can arise from (intestinal or pancreaticobiliary). Large series with homogenous patient selection are scarce.

**Methods:** A retrospective multicentre cohort analysis of patients who underwent pancreatoduodenectomy for AAC in nine European tertiary referral centres between February 2006 and December 2017, was performed. Collected data included demographics, histopathologic details, survival and recurrence. OS and DFS analyses were performed using Kaplan-Meier curves and Cox proportional hazard models.

**Results:** 887 patients were included, with a mean age of 66±10 years. The median OS was 64 months with 1-, 3-, and 5-year OS rates of 89%, 63% and 52%, respectively. N-stage (HR=3.30 [2.09 – 5.21]), perineural invasion (HR=1.50 [1.01 – 2.23]) and adjuvant chemotherapy (HR=0.69 [0.48 – 0.97]) were independent predictors of OS in multivariable analysis, DFS was only adversely predicted by N-stage (HR=2.65 [1.65 – 4.27]). Sensitivity analysis revealed adjuvant chemotherapy was only an independent predictor of OS in patients with pancreaticobiliary subtype (HR=0.61 [0.40 – 0.93, p=0.023]) but not in patients with intestinal subtype.

**Conclusions:** Adjuvant chemotherapy independently predicted improved OS. Sub-analysis of the histopathologic subtypes revealed that only patients with the pancreaticobiliary subtype benefit from adjuvant chemotherapy in terms of survival.

**Additional Information:** <http://www.alpshpbmeeting.org/wp-content/uploads/2019/01/Moekotte-Tables-ALPS-2019-abstract.docx>

**The value of diffusion-weighted MRI in discriminating malignant from benign gallbladder disorders: a systematic review and meta-analysis**

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**Abstract**

*Background:* Gallbladder malignancies have an aggressive tumour biology and survival rates are low. There is a need for a diagnostic modality that improves the differentiation between benign and malignant gallbladder lesions. Diffusion-weighted imaging (DWI) has been increasingly used for the detection of abdominal malignancies. However, its value for the differentiation between benign and malignant gallbladder lesions remains to be elucidated.

*Objective:* We conducted a systematic review and meta-analysis to evaluate the value of DWI in discriminating benign from malignant gallbladder disorders in patients with gallbladder wall-thickening or gallbladder lesions.

*Methods:* The literature (MEDLINE, EMBASE, the Cochrane Library and Web of Science databases) was systematically reviewed for publications related to the diagnostic value of DWI in patients with gallbladder lesions. Methodological quality was assessed using the quality assessment of diagnostic accuracy studies (QUADAS)-2 tool.

*Data analysis:* Pooled sensitivity and specificity rates were determined and a hierarchical summary receiver-operating characteristic (HSROC) curve was constructed to determine the area under the curve (AUC).

*Results:* In total, 3600 articles were retrieved, and the selection and screening process led to 8 eligible studies. Five hundred ninety-two patients with 221 malignant and 371 benign lesions were included. Pooled sensitivity and specificity rates were 0.87 (95% CI, 0.77-0.93) and 0.84 (95% CI, 0.78-0.89), respectively. The AUC of the HSROC curve was 0.91 (95% CI, 0.88-0.93).

*Conclusion:* DWI appears to be an accurate imaging technique in discriminating benign and malignant gallbladder lesions, and should therefore be considered as part of the diagnostic workup for gallbladder lesions.

## Outcome including long-term quality of life after total pancreatectomy (PANORAMA): a nationwide cohort study

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### Abstract

**Objective:** Total pancreatectomy (TP) is increasingly advised for main-duct IPMN and other conditions. This advice is, however, debated since data on postoperative outcome and long-term quality of life (QoL) after TP from large nationwide series are lacking.

**Design:** We performed a nationwide cohort study among adults who underwent TP between 2006 and 2016 in 17 Dutch centres. Postoperative outcomes were retrospectively analysed. QoL was assessed cross-sectionally using generic and disease-specific questionnaires and compared with reference data from the Dutch general population and patients with type-1 diabetes.

**Results:** Overall, 148 patients after TP were included. The annual number of TP increased from 5 in 2006 to 32 in 2015 ( $P < 0.05$ ). The 30-day mortality rate was 5% and the major complication rate 32%. QoL questionnaires were completed by 60 of 71 (85%) patients, with a median follow-up of 36 months. Patients after TP reported a slightly lower global (QLQ-C30; 73 vs 78,  $P = 0.03$ ) and daily health status (EQ-5D-5L; 0.83 vs 0.87,  $P < 0.01$ , table 1) compared to the general population, the clinical relevance of these differences is unclear. QoL did not worsen during follow-up (5 years, table 2). Patients after TP were satisfied with their diabetes therapy and experienced similar diabetes-related distress as patients with type-1 diabetes.

**Conclusion:** In this nationwide study, TP was associated with acceptable mortality and morbidity rates and a lower QoL compared to the general population, although differences were small. These outcome remain stable for more than 5 years after surgery.

**Additional Documents:** [https://www.jotform.com/uploads/acsglobal/81782668577375/4156699708795940321/TABLE 1 EuroQoL EQ-5D-5L index scores in 60 patients after total pancreatectomy.pdf](https://www.jotform.com/uploads/acsglobal/81782668577375/4156699708795940321/TABLE%20EuroQoL%20EQ-5D-5L%20index%20scores%20in%2060%20patients%20after%20total%20pancreatectomy.pdf)  
<https://www.jotform.com/uploads/acsglobal/81782668577375/4156699708795940321/TABLE%20Quality%20of%20life%20after%20TP%20stratified%20for%20duration%20of%20follow-up.pdf>

**Nationwide implementation and outcome of minor and major minimally invasive liver surgery (LAELIVE)**

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**Abstract**

*Background:* Although expert centres have reported favorable results for minor and major minimally invasive liver surgery (MILS), nationwide reproducibility of these results remains questionable and centralisation of MILS is a much-debated topic. This study aimed to evaluate the implementation and outcome of MILS on a nationwide scale.

*Methods:* A multicentre retrospective cohort study assessing short-term outcomes of all patients undergoing MILS in 27 centres between January 2011 and December 2016. Electronic patient files of individual patients were reviewed in all centres. The total annual volume of liver resections was collected and operative outcomes were stratified for minor and major MILS.

*Results:* Overall, 6951 liver resections were included, with a median annual volume of 50 liver resections per centre. Overall use of MILS was 13% (n=916), varying from 3% to 36% between centres ( $P < 0.001$ ). The nationwide use of MILS increased from 6% in 2011 to 23% in 2016 ( $P < 0.001$ ). Outcomes of minor MILS were comparable with international studies. The median annual volume of major MILS per centre was 2 (1-3). In centres which performed  $\geq 20$  MILS annually, major MILS was associated with less conversions (14 (11%) vs 41 (30%),  $P < 0.001$ ), shorter operating time (184 (117-239) vs 200 (139-308) minutes,  $P = 0.01$ ), and less overall complications (37 (30%) vs 58 (42%),  $P = 0.04$ ) compared to lower volume centres.

*Conclusion:* Large variations in implementation rates exist between centres. Outcome of minor MILS is acceptable. The volume-outcome relationship suggests a benefit of centralisation of major MILS.

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### Abstract

**BACKGROUND:** Laparoscopic pancreatoduodenectomy is technically challenging with concerns about higher rates of postoperative pancreatic fistula. The use of three-dimensional (3D) laparoscopy may improve surgical performance but data on the added value, both for experienced and less experienced laparoscopic surgeons, are lacking.

**METHODS:** We conducted an experimental randomised controlled cross-over trial including 20 expert laparoscopic surgeons and 20 surgical residents from 9 countries (Argentina, Estonia, Israel, Italy, the Netherlands, South Africa, Spain, UK, USA). Participants performed a pancreaticojejunostomy (PJ) and a hepaticojejunostomy (HJ) using 3D- and 2D-laparoscopy on artificial organ models according to the Pittsburgh method. We randomised for 3D or 2D first. Primary endpoint was the duration of completing of anastomoses. Performance was rated using objective structured assessment of technical skill (OSATS; range 10-50) by raters, blinded for 3D/2D.

**RESULTS:** A total of 40 participants completed 144 PJs and HJs. 3D laparoscopy reduced the operative time with 15.5 minutes (95% Confidence interval 10.2 - 24.5 min), from 81.0 to 64.4 minutes, or 23.1%, (CI 12.5 – 26.2%),  $P = 0.001$ . This reduction was observed for both experts and residents (13.0 vs 22.2 min,  $P = 0.354$ ). The OSATS score was 5.1 points (13.2%),  $SD \pm 6.3$ , higher with 3D-laparoscopy,  $P = 0.001$ . Of all participants, 94.9% stated to prefer 3D- over 2D-laparoscopy, whereas 25.6% reported minor side effects, and 5.1% severe side effects (eye strain).

**CONCLUSION:** 3D-laparoscopy, as compared to 2D, reduced the operative time and improved the OSATS score. These benefits were observed for both experts and residents.

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## **Abstract**

*Background:* Biliary tract carcinoma (BTC) is a heterogeneous group comprising aggressive gallbladder- and intra- and extrahepatic cholangiocarcinomas (GBC, ICC, EHC). They are currently classified by anatomical origin and histology. An increased understanding of the mutational profile of BTCs might result in a more refined classification that could improve new clinical applications such as molecular diagnostics and targeted therapy.

*Methods:* We performed a systematic review of studies reporting on NGS mutation profiles for BTC. We included articles reporting on NGS whole-exome/whole-genome-sequencing (WES/WGS) and targeted sequencing (TS) of BTC, published between 2000 and 2017. Pooled mutation proportions were calculated by dividing the total number of patients with a genetic mutation by the total number of sequenced patients. Proportions were initially stratified by anatomical region and NGS technique.

*Findings:* A total of 25 studies with 1806 patients was included in the meta-analysis. TP53 is the most common mutation, that affects up to 30% of all BTC. ICC and EHC show most overlap between their mutational patterns. Mutations in IDH1, IDH2 and FGFR fusion events were nearly exclusive to ICC patients. Mutations in a.o. APC, GNAS and TGFBR2 occurred only in EHC. GBC was associated with mutations in PFKFB3, PLXN2 and PGAP1.

*Interpretation:* BTC share a common mutation blueprint but also exhibit some subtype specific genetic alterations. The mutation patterns of BTC are probably influenced by the different cells of origin: dedifferentiated mature cells from the large or small bile ducts and progenitor cells from either the peribiliary glands or the canals of Hering.

**Analysis of an institutional, multimodal, algorithmic approach for the treatment of pyogenic liver abscesses**

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**Abstract**

*Introduction:* Wide variation exists in treatment pathways for pyogenic liver abscesses (PLA). Literature is limited by low patient volume and remains inconclusive between percutaneous drainage with antibiotics (PDA) versus surgery as first-line treatment of large PLA. This study aims to review and internally validate the treatment algorithm for PLA at a high-volume hepatopancreatobiliary centre of excellence.

*Methods:* Patients with PLA between 2008-2018 were retrospectively reviewed and cases following hepatic trauma/surgery or cholecystectomy with adjacent abscess unroofing were excluded. Outcomes were analysed following actual first-line treatment as well as intended first-line treatment according to the institutional algorithm: antibiotics alone for Type I abscesses (small <3 cm), PDA for Type II abscesses (large  $\geq 3$ , unilocular), or surgery for Type III abscesses (large  $\geq 3$  cm, multilocular). Treatment failure represented persistent PLA requiring re-intervention.

*Results:* Treatment occurred for 300 patients, with 219 eligible for analysis. First-line treatment was antibiotics alone in 47 patients (21.5%), PDA for 120 patients (54.8%), and surgery for 52 patients (23.7%). Type III abscesses failed significantly less following algorithmic first-line surgery (3/32) compared to antibiotics or PDA (24/80) (9.3% versus 30.0%,  $p=0.021$ ). Type II abscesses failed PDA in 25.5% (13/51), with 10 progressing to surgery. Primary surgery for Type II abscesses succeeded in 88.2% (15/17) with no 30-day mortalities.

*Conclusion:* First-line surgery is highly successful for large PLA. Considering higher failure rates for PDA we propose that the role of surgical intervention should be considered as up-front definitive treatment for select patients with either simple or complex large PLA.

**Utilisation of microwave ablation for haemorrhage control of bleeding hepatic tumours**

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**Abstract**

*Introduction:* Ruptured hepatic tumours can result in life-threatening bleeding, however urgent resection is often complicated by underlying liver dysfunction and oncologic considerations, and hepatic artery embolization (HAE) is frequently fails at hemostasis. Microwave ablation (MWA) can both treat malignancy and control hemorrhage through coagulative necrosis and vascular occlusion. We present the largest series of MWA for bleeding hepatic tumours and propose a hemodynamically-centred, oncologically-based approach.

*Methods:* Patients treated for bleeding hepatic tumours at a single institution from 2008-2018 were retrospectively analysed. Unstable patients proceeded directly to laparotomy, however stable patients were treated with a combination of observation, HAE, and minimally-invasive MWA or resection. Tumour characteristics, interventions, operative details, and clinical outcomes are reported. A proposed step-wise treatment algorithm was also retrospectively evaluated for validation.

*Results:* Twenty-eight patients were treated for ruptured hepatomas (20 hepatocellular carcinomas, 7 adenomas, 1 melanoma liver metastasis). Six patients presented unstable requiring emergent laparotomy. Of the twenty-two stable patients, 59.1% (13/22) had active extravasation on imaging and underwent HAE as first-line therapy. HAE failed to stop bleeding or had recurrent hemorrhage in 69.2% (9/13), yet all nine achieved hemostasis after proceeding urgently to laparoscopic MWA (8/9) or resection (1/9).

*Conclusions:* Microwave ablation is an effective modality for controlling bleeding hepatic tumours in stable patients. This series reveals a high rate of HAE failure but excellent success in avoiding unplanned hepatectomy when followed by minimally-invasive MWA. A step-wise approach to bleeding hepatic tumours is proposed (Figure 1) and MWA should be considered following HAE to ensure hemostasis.

*Additional Documents:* [https://www.jotform.com/uploads/acsglobal/81782668577375/4160495537733775840/Figure\\_1\\_for\\_Abstract.docx](https://www.jotform.com/uploads/acsglobal/81782668577375/4160495537733775840/Figure_1_for_Abstract.docx)

**R1 resection of colorectal liver metastasis – what is the cost of marginal resection?**

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**Abstract**

*Background and objectives:* The impact of resection margins on the outcome of patients with colorectal liver metastasis (CRLM) remains controversial. We evaluated the short and long-term results of R1 resection.

*Methods:* Between 2006 and 2016, 202 patients underwent liver resection for CRLM. R1 resection was defined as a distance of less than 1mm between tumour cells and the transection plain. Patient and tumour characteristics, perioperative, and long-term outcomes were assessed.

*Results:* In 161 (79.7%) and 41 (20.3%) patients, an R0 and R1 resections were performed, respectively. Patients that underwent an R1 resection had higher rates of disease progression while on chemotherapy (12.1% versus 5.5%,  $P=0.001$ ), need for second line chemotherapy (17% versus 6.2%,  $P<0.001$ ), increased use of preoperative volume manipulation (14.6% versus 5.5%,  $P=0.001$ ), and inferior vena-cava involvement (21.9% versus 8.7%,  $P<0.001$ ). These patients had higher rates of major postoperative complications (19.5% versus 6.8%,  $P<0.001$ ) and reoperations (7.3% versus 2.4%,  $P<0.001$ ). No significant differences in recurrence free survival, local recurrence, or overall survival were demonstrated between the groups.

*Conclusions:* Although R1 resection is associated with worse disease behavior and postoperative complications, the long-term outcome of patients following an R1 resection is non-inferior to those who underwent an R0 resection.

**Continuous or interrupted suture technique for hepaticojejunostomy? A national survey**

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**Abstract**

*Background:* Hepaticojejunostomy is commonly used in hepato-bilio-pancreatic surgery and a crucial step in many surgical procedures, including pancreaticoduodenectomy. The most frequently used techniques are the interrupted suture and the continuous suture technique. Currently, there is no data available in regard to the utilisation of these techniques.

*Methods:* In total, 102 hospitals in Germany were invited between September and November 2017 to participate in this survey. Using a paper-based questionnaire, data were collected on surgical technique and complication rates of hepaticojejunostomies.

*Results:* A total of 77 of the 102 addressed hospitals (76%) participated in the survey. On average, each hospital performed 71 hepaticojejunostomies per year - most often in the context of pancreaticoduodenectomy (71%). 24 (31%) hospitals exclusively use an interrupted suture technique, 7 (9%) hospitals solely a continuous suture technique, 3 (4%) hospitals perform a combination of continuous and interrupted suture technique and 43 (56%) hospitals decide on one of both techniques depending on intraoperative findings. According to the participants in this survey, the continuous suture technique is significantly faster than the interrupted suture technique in hepaticojejunostomy ( $p=0,015$ ). There were no significant differences in the overall complication rate ( $p=0,902$ ) and insufficiency rate ( $p=1,000$ ).

*Conclusions:* In Germany, there is a heterogeneity in the technique used to create a hepaticojejunostomy. As our survey suggests that the use of continuous suture technique may offer an advantage in time without jeopardising patient outcomes, the different techniques should be compared in a randomised controlled study.

**Hydatid cyst : pitfalls of surgical approach from open to minimally invasive**

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**Abstract**

Hydatid cyst from echinococcus granulosus is not a common disease in north-western countries and surgical approach can still be tricky. Since 2016, five cases were treated in our institution with 3 laparotomies and 2 laparoscopies. Technical aspects and pitfalls are discussed with 2 intra-operative videos. A 31 years old patient who was accidentally diagnosed with a 25 cm active (Gharbi III) hydatid cyst in the right liver. After radiological staging by thorax CT and brain MRI without evidence of extra-hepatic disease, he underwent a laparotomic pericystectomy. Evacuation of daughter cysts and germinal layer with intra-operative PAIR, using Cetyltrimethyl-ammonium-bromide 0.1% as protoscolicidal agent, were performed. Direct communication with sectorial biliary tree was found and sutured with control cholangiography. Post-operative course was characterized by persistent biliary leak treated endoscopically and radiologically. A 65 years old woman under chemotherapy for uterine leiomyosarcoma, had a 5 cm partially calcified active (Gharbi V) cyst in segment V which recently got infected developing an hepatic abscess. After infection resolution, we performed a laparoscopic pericystectomy. Biliary communication was ruled out with Methylene blue test. Post-operative course was uneventful.

With the exception of large complex lesions, for whose laparotomy is still recommended, the laparoscopic approach showed its feasibility and safety in surgical management of hydatid cysts.

**Y90 Radioembolization and surgery : treated parenchyma sparing liver resection****Presenting Author:** Dr Alessandra Cristaudi

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Intra-hepatic Y 90 radioembolization (RE) is becoming more frequent in primary and metastatic hepatic disease. Studies concerning post-operative safety after partial or complete exposure of future liver remnant to RE haven't proven direct morbidity due to the radiological procedure.

We present the case of a 56 years old woman with a pT3, pN0, M1, G3, R0 pancreatic neuroendocrine tumour, who already undertook primary surgical resection three years earlier with left pancreatectomy, splenectomy, left colectomy and 3 hepatic wedge resections in segment III, IV and VIII. After adjuvant, chemotherapy with Capecitabine liver progression was seen on follow up. RE of whole right liver and two chemoembolizations (CE) on left liver were then performed over 3 years with complete response. At one year interval, left hepatic metastatic further progression occurred with impossibility of new CE due to left arterial thrombosis, a surgical approach was then considered. Pre-operative hepatic biological function was normal. Due to previous right liver RE, a <sup>99m</sup>Tc-GSA SPECT/CT fusion imaging was performed, which surprisingly showed 75% and 84% of volume and function respectively in right liver. A left hepatectomy was then performed with R0 resection. Post-operative course was uneventful. Radiological one-year follow up was negative for recurrence.

To the best of our knowledge, this is the first case of intentional sparing surgery of previously radioembolized liver.