ALPS 2025

Abstracts

FREE PAPERS

FP01

Prognostic Value of Circulating Tumor DNA and Radiological Total Tumor Volume in Patients with Initially Unresectable Colorectal Liver Metastases

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Background

Current decisions for managing unresectable colorectal liver metastases (CRLM) are primarily based on technical resectability and radiological treatment response assessments. However, CRLM is a complex disease characterized by significant molecular heterogeneity, which is not integrated into standard treatment algorithms. Incorporating a multimodal approach that combines radiological evaluation with blood-based biomarkers could improve risk stratification and lead to more personalized treatment strategies.This study aimed to evaluate the (combined) prognostic value of Total Tumor Volume (TTV) and ctDNA in patients with initially unresectable CRLM.

Design

This translational study was performed on 101 patients who received FOLFOX/FOLFIRI and bevacizumab for unresectable liver-only CRLM during the phase 3 CAIRO5-trial (NCT02162563). TTV was measured using semi-automatic segmentation of CT scans. ctDNA was assessed using a mutation-independent, fragmentomics-based method, the DELFI-Tumor-Fraction (DELFI-TF). The primary outcome was the prognostic value for overall survival (OS).

Results

At baseline, TTV (median 139mL, IQR 23-497mL) and DELFI-TF (median 0.29, IQR 0.13-0.41) exhibited a moderate correlation (Spearman's $\rho=0.70$, 95%CI:0.57- 0.79), which decreased after the initiation of systemic treatment (Spearman's $\rho=0.09$, 95% CI:-0.01-0.42). In

multivariable analysis, baseline DELFI-TF (P=0.001) and TTV (P=0.002) as well as their change after systemic treatment were the strongest independent predictors of OS, outperforming current clinicopathological factors. The effect of TTV on OS changes depending on the amount of DELFI-TF ($P_{interaction}$=0.002).

Conclusion

Incorporating ctDNA testing alongside radiological volumetric tumor measurements could improve risk stratification and systemic treatment response monitoring in patients with initially unresectable CRLM.

FP02

Intraoperative ablation verification in laparoscopic liver ablation

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Background: Laparoscopic microwave ablation (MWA) is increasingly used for the treatment of liver tumors, but ablation completeness is difficult to verify at laparoscopy. At Oslo University Hospital, a method for ablation verification during laparoscopic MWA has been developed. We here report the first results.

Methods: Ablation was guided by laparoscopic ultrasound (bkActiv, BK Medical ApS, Herlev, Denmark). The ablation zone was verified using intraoperative CT with non-rigid registration of pre and post ablation CT-images (Syngo.via RT Image Suite, Siemens Healthineers, Erlangen, Germany). Additionally, standard of care side-by-side comparison of pre and post ablation CT by a radiologist was performed. If needed, reablation was performed during the same procedure, followed by a second post ablation CT with ablation verification.

Results: Between March 2021 and December 2023, 16 tumors in 14 patients (HCC, n=3; CLM, n=11) were treated. Median tumor size was 15 mm (range 4-30 mm). Insufficient ablation margins were found in eight tumors in six patients. Reablation was then performed, until acceptable margins were achieved. Two patients had simultaneous procedures.

Postoperative complications occurred in three patients; one was admitted to ICU for treatment of infection in the ablation zone but recovered, and two had minor complications.

After a median follow up of 18 (range 6-30) months, one patient had signs of local recurrence. A total of nine patients experienced disease recurrence, of whom seven had hepatic recurrence (median time to recurrence 6 months)

Conclusion: Intraoperative ablation verification is feasible during laparoscopic MWA. Results are promising with regards to local recurrence.

FP03

Prognostic and predictive value of total tumor volume in patients with colorectal cancer liver metastases: a comparison with RECIST1.1

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Background: Total tumor volume (TTV) may better reflect objective tumor burden and treatment response compared to the currently used RECIST1.1 criteria, which are limited by their subjective and one-dimensional nature. This study aimed to compare the prognostic value of TTV versus RECIST1.1 for overall survival (OS) in patients with colorectal cancer liver metastases (CRLM), and to assess whether TTV could guide optimal systemic treatment selection for individual patients.

Methods: Patients with unresectable liver-only CRLM from the CAIRO5 trial (NCT02162563) who received induction systemic treatment were included. Baseline TTV, change in TTV after systemic treatment, and RECIST1.1 were calculated using the CT scans before systemic treatment and at first follow-up, and were assessed for their prognostic and predictive value with multivariable Cox regression models.

Results: In total, 425 patients were included. Baseline TTV (adjusted HR [aHR] for 100 mL *vs* 10 mL, 2.44 [95% CI, 1.25–4.76]; P=0.006) and relative change in TTV were the strongest predictors for OS (aHR for 0% change *vs* 50% decrease, 2.57 [1.83–3.60]; P<0.0001). In contrast, RECIST1.1 was not independently associated with OS (aHR for partial response *vs* progressive disease, 0.63 [95% CI, 0.33–1.20]). Higher baseline TTV was predictive for a stronger treatment benefit of FOLFOX-/FOLFIRI-bevacizumab versus FOLFOX-/FOLFIRI-panitumumab on OS (Pinteraction=0.017).

Conclusion: TTV is strongly prognostic for OS in CRLM patients receiving systemic treatment, while RECIST1.1 was not. Therefore, change in TTV may better assess treatment response compared to RECISTS1.1. Moreover, baseline TTV might guide personalized treatment decision-making between bevacizumab and panitumumab.

FP04

Assessment of circulating tumor cells adds value to CA19-9 for predicting distant recurrence after resection of pancreatic ductal adenocarcinoma: a secondary analysis of the CLUSTER Trial

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Background: The high metastatic potential of pancreatic cancer (PDAC) is implicated to be related to its early disseminative ability via epithelial-to-mesenchymal transition with cancer cells en route to metastatic seeding being detectable as transitional circulating tumor cells (trCTCs). Consequently, rates of systemic recurrence remain high despite per-operative chemotherapy, but reliable preoperative prognostic biomarkers are lacking. In this study, we aim to evaluate the potential role of trCTCs in predicting systemic treatment failure.

Methods: The prospective CLUSTER trial enrolled patients planned for PDAC resection (2016-2018). CTCs were isolated using the Isolation by SizE of Tumor Cells (ISET)-device and characterised by immunofluorescence. Cox-regression models with spline terms were used to estimate non-linear associations between serologic biomarkers and distant recurrence at five years.

Results: Preoperatively, trCTCs were detected in 82 (67%) of 123 patients with a median number of two cells per 10ml (IQR 1-3). During a median follow-up of 73.9 months (IQR 65.0-78.6) for surviving patients, 76 (62%) were diagnosed with distant recurrence, while 26 (21%) and 21 (17%) had local-only or no recurrence, respectively. There was no relevant correlation between CA19-9 and trCTC-levels (Pearson correlation 0.05, 95%CI:-0.13 to 0.23). However, there was a significant association between distant recurrence and preoperative trCTC-levels (χ^2=13.2, p=0.004) as well as preoperative CA19-9-levels (χ^2=15.63, p=0.004).

Conclusions: Preoperative trCTC and CA19-9 are not correlated, but both are independent predictors of distant recurrence. Integrating trCTC assessment to existing biomarkers may help for more accurate prediction of distant treatment failure after resection for PDAC.

FP05

Activity tracking up to 90-days after minimally invasive and open pancreatoduodenectomy in the multicenterinternational randomized DIPLOMA-2 trial

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Background
Minimally invasive pancreatoduodenectomy (MIPD) aims to decrease surgical trauma and improve postoperative recovery compared to open pancreatoduodenectomy (OPD). However, previous research only investigated recovery during hospital stay and not thereafter. The DIPLOMA-2 trial measured recovery up to 90 days using wearable fitness trackers.

Methods
The DIPLOMA-2 international, multicenter, non-inferiority trial randomized patients requiring pancreatoduodenectomy for primary resectable neoplasms to MIPD or OPD (2:1 ratio). Patients were blinded for surgical procedure up to postoperative day 5. Patients wore a wearable fitness tracker (Fitbit Inspire 2™) from 2 weeks before surgery until 90 days after, which monitored postoperative activity through step count, active minutes, and heart rate variability. Endpoints were postoperative activity of MIPD versus OPD in the first 90 days post-surgery, and absolute difference in activity on day 30 post-surgery.

Results
From 236 of 288 patients (82%, 155 MIPD; 81 OPD) sufficient Fitbit activity tracker data were

available. Patients after MIPD had a significantly higher step count between day 16-39, and more active minutes between day 14-37. Heart rate variability was better after MIPD from day 30 onward. On postoperative day 30, patients after MIPD averaged 659 more steps (95% CI, 79-1240; P=0.026), 22 more active minutes (3-40; P=0.028), and 4 milliseconds better heart rate variability, compared to the OPD group (0–9; P=0.046).

Conclusions
In patients undergoing pancreatoduodenectomy for resectable pancreatic and periampullary neoplasm, MIPD resulted in higher short-term postoperative activity levels and less physiological stress, compared to OPD.

FP06

The presence of tertiary lymphoid structures associated with immunoregulatory B cells drives long-term survivorship in pancreatic cancer

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Background: Tumour biology of PDAC contributes to early recurrence and metastasis, and resistance to chemotherapy. We aim to unravel the phenotypic landscape of B cells and functional gene expression in the TME of treatment naïve long and short-term survivors of PDAC.

Methods: We enrolled 25 short-term survivors; STS (median DFS <10.5 months and OS< 21 months) and 25 long-term survivors; LTS (median DFS of 48 months and OS of 68 months). Fluorescent mIHC panels were applied to the FFPE tissues to simultaneously analyse the immune TME and structural characteristics of TLSs. We assessed tumours by NanoString PanCancer IO 360™ gene expression profiling.

Results: We found that the LTS group had a higher number of total TLSs (P=0.0082), TLS cell density (P=0.0071) and larger TLS surface area (P=0.0164) compared to STS. The number of CD38+ CD138+, CD20+ and CD27+ cell densities in the tumour area was higher in LTS than in STS. Additionally, there was an increase in CD20+ and CD27+ immune markers, at the invasive margin of LTS compared to STS. Classical GATA-6 transcription factor (P<0.0001) was highly expressed in LTS. Clustered gene pathway analyses, differential gene expression and Immune cell deconvolution transcriptome data has shown that LTS are associated with an altered tumour microenvironment compared to the STS group.

Conclusion: We show that LTS in PDAC are associated with increased frequencies of TILs, higher levels of B cells (P=0.0281), maturity of TLS and are composed of an immune-enriched B cell phenotype linked to favourable outcomes.

FP07

Surgery for perihilar cholangiocarcinoma without preoperative biliary drainage: A retrospective multicentre propensity scores weighted analysis.

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Background: Currently, there is no consensus on the optimal strategy of preoperative biliary drainage (PBD) for resectable perihilar cholangiocarcinoma (pCCA). This retrospective cohort study aims to determine the effect of PBD on postoperative mortality and morbidity in pCCA patients.

Methods: Patients from the pCCA Collaboration Group database with histologically confirmed pCCA who underwent a liver resection in 27 Western hepato-biliary centres between 2000 and 2022, were eligible for inclusion. To correct for confounding variables, a propensity score weighting (PSW) was performed using a generalised linear model. A propensity score weighted regression (PSWR) was used to compare outcomes between undrained and drained patients.

Results: Overall, 2067 patients were included of whom 350 (16.93%) did not undergo PBD. Before applying PSW, significant differences in disease stage and type of resection were observed, with drained patients presenting in more advanced disease stages. Regarding, outcomes after PSWR, 90-day mortality was comparable between the two groups (OR: 1.46, 95% CI: 0.92-2.34, p=0.11). Similarly, no difference was observed in postoperative bleeding (p=0.07) or bile leak (p=0.13). However, postoperatively drained patients exhibited a higher likelihood of major postoperative complications (OR: 1.43, 95% CI: 1.04-1.95, p=0.027) and of post hepatectomy liver failure (PHLF) (OR: 2.12, 95% CI: 1.25-3.58, p=0.005).

Conclusion: In patients with resectable pCCA, PBD did not affect 90-day mortality. However, patients who underwent PBD had a higher likelihood of major postoperative complications and PHLF. This analysis highlights the potential benefit of not draining patients unless strictly necessary.

FP08

Pancreatic Ductal Adenocarcinoma is associated with a unique Bile Microbiome which correlates with Oncological Outcomes and has shared microbiome characteristics with the Intra-tumoural microbiome, distinct from other Pancreato-biliary Malignant and Benign Pathologies.

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Background: The microbiome appears to have a role in the development of PDAC. However, the utility of bile fluid as a potential source of microbial biomarkers remains unknown. We aimed to characterise the bile microbiota composition in PDAC versus benign and malignant pathologies of the pancreato-biliary system. In addition, correlate such findings with the intratumoural and normal pancreatic microbiome.

Methods: Prospective matched tumour, normal adjacent pancreatic tissue and bile samples were obtained from 54 patients who underwent surgery for a head of pancreas mass at our institution. Full-length nanopore 16S rRNA (V1-V9) gene sequencing was performed. The cohort consisted of 30 PDAC, 14 Biliary tract cancers (BTC) and 10 benign cases.

Results: We identified biliary microbial biomarkers *Streptococcus (*FDR = 0.0047)*, Klebsiella* (FDR = 0.0095)*, Enterobacter* (FDR = 9.68E 07), and *Veillonella* (FDR = 0.0140) that were found both in the bile and tumour in patients having surgery for PDAC. These bacteria were significantly more abundant in PDAC tumours compared to matched normal adjacent tissues and benign disease. PDAC Bile cultures showed that *Enterococcus faecium, Escherichia Coli, Enterobacter cloacae* and *Klebsiella pneumoniae* increased the risk of deep-seated surgical-site infections and delayed gastric emptying. The abundance of specific genera significantly correlated with overall survival and disease-free survival in PDAC.

Conclusion: A PDAC-specific tissue and bile microbiome has been characterised. We have shown that bile microbial signatures can be used as surrogate markers and are representative of the PDAC intratumoral microbiome. The function of these microbes during pancreatic tumourigenesis must be determined.

Mini Oral Presentations

MO01

Surgical Resection Versus Expectant/Non-Surgical Treatment Policy After Induction Chemotherapy: Systematic Review and Individual Patient Data Meta-Analysis

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Background: Pancreatic cancer, particularly locally advanced pancreatic cancer (LAPC), remains challenging to treat. Around 22% of LAPC patients achieve stable disease after induction chemotherapy, making surgical resection a potential option. However, the benefit of surgery in this group is unclear, with survival outcomes possibly influenced by selection bias. This systematic review and individual patient data meta-analysis (IPDMA) aims to assess the value of surgical resection in patients with RECIST-stable LAPC after induction chemotherapy with (m)FOLFIRINOX or gemcitabine-nab-paclitaxel.

Methods: Following PRISMA guidelines, the IPDMA will include LAPC patients who have stable disease after 3-6 months of induction chemotherapy. Eligible studies will be identified through a systematic literature search. The primary outcome is overall survival (OS); secondary outcomes include surgical mortality, morbidity, and subgroup analyses based on biological response (e.g., CA19-9 reduction) and LAPC score (1-3). Kaplan-Meier curves and Cox proportional hazards models will compare survival between surgical and non-surgical patients.

Results: We hypothesize that resection will improve median OS, particularly in patients with favorable biological responses, such as reduced CA19-9 levels. However, increased morbidity and mortality risks are expected, necessitating a balance of potential survival benefits against surgical risks.

Conclusion: This systematic review and IPDMA will clarify the true benefit of surgical resection in RECIST-stable LAPC patients post-chemotherapy. By balancing potential survival improvements with the risks of morbidity and mortality, the findings will contribute to more personalized and precise treatment guidelines, offering critical insights to refine treatment strategies for LAPC.

MO02

Routine use of hepatobiliary scintigraphy leads to lower mortality in patients scheduled for major liver surgery

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Background
Hepatobiliary scintigraphy (HBS) in preoperative liver function assessment is predictive of primary post-hepatectomy liver failure (PHLF). However, the observed reduction in liver failure may be attributed to fewer high-risk resections, potentially due to the liberal labelling of unsafe and futile resections. This study aims to evaluate the contribution of HBS-related selection bias in reducing PHLF and assess whether patients deemed futile for surgery due to insufficient future liver remnant (FLR) contribute to this reduction.

Methods
All patients who underwent HBS at the Amsterdam UMC between September 2017 and April 2024 with an indication to undergo major liver surgery were included. The course of treatment was decided in a multidisciplinary team meeting. Patients who did not proceed with curative treatment were further analyzed to determine the underlying cause.

Results
In 397 patients, 117 did not go for curative treatment as a result of tumour progression 62% (73/118), technical unresectability 18% (21/118), comorbidities 11% (13/117), opting out of surgery 5% (6/117), and insufficient FLR 3% (4/117). The remaining patients underwent treatment with curative intent. Of the major liver resections, 90 day mortality was 5% (10/197). No cause of death was related to primary PHLF.

Conclusion
The findings of this study confirm that the use of HBS in the preoperative assessment for major liver surgery does not result in the selection of patients for futile resection. The majority of patients who did not proceed with curative treatment were attributed to alternative clinical factors rather than limitations imposed by HBS.

MO03

Outcome of a 'step-up approach' for recurrent cholangitis in patients with a non stenotic hepaticojejunostomy after hepato-pancreato-biliary surgery: single center series

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Background: Recurrent non-stenotic cholangitis (NSC) is a challenging and poorly understood complication of a surgical hepaticojejunostomy (HJ). Optimal treatment remains unclear.

Methods: A retrospective single center series including patients with recurrent cholangitis with a non-stenotic HJ after hepato-pancreato-biliary surgery was conducted (2015-2022). Primary outcome was resolution of NSC (i.e. free of NSC during six months). Secondary outcomes included reduction of NSC monthly episode frequency and secondary sclerosing cholangitis.

Results: Overall, 50 of 1179 (4.2%) patients with HJ developed NSC. Treatment included a 'step-up approach' with short-course antibiotics (n=50, 100%), prolonged antibiotics (n=26, 52%), and revisional surgery (n=7, 14%). Resolution of NSC was achieved in 15 patients (30%) and reduction of NSC frequency in an additional 21patients (42%). Concomitant ursodeoxycholic acid use and discontinuation of proton pump inhibitors was the only predictor for resolution (OR 4.229, p=0.035). Secondary sclerosing cholangitis occurred in 12 patients (24%) and was associated with the number of NSC episodes (OR 1.2, p=0.050).

Conclusions: A 'step-up approach' to recurrent NSC after HJ resulted in 30% resolution and further 42% reduced frequency of NSC although still a quarter of patients developed secondary sclerosing cholangitis. Future prospective studies should assess whether a protocolized approach could improve outcomes.

MO05

Combined Portal and Hepatic Vein Embolization (PVE/HVE) versus Associating Liver Partition and Portal vein Ligation for Staged hepatectomy (ALPPS) in patients with Colorectal Liver Metastases: an analysis of the DRAGON 1 and LIGRO trial study populations

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Background:

Bilobar colorectal cancer liver metastases (CRLM) can be difficult to treat, often requiring major liver resections and potentially resulting in an insufficient future liver remnant (FLR). In addition to the standard intervention for FLR enhancement, portal vein embolization (PVE), there are alternative regenerative techniques such as combined Portal and Hepatic Vein Embolization (PVE/HVE) and Associating Liver Partition and Portal vein Ligation for Staged hepatectomy (ALPPS). Although these procedures are less established, they both seem to lead to accelerated FLR growth and higher resection rates than PVE alone.

Methods:

This study aims to retrospectively analyze the outcomes of PVE/HVE versus ALPPS in two prospective study populations from two multicenter, international trials: the DRAGON 1 trial and the LIGRO randomized controlled trial (RCT). The primary outcome is the effectiveness of PVE/HVE versus ALPPS. Effectiveness is defined as resection completed with 90-day survival thereafter. Secondary outcomes evaluate the kinetic growth rate, successful resection rate, time to completed resection, length of hospital stay, and 90-day periprocedural complications.

Results:

This abstract is a placeholder submission. Results will be available for the evaluation committee in January 2025 and can be presented at the ALPS 2025 meeting by the first author.

Conclusions:

To date, no RCT has compared PVE/HVE and ALPPS directly. This study seeks to shed light on the use and effectiveness of these two procedures in patients with bilobar CRLM and an insufficient FLR.

MO06

Population-based cohort study on treatment and overall survival of patients clinically diagnosed with T1 ampullary cancer

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Background: Ampullary cancer is a rare gastrointestinal malignancy with limited data from large cohorts, especially regarding T1 disease. The aim of this study is to determine treatment, overall survival, and prognostic factors in patients diagnosed with a clinical (c) T1 ampullary cancer.

Methods: Patients diagnosed with cT1 ampullary cancer and patients with pathological (p) T1 in the case of cTx were included from the Netherlands Cancer Registry (2014-2021). Primary endpoint was OS, analyzed using the Kaplan-Meier estimator. Multivariable Cox proportional hazards regression identified predictors of OS.

Results: Overall, 244 patients with cT1 ampullary cancer were included, of whom 75% (n=184) underwent resection. Among these, 68% (n=125) were upstaged to a higher pT classification (pT2:40%, pT3:22%, pT4:5%). Similarly, cN0 was upstaged to pN1 in 47% (n=87).

Next, 100 patients with pT1 and cTx ampullary cancer were included, making a total of 159 patients with pT1 tumor. 92% (146/159) underwent pancreatoduodenectomy, while 8% (13/159) underwent endoscopic or local surgical resection.

The 1- and 5-year OS for cT1N0 ampullary cancer were 72% and 36%, while for pT1N0 they were 94% and 75%. Independent poor prognostic factors for OS were pN1 classification (HR 2.12; 95%CI 1.15–3.94, p=0.017), pNx classification (i.e. locally resected patients) (HR 2.82; 95%CI 1.22–6.55, p=0.016), and poorly differentiated tumors (HR 4.05; 95%CI 1.33–12.40, p=0.014).

Conclusion: In patients with cT1 ampullary cancer, more than two-thirds had a higher pT classification, and almost half had a higher pN classification. These findings suggest that pancreatoduodenectomy is recommended for cT1 ampullary cancer.

MO07

Delta-Function: Proof of Concept and Application to CA19-9 Variations for Survival Prediction after Neoadjuvant Chemotherapy in Borderline-Resectable Pancreatic Adenocarcinoma

Dr Jonathan Garnier[1,2], Dr Alessio Marchetti[2,3], Dr Brady Campbell[4], Dr Paul Andel[2], Dr Marie-Sophie Alfano[1], Dr Camila Hidalgo-Salinas[2], Dr Eddy Traversari[1], Dr Joseph Habib[2], Dr Gabriella Lionetto[3], Dr Anais Palen[1], Dr Jacques Ewald[1], Dr Kelly Lafaro[4], Dr Brock Hewitt[2], Dr Richard Burkhart[4], Pr Salvatore Paiella[3], Dr Greg Sacks[2], Pr Giuseppe Malleo[3], Pr Christopher Wolfgang[2], Pr Roberto Salvia[3], Pr Jin He[4], Pr Olivier Turrini[1], Dr Ammar Javed[2]

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Background: Static values or percentage changes in CA19-9 levels have been the primary markers for treatment response, which often fail to capture the complexity of tumor biology and the varying responses to neoadjuvant therapy (NAT) for patients with borderline resectable pancreatic ductal adenocarcinoma (BR-PC). Here we used the trajectory of CA19-9 during NAT, encompassing both its slope and cumulative function over time, to stratify patients regarding overall survival (OS) and disease-free survival (DFS).

Methods: Four international high-volume centers included patients undergoing pancreatectomy after NAT for BR-PC (2011 – 2023). Three new features were designed: the slope coefficient (SC, difference between preoperative and diagnostic CA19-9 divided by duration of NAT), the delta function ($\delta f(CA19.9)$, sum of CA19-9 values during NAT) and the mean δf ($m\delta f(CA19.9)$, $\delta f(CA19.9)$ divided by number of 15-day intervals in NAT). The objective was to identify a threshold maximizing the difference in OS.

Results: This study included 991 patients. The mean age was 65 ± 9.2 years and 678 (68%) had pancreatic head cancer. FOLFIRINOX was the first choice of treatment in 708 patients (71%). The population comprised independent derivation (n=365) and validation cohort (n=626). Two $m\delta f$ thresholds were determined, for negative SC (206 U.mL^{-1}.months^{-1}) and positive SC (115 U.mL^{-1}.months^{-1}). Both criteria were validated and significantly associated with OS and DFS.

Conclusion: A novel approach for assessing CA19-9 trajectory is presented, integrating therapy duration and accurate prediction of survival outcomes. This tool, available on-line at https://www.pancpals.com/tools, can help guide treatment strategies during restaging for BR-PC.

Survival prediction after neoadjuvant chemotherapy for borderline
pancreatic adenocarcinoma using the mean delta function (mδf) of CA 19-9

Jonathan Garnier et al.

mδf survival prediction

CA 19-9 at diagnosis:

> 792

CA 19-9 at restaging:

> 384
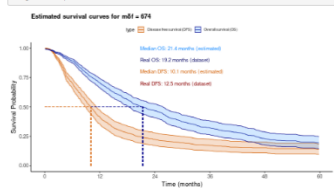
Chemotherapy duration (months):

> 3

[Calculate]

Slope coeff: -143

δt: 4866

mδf: 674

mδf > threshold
categorized the patient into a cohort with 22.1 and 10.1 months of median OS and DFS*

Estimated survival curves for mδf = 674

type Disease-free survival(DFS)   Overall survival(OS)

Median OS: 21.4 months (estimated)
Real OS: 19.2 months (dataset)
Median DFS: 10.1 months (estimated)
Real DFS: 12.5 months (dataset)

Anatomical classification and staging systems of borderline resectable and locally advanced pancreatic cancer – A subgroup analysis of the NORPACT-2 trial

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Background: This study aims to provide a detailed understanding of resectability and prognosis within anatomical subgroups of borderline resectable (BRPC) and locally advanced (LAPC) pancreatic cancer (PC) based on established classification systems. *Methods:* Patients with BRPC/LAPC, defined by National Comprehensive Cancer Network (NCCN) criteria, were prospectively included from 2018-2020. BRPC was subcategorized by vascular involvement, LAPC by the Louisville (Lv) classification system, and both cohorts were reclassified according to the Dutch (DPCG) criteria. NCCN-defined primary resectable PC that met DPCG-BRPC criteria were included in the analysis. *Results:* 228 patients (96 NCCN-BRPC, 92 NCCN-LAPC, and 40 reclassified from NNCN primary resectable PC to DPCG-BRPC) were included. NCCN-BRPC exhibiting both venous and arterial involvement had a lower resection rate (OR 0.22, p = 0.038). Isolated vein involvement and baseline CA19-9 levels < 500 kU/L predicted resectability (OR 5.99, p = 0.005) and survival (HR 0.47, p = 0.024). DPCG-BRPC demonstrated higher resectability rates (67.4% vs. 46.9%, p = 0.004) and fewer vascular resections (37 % vs 58 %, p = 0.031) compared to NCCN-BRPC. While the NCCN only predicted resectability, DPCG also predicted survival. No patients with Lv type IIIc2-4 (non-reconstructable invasion of the portomesenteric vein combined with arterial involvement) underwent resection, and this subgroup had worse survival (HR 2.08, p = 0.021). *Conclusion:* A more detailed understanding of the anatomical subgroups in BRPC and LAPC, alongside CA19-9 levels, should enhance patient stratification regarding tumor resectability. This could lay the framework for a more nuanced approach to neoadjuvant therapy.

MO09

30-Day vs 90-Day Mortality as Quality Metrics for Pancreatic Surgery: A national audit study

Dr Tessa E Hendriks, Dr Leonoor Wismans, Dr Paul Andel

Dutch Pancreatic Cancer Group, Netherlands

Introduction Most international studies report on 30-day mortality to assess quality and safety after pancreatic surgery. This limited timeframe might underestimate the complication related mortality. This study aimed to determine the added value of 90-day mortality compared to the more frequently used 30-day and 30-day / in-hospital mortality.

Methods This nationwide retrospective cohort study included all consecutive patients after pancreatic surgery with histologically proven pancreatic ductal adenocarcinoma (PDAC) between 2014 and 2019, registered in the Dutch Pancreatic Cancer Audit (DPCA) and the recurrence database. The primary endpoint included the 30- and 90-day complication related mortality rate and the in-hospital mortality rate.

Results Overall, 2639 patients after pancreatic surgery were included, of whom 46% were female. The median age was 69 years (IQR: 61-75). Most of the patients underwent a pancreatoduodenectomy n 2149 (83%), the median follow-up duration was 17 months (IQR 7-38). Within the first six month after surgery 133 (5.0%) patients died of surgery related-complications of whom 77 (58%) died within 30-days after the surgery. 41 patients (33%) died within the 30-to-90-day interval, of whom 15 (11%) died during hospital admission. (figure 1)

Conclusions This nationwide study showed that 42% of all complication-related mortality after pancreatic surgery is missed when the assessment is limited to 30-day mortality. Even when including in-hospital mortality, still 31% complication-related mortality is missing. By expanding the timeframe from 30 to 90 days after surgery, 89% of all complication-related mortality will be reported.
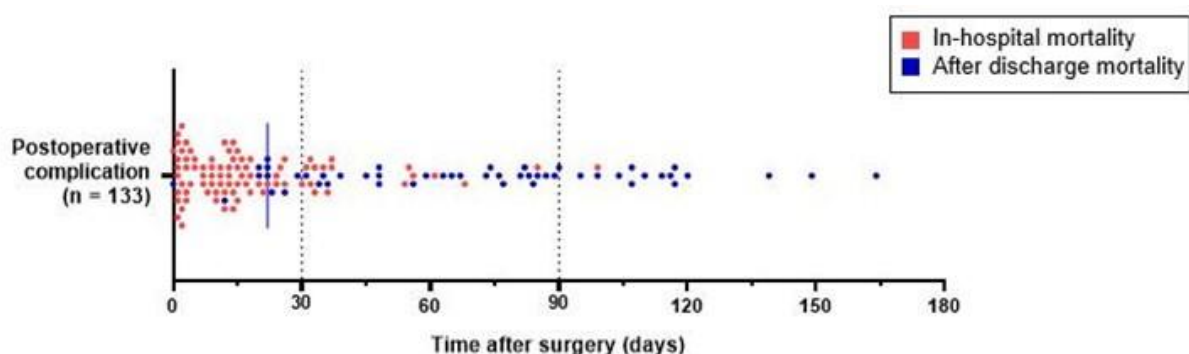
MO10

Pulmonary metastases after resection of pancreatic ductal adenocarcinoma – impact on long term outcome and perspectives on targeted treatments

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Karolinska Institutet, Sweden

Background

After resection for pancreatic ductal adenocarcinoma (PDAC), recurrence is frequent and impacts outcome. Isolated pulmonary metastases exhibit favorable overall survival (OS). Outcome for pulmonary metastases involving other recurrent sites is not well studied. This study aimed to assess OS for patients with different pulmonary recurrence patterns after PDAC surgery.

Material and methods

Adult patients resected for PDAC between 2009 and 2018 at Karolinska University Hospital, Stockholm. Three groups were compared, metastases involving the liver (Liver), pulmonary metastases not involving the liver (Lung, no Liver), and metastases not involving neither lung nor the liver (No Lung, no Liver). Cox regression was undertaken to quantify covariates effect on OS. Survival analyses using the Kaplan-Meier method and log-rank tests were used to depict outcome for the different recurrent patterns.

Results

Of 344 included patients, 294 (85%) demonstrated recurrence within three years, 142 (41%) affecting the Liver, 64 (19%) the Lung, no Liver and 88 (26%) No Lung, no Liver respectively. The median OS for mentioned groups was 13.4, 29.5 and 20.5 months respectively (p<0.001). Lung, no Liver metastases including the peritoneum had similar OS compared to other Lung, no Liver patterns, 29.1 months (p=0.56). In Cox regression, the strongest predictor for death was presence of recurrence, hazard ratio (with corresponding confidence intervals) was for the groups 15.1 (9.01-25.4); 4.96 (2.91-8.46) and 8.65 (5.09-14.7) respectively.

Conclusions

Pulmonary metastases exhibit superior OS compared to other recurrence patterns, even if the peritoneum is included, and warrants further consideration for targeted treatment.

MO11

Textbook outcomes in liver surgery – perspective from a low volume centre in a lower middle economic country

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Background: Textbook outcomes in liver surgery (TOLS) is a novel concept, comprising of a composite measure that captures the most desirable surgical outcomes as a single indicator of quality assessment after liver surgery. Despite emerging data on TOLS from the developed world, no comparable outcomes have been reported from the lower-middle income countries (LMIC).

Methods: We assessed TOLS in 203 consecutive patients who underwent open liver surgery at our hospital. We used the online TOLS calculator developed by the international expert group consisting of 7 parameters including the absence of: grade 2/3 intraoperative incidents, Clavien-Dindo complication grade III or higher, 90-day readmission, grade B/C bile leak, grade B/C liver failure, in-hospital or 90-day mortality and R_0 resection.

Results:

Mean age of our patients was 54 years and 56% were males. About 43% were classified as ASA III or above, 33% had underlying cirrhosis and 34% underwent a major liver resection.

TOLS was achieved in 76% of our patients including 73% in patients with HCC, 75% in patients with biliary cancers, 82% in metastatic cancers and 79% in patients with benign pathology. Multivariate analysis revealed that major hepatic resection, estimated blood loss >500 ml and longer duration of procedure were associated with negative TOLS achievement in our patients. Age, gender, ASA class and cirrhosis showed no significant association.

Conclusions:

Textbook Outcome offers the possibility of comparing data across the patients and institutions. Despite being a low volume centre, our rates of TOLS are comparable to the international literature.

MO12

Analysis of recent changes in treatment options for patients with hepatocellular carcinoma using data from a highly comprehensive Japanese national database: impact of advances in systemic therapy and minimally invasive surgery

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Abstract

Background In 2011, the Ministry of Health, Labor and Welfare started providing data from the National Database of Health Insurance Claims and Specific Health Checkups of Japan (NDB) for research purposes. The NDB is an exhaustive and valuable database for health policymaking and research. It provides an accurate and most recent visualization of the burden of hepatocellular carcinoma (HCC) in Japan. In this study, we analyzed the trend in HCC treatments using data from the NDB.

Methods We retrospectively analyzed the NDB data to calculate the number of patients who were diagnosed with HCC (International Classification of Diseases, version 10 code of C22.0) and underwent treatment from fiscal year (FY) 2016 to 2020.

Results We observed the following trends in HCC treatments during the past 5 years: a slight increase in the number of liver resection (LR) cases (+5.4%), a decrease in the number of radiofrequency ablation cases (−15.2%), and a considerable decrease in the number of transarterial chemoembolization/transarterial embolization cases (−38.2%). However, the number of patients who received systemic therapy dramatically increased from 471 in FY 2016 to 1584 in FY 2020 (+236%). Among LR cases, there was a remarkable increase in the number of laparoscopic procedures from 1227 in FY 2016 to 2057 in FY 2020 (+67.6%).

Conclusions This analysis of a national highly comprehensive database revealed a very recent visualization of HCC management in Japan, wherein the impact of recent advances in systemic therapy and minimally invasive surgery was prominent.

MO14

The role of neoadjuvant treatment in extrahepatic cholangiocarcinoma

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Background: Surgical resection offers the only chance for long-term survival for patients with perihilar cholangiocarcinoma (pCCA), but only a third are potentially resectable at diagnosis. Preoperative challenges include physical deterioration (30%) and disease progression (30%), with high recurrence rates (50% <1 year) and low 5-year survival (13-40%). Neoadjuvant treatment may address these challenges by increasing radical resections, and improving patient selection, but may also be challenging in these complex patients. This study aimed to evaluate the feasibility and efficacy of gemcitabine-cisplatin induction treatment in patients with unresectable locally advanced pCCA.

Methods: This prospective single-center study included patients with unresectable pCCA who then received induction treatment with gemcitabine-cisplatin, aiming to downstage the tumor for resection. The primary outcome was resection rate.

Results: Between January 2020 and June 2023, 23 patients were included. Eight patients became radiologically resectable, of whom 6 underwent resection (26%). Compared to baseline, CA19-9 levels decreased by 42% and 8% at the first and second restaging, respectively (P=0.04 and P=0.80, Fig1). Tumor size did not significantly decrease after chemotherapy. Median overall survival was 40 (95%CI:24-56) in the resected-group and 19 months (95%CI:13-26) in the unresected-group (P=0.127). Two out of 23 patients experienced grade ≥3 adverse events.

Conclusion: Gemcitabine-cisplatin induction treatment shows promising efficacy and feasibility and has led to resection in 26% of cases that were initially unresectable. Combined with a low toxicity rate, these results support further exploration of gemcitabine-cisplatin as neoadjuvant treatment in our recently initiated randomized controlled NEODISCO-trial (neoadjuvant treatment in extrahepatic CCA).
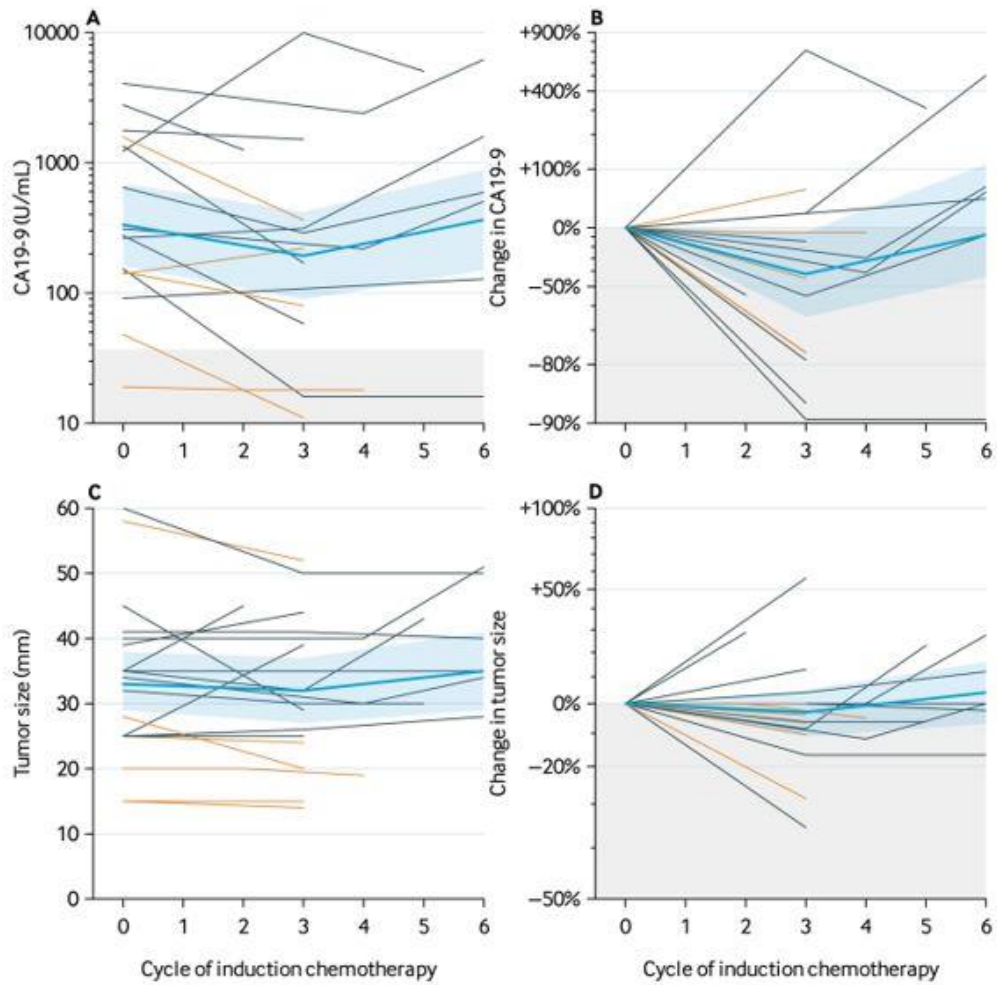
Figure 1. CA19.9 and tumor size (in mm) over time (cycles of induction chemotherapy) per patient.
A. Absolute CA19.9 level over time per patient. B. Relative change in CA19.9 level over time per patient. C. Absolute tumor size over time per patient. D. Change in tumor size over time per patient. Dark blue line: unresected; gold line: resected; blue line: trend for whole cohort with confidence interval; grey area in A: CA19.9 <37 U/mL; grey area in B: decrease in CA19.9 level; grey area in D: decrease in tumor size.

MO15

Quantitative MRI in the pre-operative evaluation of liverfunction for hepatectomy – a scoping review

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Background: Careful assessment of remnant liver function before liver resection is essential to minimize the risk of posthepatectomy liver failure (PHLF). Quantitative magnetic resonance imaging (qMRI) has emerged as potential technique for evaluating liver function, predicting PHLF, and assessing underlying liver diseases. However, the application of qMRI in the preoperative evaluation for liver surgery is limited. The aim of this review is to present an overview of the role of qMRI in the preoperative assessment for liver surgery. Methods: A systematic review was conducted for qMRI sequences compared to preoperative tests to measure liver function as mentioned in the E-AHPBA-ESSO-ESSR (EAEE) Innsbruck consensus guidelines or to liver pathology affecting liver function. In compliance with PRISMA-ScR guidelines, systematic searches of the Embase, Web of Science, and Medline databases were conducted until October 9, 2023. Results: A total of 216 studies were included. The current applications and limitations of T1-relaxometry, magnetic resonance elastography (MRE), diffusion-weighted imaging (DWI), proton density fat fraction (PDFF), and multiparametric MRI for conducting quantitative liver assessment before hepatectomy are discussed. T1-relaxometry is primarily used for assessing liver function and predicting PHLF, whereas other qMRI techniques evaluate underlying liver disease. Nevertheless, their application in the preoperative setting remains limited. Conclusion: This review highlights the potential of qMRI techniques in preoperative assessment for liver surgery. Integration of individual qMRI tec

MO16

Identifying the symptom burden in patients with palliative upper gastrointestinal cancer – results from the Hope Study

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Background: Upper gastrointestinal (UGI) cancers generally present at an advanced stage. This contributes to limited opportunities for curative therapy and poor overall 5-year survival rates. Between 50-80% of all patients are not eligible for surgery, thus requiring palliative care (PC) or best supportive care (BSC). This study aims to identify morbidity in patients receiving BSC in order to optimize it in all of its aspects.

Method: Patients with UGI cancer discussed by a multidisciplinary team (MDT) at Sahlgrenska University Hospital between 2018 – 2021, who were recommended BSC without prior curative or palliative (surgical or oncological) treatment were included in this retrospective register-based study. Baseline demographic, blood tests, symptoms, need for in-hospital care and interventional procedures were collected for all patients.

Results: 346 patients with UGI-cancer were included. Mean age was 79 years and 52% were male. Pain was the most prevalent symptom (88%) followed by weight loss (59%) and nausea (51%). 50% of patients required some form of UGI-stent. The median survival from MDT were 69 days. 85% required hospitalization after MDT of which 29% were hospitalized twice or more. Mean total length of stay was 14 days. 28% of the cohort were admitted to a hospital at the time of death.

Conclusion: patients with UGI cancers receiving BSC present a high morbidity and need for in-hospital care. While further subgroup analysis will be conducted, this preliminary data supports the need for structuralized care as many of the symptoms may be treatable and could strongly impact the quality of life.

MO17

Surgery for chronic pancreatitis across Europe (ESCOPA): prospective international multicenter study

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Background Randomized trials from Europe have confirmed the advantage of surgery over endoscopy in patients with symptomatic chronic pancreatitis (CP). However, the current state of surgery for CP is unclear as prospective pan-European studies CP are lacking.

Methods This prospective multicenter study included consecutive patients undergoing surgery for symptomatic CP (e.g. pain) in 22 centers in 13 countries (June 2021 - November 2022). The primary endpoint was Izbicki pain score at 6-month follow-up with 'complete pain relief' defined as Izbicki score ≤10 and partial pain relief as >10 but more than 50% decrease compared with baseline. Predictors for complete pain relief were assessed using multivariable analysis.

Results Overall, 207 patients undergoing surgery for symptomatic CP were included: 51 surgical drainage procedures (24.6%), 61 duodenum-preserving-head-resections (29.5%), and 95 formal pancreatic resections (45.9%). After surgery, the rate of major complications was 14% (n= 29), and 90-day mortality 1.4% (n= 3). In 113 patients operated for pain, the Izbicki pain score improved from 61.3 at baseline (IQR 49.1-84.9) to 19.0 at 6-month follow-up (IQR 0.0-33.5; p

<0.001). This translated into pain relief in 72.6% (n= 82) (complete n=43, partial n=39). Reduced pain scores were reported by 102 (90.3%) patients. Multivariable analysis showed that duration of symptoms (OR 0.947 [0.897-1.000; p=0.045) and 'no opioids prior to surgery' (OR 3.161 [1.036-9.643]; p = 0.043) were associated with complete pain relief.

Conclusion This study found good results of surgery for CP across Europe, with pain relief in most patients and low complication rates.

MO18

Introduction of robot-assisted pancreatoduodenectomy in a high-volume center: is it worthwhile?

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Background
Robot-assisted pancreatoduodenectomy (RPD) aims to enhance recovery compared to open (OPD). Implementation faces scrutiny because of high costs and operating time. Costs after the learning-curve remain unclear. This study aimed to compare costs and clinical outcome of RPD vs OPD during introduction in a high-volume center.

Methods
Clinical/economic evaluation of consecutive RPD and selected OPD (2015-2024). OPDs selected based on RPD criteria. Primary outcomes: total length of stay (LOS) and costs per patient (bottom-up). Robot purchase/maintenance were calculated per procedure by dividing the costs over all robot procedures. Sensitivity analyses: post-learning-curve and without purchase.

Results
588 patients were included (RPD=214;OPD=374). LOS was shorter after RPD (10vs12;p=0.001) with more LOS<7days (25.2%vs12.3%;p<0.001). Mortality did not differ (1.9%vs3.2%;p=0.34). Costs (€27kvs€22k;p=0.004) and intraoperative costs were higher for RPD (€12kvs€6k;p<0.001), postoperative costs did not differ (€15kvs€17k;p=0.32). Without purchase, costs did not differ (€25kvs€22k;p=0.09). After the learning-curve, clinical outcomes improved: LOS (12vs9days;p<0.001), LOS<7days (17.8%vs32.7%;p=0.01), POPF (48.6%vs31.8%;p=0.01), DGE (33.6%vs15.0%;p=0.001), and operative time (373vs310min;p<0.001). RPD costs reduced with €11k (€33kvs€22k;p<0.001), no difference was present for OPD (€23kvs€21k;p=0.40). After the learning-curve, cost did not differ (€22kvs€21k;p=0.68), postoperative costs were lower after RPD (€10k vs€15k;p=0.003). Without robot purchase, costs did not differ (€20kvs€21k;p=0.45).

Conclusion
Introduction of RPD in a high-volume center was associated with higher costs than OPD, related to the learning-curve. After the learning-curve, RPD outcome improved, costs reduced with

€11k per patient, and cost was similar to OPD. Multicenter RCTs have to compare clinical outcome and cost after the learning-curve.

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Preventing and treating delayed gastric emptying (DGE) after pancreatic surgery: a systematic review and meta-analysis of randomized controlled trials.

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Background

Among all complications of pancreatic surgery, DGE has the largest impact on prolonged hospital stay. Several randomized controlled trials (RCTs) have addressed DGE after pancreatic surgery, either as primary or as secondary outcome.

Methods

RCTs involving pancreatic surgery with DGE as primary or secondary outcome were identified using the online database of the ISGPS Evidence Map of Pancreatic Surgery (2007-2023). Meta-analysis was performed for impact on DGE grade B/C for interventions studied by at least 2 RCTs.

Results

Overall, 152 RCTs were included with 22,260 patients undergoing pancreatic surgery. The overall rate of DGE grade B/C was 11.9%, including 12.7% after pancreatoduodenectomy and 4.2% after left pancreatectomy. No RCT identified an effective treatment of DGE grade B/C. Strategies which reduced the rate of DGE in at least one RCT included: prehabilitation, pancreatico-jejunostomy, antecolic gastrojejunostomy, Billroth II technique, pylorus resection, modified Roux-en-Y technique, no intraperitoneal drainage in left pancreatectomy, minimally invasive left pancreatectomy, minimally invasive pancreatoduodenectomy, mERAS, nasojejunal tube, and early oral feeding. Additional meta-analyses identified minimally-invasive left pancreatectomy as preventive for DGE grade B/C compared to open left pancreatectomy.

Conclusion

This systematic review of RCTs identified 12 strategies which reduced the rate of DGE grade B/C after pancreatic surgery but no effective treatment strategy. Of the 12 preventive strategies, only minimally-invasive left pancreatectomy was confirmed effective in a meta-analysis. Future RCTs should focus on both prevention and treatment of DGE after pancreatic surgery.

MO20

Textbook outcome following pancreaticoduodenectomy in elderly patients: age stratified analysis and predictive factors

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Background: Despite advancements in pancreatic surgery, managing elderly patients undergoing pancreaticoduodenectomy (PD) remains challenging. Textbook outcome (TO) serves as a benchmark for surgical outcomes, but its applicability in elderly patients is underexplored. This study aims to assess TO in elderly patients after PD and identify predictors of TO failure.

Methods: A retrospective analysis was conducted on elderly patients (≥ 70 years) who underwent PD from January 1, 2017, to December 31, 2023. TO achievement rates were evaluated across the cohort and stratified by age groups (70-74, 75-79, ≥80). Uni- and multivariate logistic regression analyses were performed to identify risk factors for failing to achieve TO.

Results: Among 222 patients, 54.5% achieved TO following PD. TO rates declined with age, with only 35.0% of octogenarians achieving TO compared to 57.1% of those aged 70-74. Multivariate analysis indicated that age ≥80, ASA score ≥2 and histopathologic types other than pancreatic ductal adenocarcinoma and distal cholangiocarcinoma were risk factors for not achieving TO.

Conclusions: Nearly half of elderly patients undergoing PD achieved TO, with decreasing likelihood among older age groups, particularly in octogenarians. Higher ASA scores also correlated with lower TO achievement. These findings highlight the need for meticulous preoperative assessment, considering age, to optimize surgical outcomes in elderly PD patients.