Colorectal surgery

Adjuverende kemoterapi til patienter med UICC II high-risk koloncancer

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Background: Rationalet for anvendelse af adjuverende kemoterapi til patienter med UICC II koloncancer er baseret på ældre studier hvor patienter med høj risikoprofil (HR) blandes med patienter uden risikofaktorer. I Danmark anbefales adjuverende kemoterapi (AC) til patienter med UICC II og akut præsentation, T4 tumorer, <12 lymfeknuder, signetcelle carcinom eller anastomoselækage. Det er ikke tidligere undersøgt hvorvidt denne strategi medfører en overlevelsesgevinst i Danmark.
Method: Patienter med UICC II HR koloncancer i årene 2014 til 2018 blev identificeret i DCCG.dk. Patienter med UICC II og alder <75 år, performance status < 3 og normale MMR proteiner, blev defineret som opfyldende kravene til adjuverende kemoterapi.
Primære outcome var overordnet 3-års overlevelse.
Results: Mellem 2014 og 2018 blev 4511 patienter med UICC II opereret. 30-dages mortalitet var 2,2% (98 patienter), hvilket efterlader 4413 fordelt på 3306 (75%) med UICC II uden HR og 1107 (25%) med UICC HR til analysen. Den mediane 3-års overlevelse var 91,7% for patienter uden HR og 80,3% for patienter med HR. Blandt de 1107 patienter med HR opfyldte 451 (41%) kravene til adjuverende kemoterapi. Blandt patienter der ikke opfyldte kravene til AC var der en signifikant dårligere overlevelse end hos patienter der opfyldte kravene (3-års overlevelse på 73% vs. 90%). Blandt de 451 patienter modtog 219 (49%) AC. Hos de patienter der modtog kemoterapi, fandtes en signifikant overlevelsesgevinst over 3 år sv.t 11% (94% vs 83%).
Conclusion: Patienter med UICC II HR har en dårligere prognose end patienter uden HR. Kemoterapi ser ud til at øge 3-års overlevelsen, men kun halvdelen af patienterne der opfyldte kravene, modtog adjuverende kemoterapi.

Behandling af benign stenose efter kolorektal anastomose -et systematisk gennemgang

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Background: Benign stenose af kolorektal/koloanal anastomose forekommer hos op til 30 % af patienter der har fået foretaget kolorektal resektion. Vi har systematisk gennemgået litteraturen, der omhandler behandling af benign stenose efter kolorektale/koloanale anastomose.
Method: En systematisk litteratursøgning blev udført på søgedatabaserne, PubMed, Cochrane og Embase. Relevante studier, publiceret efter år 2000 blev identificeret. Yderligere studier blev identificeret ved gennemsyn af referencelister.
Results: Vi har inkluderet 39 studier, og identificeret en blanding af kasuistikker, retrospektive og prospektive studier. Behandlingsmetoder inkluderet digital dilatation, metal dilatation, endoskopisk ballon dilatation, endoskopisk stent, endoskopisk elektroincision, radial incision, steroide behandling, *"redo"* kirurgi, og kombinationsbehandling med varierende succes rate fra 20 til 100 %. Endoskopisk ballon dilatation var første valget med få komplikationer til følge, dog var flere behandlinger ofte påkrævet. Stent behandling havde høj succes rate, men efterfølgende stent migration var en hyppig komplikation.
Conclusion: Der er flere modaliteter til behandling af stenose efter kolorektale/koloanale anastomoser. Den mest anvendt er endoskopisk ballon dilatation, som også er en sikker procedure med få komplikationer. Mange andre behandling er afprøvet og kan bruges som supplement. Adskillige nye metoder er tilkommet indenfor de sidste par år, disse kræver dog yderligere forskning før de har en plads i vores kliniske hverdag.

Bile acid malabsorption in patients with chronic diarrhoea following right-sided hemicolectomy for colon cancer

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Background: A proportion of colon cancer patients treated with right-sided hemicolectomy have documented long-term bowel dysfunction, including chronic diarrhoea, urgency and faecal incontinence, affecting their quality of life. The underlying causes are unknown. The aim of this study was to investigate the aetiology of chronic diarrhoea among right-sided hemicolectomy patients curatively operated for cancer in the right colon.
Method: Cases with chronic diarrhoea (Bristol stool type 6-7) after right-sided hemicolectomy were compared to a control group of right-sided hemicolectomy patients without diarrhoea. All participants underwent a selenium-75 homocholic acid taurine (SeHCAT) scan to diagnose bile acid malabsorption (BAM). A glucose breath test was performed to diagnose small intestinal bacterial overgrowth (SIBO). Fibroblast Growth Factor (FGF) 19 was measured in fasting blood. In addition, gastrointestinal transit time (GITT) was measured in all participants.
Results: In total, 45 cases and 19 controls were included. In the case group, 82% had BAM, compared with 37% in the control group, P <0.001. SIBO was diagnosed in 73% of patients with chronic diarrhoea as well as in 74% of the control patients. No association between BAM and SIBO was observed. Median (interquartile range) FGF19 was 90.7 (67.9-135.8) pg/ml in cases and 93.9 (78.1-115.0) pg/ml in controls, P = 0.894. There was no association between SeHCAT retention and FGF19. GITT was similar in cases and controls.
Conclusion: Right-sided hemicolectomy patients with chronic diarrhoea had a higher frequency of BAM than controls, indicating that BAM plays an important role in the bowel dysfunction seen after colonic resection for right-sided colon cancer. Since BAM was frequently found in patients without diarrhoea, further studies are needed.

Combined Endoscopic and Laparoscopic Surgery (CELS) for early colon cancer in high risk patients

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Background: The introduction of screening programs for colorectal cancer has resulted in an increased detection and incidence of early cancers (T1-T2). Local excision of the tumor could be an option in selected patients with high risk of complications to surgery. Our aim was to assess feasibility and safety in high risk patients with early colon cancer treated with CELS resection.
Method: A non-randomized prospective feasibility study conducted at four hospitals (Zealand University Hospital, Herlev University Hospital, Bispebjerg University Hospital and Hvidovre University Hospital). We plan to include 25 patients, and have included 19 so far. Patients with PS (Performance Status) score ≥1 and /or ASA (American Society of Anesthesiologists) score ≥3, and clinical UICC stage 1 colon tumor suitable for CELS resection were included.
Results: We have included 19 patients with clinical UICC stage 1 colon cancer (12 cT1 and seven cT2). Failure after CELS resection (defined as either incomplete resection (R1/R2), local recurrence within 3 months, complication related to CELS within 30 days (Clavien-Dindo grade ≥ 3) or death within 30 days of any cause or death within 90 days due to complications to surgery) happened in one patient (incomplete resection margin in benign tumor). Final histopathological examination showed six T1, eight T2, three T3 tumors and 2 benign lesions. Two patients where converted perioperative due to tumor placement. Three patients we allocated to re-resection due to histological risk factors for lymph node metastasis. None of them had lymph node metastasis. One patient developed a metacronous tumor during follow up, and was subsequently resected. No serious adverse outcomes or local recurrences occurred.
Conclusion: We experienced only one failure despite the new method implemented.

En bilateral Transmuskulær Quadratus Lumborum blokade nedsætter ikke det postoperative opioidforbrug efter laparoskopisk hemikolektomi på grund af koloncancer – Et randomiseret, dobbelt-blindet klinisk forsøg i en ERAS-setting

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Background: Et opioidbesparende postoperativt smerteregime efter en laparoskopisk hemikolektomi er optimalt for at fremme tidlig mobilisering, sænke komplikationsraten og forbedre 'Quality of recovery' for patienterne. Flere forskellige regionale anæstesiteknikker er i den forbindelse blevet testet for at forbedre den postoperative smertebehandling efter laparoskopisk hemikolektomi. Den Transmuskulære Quadratus Lumborum (TQL) blokade er en ultralydsvejledt single-shot nerveblokade, hvor lokalbedøvelsen bedøver bugvæggen, viscera og retroperitoneum. Effekten af TQL blokaden er vist i flere klinisk randomiserede studier, hvor det postoperative opioidforbrug er reduceret efter perkutan nefrolitotomi, elektivt kejsersnit og laparoskopisk nefrektomi.
Formålet med studiet var at reducere det postoperative opioidforbrug ved at anlægge et aktivt bilateralt ultralydsvejledt TQL blok og sammenligne med placebo.
Method: I et kontrolleret dobbelt-blindet forsøg blev 69 patienter, som fik foretaget en laparoskopisk hemikolektomi på grund af koloncancer, randomiseret til at få anlagt en ultralydsvejledt TQL blokade med 0,375% 30 ml ropivacain bilateralt eller samme bilaterale blokade med isoton saltvand. Det primære effektparameter var det totale opioidforbrug 24 timer efter operationen. De sekundære effektparametre var blandt andet smertescore (NRS 0-10) i hvile og bevægelse de første 24 timer postoperativt, smerter ved mobilisering 3, 6 og 24 timer efter operationen, tilstedeværelse af ortostatisk hypotension 3, 6 og 24 timer postoperativt, indlæggelsestid og Claviden-Dindo-score 30 dage postoperativt.
Results: Opioidforbruget (orale morfinækvivalenter, mean (SD)) de første 24 timer efter operationen var 129 (88.4) i aktivgruppen sammenlignet med 127,2 (89,9) i placebogruppen (p = 0.93). Der var ingen signifikante forskelle mellem de to grupper for nogen af de sekundære effektparametre.
Conclusion: Anlæggelsen af en bilateral Transmuskulær Quadratus Lumborum blokade som en del af den postoperative smertebehandling efter laparoskopisk hemikolektomi nedsætter ikke opioidforbruget signifikant de første 24 timer efter operationen.

Gastrointestinale symptomer efter cytoreduktiv kirurgi og hyperthermisk intraperitoneal kemoterapi

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Background: Den kirurgiske behandling af metastaser udvikles i ekstensiv retning, hvilket resulterer i flere langtidsoverlevere med risiko for flere senfølger. Patienter med peritoneale metastaser behandles med cytoreduktiv kirurgi (CRS) og hyperthermisk intraperitoneal kemoterapi (HIPEC). Omfanget af den kirurgiske behandling varierer alt efter sygdommens lokalisation og udbredelse. Vi ønsker i dette studie, at undersøge om omfanget af kirurgien påvirker senfølgerne efter CRS+HIPEC.
Method: Studiet er udført som et nationalt prospektivt kohorte studie. Vi inkluderede patienter behandlet med CRS+HIPEC i perioden 2006-2018, som besvarede minimum ét spørgeskema (European Organization for Research and Treatment of Cancer QLQ-C30 (EORTC QLQ-C30)) mellem 3-12 måneder postoperativt.
Det kirurgiske omfang blev defineret ved parietale peritonektomier, kolorektale resektioner og kolorektale anastomoser, og inddelt i 3 grupper (minor/intermediate/major).
Vi analyserede senfølger baseret på EORTC QLQ-C30.
Vi benyttede en lineær mixed effect regressionsmodel, hvor det kirurgiske omfang (minor/intermediate/major) og tiden siden kirurgi samt interaktionen blandt disse var konstante effekter. Analyserne blev justeret for alder, køn, sygdom og komorbiditet. Resultaterne præsenteres som mean-difference med 95% konfidensintervaller blandt grupperne.
Results: I perioden fra 2006-2018 blev 438 patienter behandlet med CRS+HIPEC, hvoriblandt vi 257 patienter (58.7%) besvarede minimum ét spørgeskema indenfor 12 måneder postoperativt.

Patienter behandlet med 'major' kirurgi rapporterede signifikant sværere diarre sammenlignet med patienter, hvor omfanget af kirurgien var mindre (Major vs. minor: 12.3 (2.4;22.2, p=0.02), major vs. intermediate: 12.4 (5.1; 19.8, p=0.0), intermediate vs. minor: -0,1 (-9.1;8.9), p=1.0). Symptombyrden fra diarre var uændret i perioden fra 3-12 måneder (-3.5 (-9.0; 2.0), p=0.2). Typen af kolorektalresektion (venstresidige vs. højresidige) ændrede ikke diarresymptomerne (-0.8 (-9.7;8.1), p=0.9).
Conclusion: Symptombyrden fra diarre er signifikant større blandt patienter, hvor kirurgien har været omfattende. Diarresymptomerne forbedres ikke indenfor det første år. Vi eksplorerer i strategier, der kan forbedre senfølgerne hos denne gruppe af patienter.

Impact of inflammatory bowel disease on risk of venous thromboembolism in patients undergoing colorectal cancer surgery – a population based cohort study

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Background: Inflammatory bowel disease (IBD) is associated with increased postoperative mortality in patients undergoing colorectal cancer (CRC) surgery. Venous thromboembolism (VTE) is a serious complication following surgery and may partly explain of the elevated mortality. We therefore investigated risk of VTE in patients with and without IBD undergoing first-time CRC surgery.
Method: Using data from Danish health and administrative registries (1996-2013) we conducted a population-based cohort study. We included all Danish patients undergoing first-time CRC surgery in Denmark from 1996-2012 to allow for at least one year of follow-up period. Patients with an IBD diagnosis prior to or on the date of CRC surgery were defined as exposed to IBD. We followed each patient from CRC surgery date until first occurrence of VTE (deep venous thrombosis and/or pulmonary embolism), death, emigration, or end of follow-up. We calculated 0-30-day and 0-365-day cumulative risk of VTE with death as competing risk. Cox proportional hazards regression was used to calculate hazard ratios (HRs) with 95% confidence intervals (CIs) associating IBD with VTE in patients undergoing CRC surgery. In the regression analyses, HRs were adjusted for sex, age group, year of CRC surgery, CRC location, CRC stage at diagnosis, and Charlson Comorbidity Index score.
Results: We identified 52,779 patients undergoing first-time CRC surgery. Of these, 638 (1.2%) had IBD. Among patients with IBD, 14 were diagnosed with VTE during follow-up. The corresponding number was 915 in CRC patients without IBD. In IBD patients, the 0-30-day VTE risk after CRC surgery was 0.47% (95% CI: 0.13-1.30) and the 0-365-day risk was 2.19% (95% CI: 1.26-3.56). In patients without IBD, 0.46% (95% CI: 0.40-0.52) and 1.75% (95% CI: 1.64-1.87) experienced a VTE 0-30 days and 0-365 days after surgery, respectively. We observed a 0-30-day adjusted HR of 0.99 (95% CI: 0.32-3.10) and a 31-365-day adjusted HR of 1.25 (95% CI: 0.69-2.27).
Conclusion: CRC patients with and without IBD had similar risk of developing VTE within 30 days after CRC surgery. The risk of VTE 31-365 days after CRC surgery was slightly elevated in IBD patients compared with those without IBD. However, the estimates were imprecise and our findings require confirmation in larger studies.

Implementation of standardized surgical technique and peri-operative care pathways in minimally invasive restorative rectal cancer resection – The Delaney-Package. A single center cohort study

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Background: Although there has been a focus on the technical performance of total mesorectal excision over recent decades, anastomotic leakage (AL) continues to be a frequent and serious

complication for many patients, often for patients being cared for by experienced surgical groups. We describe implementation of technical surgical and combined peri-operative care protocols in an effort to reduce variability, decrease the risk of anastomotic leakage, and improve associated short-term outcomes for rectal cancer patients undergoing robot-assisted restorative rectal resection (RRR).
Method: We evaluated rectal cancer patients undergoing intended minimally invasive RRR at Aarhus University Hospital between 2017 and 2020. Six standardized surgical steps (the "Delaney-Package") directed to improve anastomotic healing were mandatory for all RRR. Additional changes were made during the period with prohibition of systemic dexamethasone and limiting the use of endoscopic stapling technique.
Results: The use of the full Delaney-Package, including all six surgical steps, increased from 40.3% (95% CI, 0.28-0.54) to 86.2% (95% CI, 0.68-0.95). The risk of AL decreased from 21.0% (95% CI, 0.12-0.33) to 6.9% (95% CI, 0.01-0.23). Length of hospital stay (LOS) decreased from 6 days (range 2-50) to 5 days (range 2-26). The rate of patients readmitted within 90 days decreased from 21.0% (95% CI, 0.12-0.33), to 6.9% (95% CI, 0.01-0.23).
Conclusion: The full Delaney-package was effectively implemented for rectal cancer patients undergoing robot-assisted RRR. The risk of AL, LOS and the rate of patients readmitted decreased during the study period. A team focus on high-reliability and peri-operative complications can improve patient outcomes.

Inhalationsanæstesi og postoperative komplikationer efter kolorektal cancer kirurgi. Et observationelt registerstudie

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Background: Generel anæstesi med inhalations- eller total intravenøs anæstesi (TIVA) er nødvendigt for at kunne udføre colorektal cancer kirurgi. Postoperative komplikationer er hyppige og kan muligvis påvirkes af de benyttede anæstesimidler. I dette studie var målsætningen at estimere associationen mellem inhalationsanæstesi og postoperative komplikationer efter kolorektal cancer kirurgi gennem brug af danske databaser.
Method: Patienter opereret for kolorektal cancer 2004-2018 blev identificeret i Dansk Kolorektal Cancer Database. Ved brug af CPR-nummer og operationsdato blev kohorten beriget med data fra Dansk Anæstesidatabase. Lægemiddelstatistikregistret blev brugt til at identificere sygdomme med behov for receptpligtig medicin inden for tre måneder inden kirurgi. Patienterne blev opdelt ud fra, om de var eksponeret for inhalationsanæstesi eller TIVA under deres operation. Vi benyttede propensity score matching til at balancere grupperne i forhold til mulige confounders. Det primære outcome var komplikationer inden for 30 dage postoperativt. Sekundære outcomes var specifikke kirurgiske og medicinske komplikationer.
Results: Vi identificerede 22179 patienter opereret for kolorektal cancer med tilgængelige anæstesidata. Propensity score matching resulterede i 8647 patienter i hver gruppe. Postoperative komplikationer blev observeret i 1917 (22,2%) patienter eksponeret for inhalationsanæstesi og i 2132 (24,7%) bedøvet med TIVA (OR 0,87 (CI 0,81-0,93). Vi observerede 1359 (15,7%) kirurgiske komplikationer i inhalationsgruppen og 1647 (19,0%) i TIVA gruppen (OR 0.79 (CI 0,73-0,83)). Risikoen for fascieruptur, anastomoselækage, ileus, sårabsces og intraabdominal absces var signifikant lavere i inhalationsanæstesigruppen. Der blev ikke observeret nogle forskelle i medicinske komplikationer.
Conclusion: Inhalationsanæstesi var associeret med færre postoperative komplikationer efter kolorektal cancer kirurgi sammelignet med TIVA. Særlig var der færre komplikationer relateret til sårheling og infektion men ingen forskel i medicinske komplikationer.

Injection of freshly collected autologous adipose tissue into complex cryptoglandular anal fistulas

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Background: Treatment of cryptoglandular anal fistulas with injection of autologous or allogenic adipose-tissue-derived mesenchymal stem cells (ASCs) has shown promising results. However, allogenic ASCs is expensive and use of autologous ASCs requires preceding liposuction and isolation of ASCs, time for cell culture and laboratory facilities. Freshly collected autologous adipose tissue may be an easy accessible and inexpensive alternative.
The objetctive of present study was to investigate the efficacy of injection with freshly collected autologous adipose tissue into complex cryptoglandular anal fistulas.
Method: In a prospective cohort-study seventy-seven patients with complex cryptoglandular anal fistulas recieved treatment with injections of freshly collected autologous adipose tissue. Patients not achieving healing after 8-12 weeks were offered a second injection.
Primary outcome was fistula healing defined as no symptoms of discharge, no visible external and no palpable internal opening by anorectal digital examination at clinical evaluation 6 months after final treatment.
Secondary endpoints were combined clinical and MRI healing, reduced fistula secretion and anal discomfort, and complications to the treatment.
Results: Thirty-nine patients (51%) achieved the primary outcome of fistula healing 6 months after their final treatment. Nine patients (12%) experienced reduced secretion and decreased anal discomfort. Thirty-seven patients (48%) achieved combined clinical and MRI fistula healing. Treatment was well tolerated; five patients (4%) experienced serious adverse events (infection or bleeding) requiring surgical intervention.
Conclusion: Injection of freshly collected autologous adipose tissue is a safe treatment of complex cryptoglandular anal fistulas and may be an easily accessible inexpensive alternative to cultured autologous and allogenic ASCs.

Intracorporeal versus extracorporeal anastomosis in robotic right colectomy: A multicenter, triple-blind, superiority, randomized clinical trial (the INEXA trial)

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Background: Previous RCTs have unambiguously shown that intracorporeal anastomosis (ICA) improves postoperative recovery in minimally invasive right colectomy. But it has not yet been evaluated in a setting with optimized perioperative care with ERAS protocols, with sufficient blinding procedure, or with patient-related outcome measures. The objective of this trial was to determine if robotic right colectomy with ICA improves postoperative recovery compared to extracorporeal anastomosis (ECA).
Method: This was a multicenter, superiority, triple-blind, randomized trial on patients undergoing elective robotic right colectomy. Patients were intraoperatively randomized to either INtracorporeal or EXtracorporeal Anastomosis (the INEXA trial). Two high-volume colorectal centers with strict adherence to optimized perioperative care pathways with standardized ERAS protocols were involved in the study. The patients, outcome assessors, and the biostatistician were all blinded to the intervention. The primary outcome was patient-reported postoperative recovery measured using the "Quality of Recovery- 15 items" questionnaire (QoR-15). ClinicalTrials.gov NCT03130166**.**
Results: A total of 89 patients were randomized (44 ICA and 45 ECA), and analyzed according to the "Intention-to-treat"-principle. We found no statistically significant differences in patient-reported recovery (QoR-15) between the groups. There were no statistically significant differences in secondary recovery outcomes of length of hospital stay (median 3 [2, 3] days in both groups, P = >.99) or time to first flatus/bowel movement (mean (SD) of 36 (17) hours in ICA versus 41 (19) hours in ECA, P = .74). There were no significant differences in postoperative pain, opioid consumption, nausea, time to ambulation, pathophysiological tests (lung function test, "Timed-up-and-go" test, "orthostatic hypotension" test), postoperative complications (overall morbidity, anastomotic leakage, reoperations, readmittance, and mortality) between the study groups. The duration of time to create the anastomosis was significantly longer with intracorporeal anastomosis (17 vs. 13 min, P = .003), while all other intraoperative, and pathology variables showed no differences.
Conclusion: We found no statistically significant differences in patient-reported postoperative recovery or any other clinically relevant outcomes following ICA compared to ECA in an optimized ERAS setting.

Intratumoral influenza vaccine in early colorectal cancer

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Background: Recurrence is the leading cause of increased morbidity and mortality after colorectal cancer surgery, with up to one-third of patients undergoing curatively intended surgery having a recurrence. The degree of tumor-infiltrating immune cells is crucial for the risk of recurrence, which is why interventions targeting the tumor and the local microenvironment are in increased focus. In larger population studies, an association has been found between exposure to the influenza vaccine in relation to surgery for a solid cancer and better long term oncological outcomes. Intratumoral injection of the vaccine has in experimental studies shown to increase the proportion of infiltrating immune cells and lead to tumor shrinkage in both treated and untreated tumors. The purpose of this combined phase 1 and 2 study was to determine the safety of intratumoral influenza vaccine injection and whether it induces local and systemic immunological changes.
Method: All patients with non-metastatic sigmoid and rectal cancer were eligible for inclusion. The intratumoral influenza vaccine was administered by an additional sigmoidoscopy 7-14 days before the scheduled surgery. The primary outcome was safety. The clinical outcome was Mandard tumor regression grade (TRG) assessed by two independent pathologists. Translational outcomes included local and systemic immunological changes, analyzed via immunohistochemistry, mRNA gene expression, and FLOW quantification of immune cells.
Results: Ten patients were included in the study, four with sigmoid cancer and six with rectum cancer. No serious adverse reactions occurred. TRG was rated at five in all patients, except one rated at four by a single pathologist. There were no differences in FLOW analyzes of CD3+ T cells, CD4+ T cells, CD8+ T cells, and NK cells before and after the intervention. mRNA gene expression and immunohistochemistry data have not yet been analyzed but will be available at the annual surgical convention.
Conclusion: Intratumoral influenza vaccine is a safe intervention. The intervention did not lead to clinical histopathological response or systemic changes analyzed by FLOW quantification of immune cells. The results of the local tumor microenvironment via immunohistochemistry and mRNA gene expression will determine whether the intervention needs to be further investigated in larger clinical trials.

Intravenøs jernbehandling og transfusionspraksis ved elektiv kolorektalkræftkiurgi. Et single center retrospektivt kohorte studie

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Background: Anæmi er associeret med øget morbiditet og død hos patienter opereret for kolorektalkræft (CRC). Ved jernmangelanæmi anbefales præoperativ optimering med intravenøs (i.v.) jern i tiltagende grad, men grundet den korte tid mellem diagnose og operation i Danmark er det usikkert om behandlingen kan nå at have en effekt. Blodtransfusioner er ligeledes associeret med nedsat kort- og langtidsoverlevelser hos CRC-patienter. Den Nationale Kliniske retningslinje for blodtransfusion anbefaler en restriktiv transfusionspraksis baseret på hæmoglobin niveau og på specifik komorbiditet. Det er uvist i hvor høj grad klinisk transfusionspraksis efterlever dette
Method: Single center retrospektivt kohortestudie hvor lokale og regionale data blev koblet med data fra DCCG. Elektivt opererede CRC-patienter med jernmangelanæmi på diagnosetidspunktet blev inkluderet (periode 2013-2018). Hæmoglobinudvikling fra diagnose til operationsdag og risikoen for blodtransfusioner blev sammenlignet mellem dem der præoperativt havde modtaget i.v. jern og dem der ikke havde. Samtlige blodtransfusioner (fra diagnosen til 30 dage postoperativt) blev gennemgået. Den observerede transfusionspraksis, herunder hæmoglobinniveauer og komorbiditet, blev analyseret og sammenholdt med den nationale transfusionsretningslinje
Results: Ud af 152 inkluderede CRC-patienter med jernmangelanæmi havde 105 modtaget præoperativ i.v. jernbehandling. Der var en mediantid på 8 dage imellem jernbehandling og

præoperativ hgb måling. Ændringen i hgb fra diagnose til operation var -0.20mM (IQR -0.79 to 0.40) i ikke-behandlingsgruppen og -0.25mM (IQR -1.61 to 0.20) i i.v. jerngruppen (p>.05). Den samlede perioperative transfusionsrate var 42% uden signifikant forskel de to grupper imellem. 77% af alle blodtransfusioner blev givet på en hgb over den absolutte transfusionstrigger på 4.3mM, og af disse blev 77% givet uden tydelig angivelse af forklarende kardiel sygdom eller tilstedeværelse af anæmisymptomer. I tilfælde hvor mere end portion blod blev givet, skete dette i 85% af tilfældene uden fornyet klinisk vurdering og ordination.
Conclusion: Præoperativ iv jernbehandling var ikke associeret med en stigning I hæmoglobin præoperativt eller med en nedsat risiko for at modtage blodtransfusion perioperativt. Overordnet set var transfusionsraten overraskende høj og det er iøjnefaldende hvor stor en andel af patienterne der så ud til at blive transfunderet uden for de retningslinjer som den nationale kliniske retningslinje anbefaler

Long-term outcome after Bascom's pit-pick procedure for pilonidal sinus disease: a cohort study

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Background: Previous studies show favourable short-term results after pit-pick procedure. Follow-up after 5 years is considered gold standard as most recurrences occur within this period. Long-term studies in a Danish setting are needed to investigate whether pit-pick procedure is an adequate treatment with an acceptable recurrence rate or just delays a final more extensive treatment.
Method: Prospective collection of data in a local pilonidal sinus database up to one year after primary surgical intervention were supplemented with long-term data collected by a survey sent to e-Boks or by phone interview in case of no response. The survey including questions about demographic characteristics, lifestyle, complications, reintervention, sexual activity, pain, satisfaction with cosmetic appearance. Electronic medical records were reviewed to update the database and verify survey answers if consent was given.
Results: 158 patients underwent pit-pick procedure from August 1, 2007 to March 31, 2014. 99 % of the procedures were performed with local analgesia (missing data on 12 patients). Median follow-up was 7.98 [IQR 0.66, 10.96] years. Twelve patients (8 %) had reintervention due to incomplete wound healing. Thirty-two patients experienced recurrence after complete wound healing. The 10-year cumulative recurrence rate was 27 % (95% CI 19-35%) of the patients with complete wound healing. Treatment success was 68 %. Recurrence was associated with active smoking, HR of 5.30 (95% CI 1.42-19.86; p = 0.01), and number of primary pits ≥3, HR of 5.11 (95 % CI 1.49-17.47; p = 0.01). More than 90 % did not experience chronic pain or postoperative complications and more than 70 % reported a high satisfaction with cosmetic appearance.
Conclusion: Pit-pick seems to be an adequate treatment for patients with simple pilonidal sinus disease and small number of primary pits with an overall treatment success of 68 %, few postoperative complications, low risk of chronic pain, and acceptable rate of high satisfaction with cosmetic appearance.

Long-term outcomes after Bascom's cleft-lift procedure under tumescent local analgesia for pilonidal sinus disease: a cohort study

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Background: Pilonidal sinus disease is a common inflammatory disease in the natal cleft with no consensus on optimal treatment. Cleft-lift under tumescent local analgesia is feasible and well tolerated with a high patient satisfaction, minimal pain, and acceptable short-term outcomes. This study aimed to investigate if the long-term outcomes after Bascom's cleft-lift under tumescent local analgesia were acceptable**.**

Method: Single-center cohort study of all patients undergoing Bascom's cleft lift procedure under tumescent local analgesia in a day-surgery setting at Nordsjællands Hospital during the period August 1, 2007 to March 31, 2014. Data were registered prospectively in a local database. Two-hundred patients were contacted regarding long-term outcomes following surgery. Additional clinical data were collected from the medical records if the patients gave consent. Primary outcome was 10-year risk of recurrence in patients with complete wound healing within 180 days of surgery using competing risk analyses. Secondary outcomes were healing rate, chronic pain, cosmetic satisfaction, and effect on sexual activity.
Results: 195 patients had complete wound healing within 180 days, and the median time to complete wound healing was 29 days [IQR:16–47]. The cumulative risk of 10-year recurrence rate was 11.3 % [95%CI: 6.2–16.4%], with a median follow-up time of 8.5 [IQR: 1.0–10.7] years. Treatment failure was 13.7 %. No significant predictors were found to be associated with recurrence. 90 % of patients experienced no chronic pain.
Conclusion: Bascom's cleft-lift procedure performed under tumescent local analgesia is associated with a low 10-year risk of recurrence and chronic pain thus feasible in a day-surgery setting.

Myocardial injury after colorectal cancer surgery and postoperative 90-day mortality and morbidity - a retrospective cohort study.

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Background: Myocardial injury after non-cardiac surgery is a strong predictor of 30-day mortality and morbidity. The purpose of this study was to examine the incidence of myocardial injury and the association with 90-day postoperative mortality and complications in patients undergoing colorectal cancer surgery in an Enhanced Recovery After Surgery protocol.
Method: Patients undergoing colorectal cancer surgery between June 2015 and July 2017 were included in this retrospective cohort study, if they had troponin measured twice during the first seven days after surgery at Zealand University Hospital, Denmark. The patients were followed for 90 days. Myocardial injury was defined as an elevated troponin I measurement (>45 ng/l) without evidence of a non-ischemic etiology causing the elevation. Ninety-day postoperative mortality and complications were assessed.
Results: A total of 586 patients were included of which 42 were diagnosed with myocardial injury. Thirteen patients (2%) died within 90 days of surgery. There was no significant difference in 90-day mortality between patients with and without myocardial injury, 5% [2/42] versus 2% [11/544], P=0.24. We found a higher incidence of postoperative complications within 90 days of surgery in the myocardial injury group compared with the non-myocardial injury group, 43% [18/42] versus 20% [107/544], P<0.01. We found a significant difference between the myocardial injury group and non-myocardial injury group in terms of medical complications (33% [14/42] versus 9% [50/544], P<0.01) but not surgical complications (19% [8/42] versus 16% [85/544], P=0.56). Myocardial injury was an independent predictor of postoperative complications within 90 days of surgery (adjusted odds ratio: 2.69, 95% confidence interval: 1.31-5.55).
Conclusion: Myocardial injury occurs frequently in patients undergoing colorectal cancer surgery in an Enhanced Recovery After Surgery protocol. Patients with myocardial injury did not have a significantly higher 90-day mortality but had higher risk of 90-day postoperative complications compared with patients without myocardial injury. Future research should examine prevention and treatment of myocardial injury.

Non-microradical resection margin as a predictor of recurrence in patients with stage iii colon cancer undergoing complete mesocolic excision: a prospective cohort study

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Background: The prognostic value of the present definition of microradicality in colon cancer is poorly understood, especially considering the vast influence it has in rectal cancer prognosis. This study aimed to investigate whether the risk of recurrence after complete mesocolic excision for

stage III colon cancer is associated with the distance from tumor tissue to resection margin and whether the location of the involved margin is of any significance.
Method: A prospective cohort of patients was stratified into 2 groups to distinguish between direct margin invasion (0-mm resection margin) and a ≤1-mm resection margin without direct invasion or 3 groups to distinguish between the location of margin involvement (lateral tumor resection margin, central vascular ligation margin, and non-peritonealized mesocolic resection margin). Patients with microradical resections were used as a control group. We included all patients undergoing elective complete mesocolic excision for International Union Against Cancer stage III colon cancer at Nordsjællands Hospital between January 1, 2008, and December 31, 2016. Primary outcome was risk of recurrence after 3.2 years.
Results: A total of 276 patients met all inclusion criteria and none of the exclusion criteria with 41 patients (15%) had a non-microradical resection. The 3.2-year cumulative incidence of recurrence for a 0-mm margin was 43% and 24% for a ≤1-mm margin without direct invasion, corresponding with an HR of 4.3 (p = 0.0146) and 1.3 (p = 0.474). The location of the involved margin showed no significant differences.
Conclusion: We found no increased risk of recurrence for a ≤1-mm margin without direct invasion, indicating that the present classification of microradicality might not be justified if an intact posterior mesocolic fascia without invasion of tumor tissue is present.

Organ specific adverse effects after cytoreductive surgery with hyperthermic intraperitoneal chemotherapy - A scoping review

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Background: We conducted a review in order to describe type and extent of organ specific adverse effects after cytoreductive surgery (CRS) + hyperthermic intraperitoneal chemotherapy (HIPEC) for certain gastrointestinal (GI) cancers and pseudomyxoma peritonei (PMP).
Method: In November 2020, a systematic literature search was done using 6 databases to identify studies reporting on organ specific adverse effects developed after CRS+HIPEC for GI cancers and PMP. We categorized organ specific adverse effects into gastrointestinal, urological dysfunction, sexual dysfunction, pain and others. We extracted data on type and extent of these adverse effects developed over short-term (0-5 months following surgery), medium-term (6-11 months) and long-term (≥12 months).
Results: In total, we screened 2451 papers. 18 studies fulfilled the eligibility criteria: 12 prospective cohort studies, three retrospective cohort studies, two cross-sectional studies and one study, which reported data on a prospective cohort as well as a cross-sectional population. Using five different questionnaires, the studies reported on a total of 2081 patients. We found an increase in organ specific adverse effects 3-6 months after surgery. A return to preoperative level differed within the different adverse effects. Diarrhea was still worse 12 months after surgery compared to preoperatively in the majority of the studies and improved later only. For constipation, symptoms improved fast after surgery. Sexual dysfunction did not seem to improve in the long-term compared to the other adverse effects, based on only 2 studies. On urological dysfunction and stoma-related dysfunction we had limited data, which did not allow for any conclusions to be made. In the remaining domains (nausea/vomit, 'loss of appetite', pain) a return to preoperative level happened within the first year after surgery.
Conclusion: This review showed an increase in organ specific adverse effects 3-6 months after surgery. A return to preoperative level differed within the different adverse effects. Furthermore, this review clearly demonstrated a lack of knowledge on stoma-related issues and urological- and sexual dysfunction. In the future these aspects should be investigated in studies having a larger patient population, including patients with only one or two types of tumor origin, with the use of validated questionnaires and in context to the type of surgery and extent of surgery that has been performed, i.e. using questionnaires in a personalized matter.

Plane of mesocolic dissection as predictor of recurrence after complete mesocolic excision for sigmoid colon cancer

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Background: West et al. has proposed a grading system similar to the one used for rectum cancer, to assess colon specimens. The grading system has never been validate in a population of patients undergoing complete mesocolic excision for sigmoid colon cancer. To investigate whether intramesocolic plane dissection assessed on fresh specimens by the pathologist is a risk factor for recurrence after complete mesocolic excision for sigmoid cancer when compared with mesocolic plane dissection.
Method: Single-centre study based on data from a local database containing prospectively registered data on patients undergoing resection for UICC stage I–III sigmoid colon adenocarcinoma at Nordsjællands Hospital during the period 2010–17. The patients were stratified into either an intramesocolic plane group or a mesocolic plane group (control group). Primary outcome was risk of recurrence after 4.2 years using inverse probability treatment weighting and competing risk analyses.
Results: Of a total of 332 patients, two were excluded as the specimen was assessed as muscularis propria plane, 237 (72%) specimens were deemed as mesocolic and 93 (28%) as intramesocolic. The 4.2-year cumulative incidence of recurrence after inverse probability treatment weighting was 15.1% (10.5–19.6) in the mesocolic group compared with 9.9% (4.0–15.9) in the intramesocolic group, thus the absolute risk difference between the mesocolic plane and intramesocolic plane was 5.1% (-12.5–2.2; p=0.17) in favour of the intramesocolic group.
Conclusion: Intramesocolic plane dissection was not a risk factor for recurrence after complete mesocolic excision for sigmoid cancer when compared with mesocolic plane dissection. Our study showed no difference in risk of local recurrence, no difference in risk of death before recurrence, and no difference in overall survival after 4.2 years between the two groups. Therefore, the classification system appears unusable for the risk prediction of sigmoid colon cancer.

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Predicting 1- 3-, and 5-years mortality after surgery for colorectal cancer using a Danish quality assurance database

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Background: Colorectal cancer (CRC) is the 3rd most common malignant disease and the second most deadly globally, with more than 1.900.000 new cases estimated in 2020 and 935.000 deaths. The cornerstone of local or regional treatment is surgery, with the ultimate goal of securing long term survival. Creating prediction models that can estimate the risk of postoperative mortality can have clinical utility for shared decision making.
Method: Data from the Danish Colorectal Cancer database from 2001-2019 were transformed into the Observational Medical Outcomes Partnership Common Data Model. Cohorts and predictive studies designed using the Observational Health Data Science and Informatics ATLAS. Patients operated for colorectal cancer and having minimum 1, 3 or 5 years of follow-up were included in the study. Outcomes were all-cause mortality within 1, 3, or 5 years after surgery. All variables known at any time prior to surgery were considered potential predictors. Model performances were evaluated on the test set using metrics for discrimination (area under the receiving operator curve (AUROC) and area under the precision-recall curve (AUPRC)) and calibration (calibration intercept, calibration slope and Brier score). After initial training a team of medical experts reviewed the predictors and excluded any variables not deemed clinically relevant.
Results: For 1, 3 and 5 year mortality, 63333, 55819, 47333 patients were included, with 10587, 18142, and 20971 deaths within the respectively times-at-risk. Model discrimination metrics were: AUROCs of 0.863, 0.844, and 0.833, and AUPRCs of 0.635, 0.772 and 0.826 respectively. Model calibration metrics were: calibration intercepts of -0.06, -0.02, 0.00 and calibration slopes of 0.95, 0.98, 0.98 and Brier scores of 0.09, 0.14, and 0.16.
The models included 263, 248 and 203 predictors.
Conclusion: In this study we showed that building prediction models from Danish quality assurance data showed promising results with good discrimination and close to ideal calibration. This indicates that using standardized analytical pipelines with high quality observational data is a feasible basis for high-performance prediction models, and possible in the future for clinical use. Model performance could potentially be enhanced in the future by merging additional data sources, enhancing data with domains where DCCG have limited information e.g. medical history, lab results, and drug exposures and investigating other prediction model algorithms.

Prognostiske markører hos patienter med koloncancer efter kurativ kirurgi

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Background: Immunsystemet kan genkende og uskadeliggøre cancerceller. Cancerceller kan udvikle mekanismer til at undgå genkendelse af immunsystemet ved ekspression af bestemte proteiner på kræftcellernes overflade. Formålet med dette studie var at undersøge de immunhistokemiske markører HLA-G, PD-L1, CDX2, CD3 og CD8 i forhold til prognose hos patienter med koloncancer.
Method: Patienter med pT3 og pT4 koloncancer blev inkluderet retrospektivt. Der blev foretaget immunhistokemisk farvning af vævssnit fra primærtumor med repræsentation af den invasive margin med HLA-G, PD-L1, CDX2, CD3 og CD8. Ekspressionen af PD-L1 blev aflæst og analyseret som en samlet positiv score af tumorceller og immunceller. Ekspressionen af CD3 og CD8 i den invasive margin og tumorcentrum blev analyseret separat og efterfølgende samlet til én score. Endvidere blev alle markørerne vurderet som en *combined marker score* med tre kategorier (lav, mellem og høj). Hazard-ratio for recidiv, sygdomsfri overlevelse og mortalitet blev beregnet.
Results: Vi inkluderede 188 patienter, der blev reseceret for koloncancer i 2011-2012. Den mediane opfølgning efter resektion var 41,7 måneder, hvor 41 (21,8 %) patienter fik recidiv og 74 (39,4 %) døde. I den multivariable regressionsanalyse fandtes positiv HLA-G-ekspression associeret med en højere risiko for recidiv (HR=3,37; 95%CI [1,64-6,93]), mens bevaret CDX2-ekspression var associeret til en lavere risiko for recidiv (HR=0,23; 95%CI [0,06-0,85]). En mellem eller en høj *combined marker score* var associeret med højere risiko for recidiv (henholdsvis HR=20,53; 95%CI [2,68-157,32] og HR=7.56; 95%CI [1,06-54,16]). Hverken høj ekspression af PD-L1 eller høj CD3-CD8-score var signifikant associeret med lavere recidivrater (HR=0,74; 95%CI

[0,37-1,47] og HR=0,72; 95%CI [0,33-1,60]). Patienter med en høj CD3-CD8-score havde dog en signifikant længere sygdomsfri overlevelse og samlet overlevelse.
Conclusion: Ekspressionen af HLA-G og tab af CDX2-ekspression i tumorceller var associeret med cancerrecidiv. Desuden fandt vi, at en kombination af bestemte tumor-biomarkører var associeret med recidiv hos patienter med koloncancer.

Recurrence after complete mesocolic excision for right-sided colon cancer: post-hoc sensitivity analyses – early recurrence, surgery by specialist, and dissection in the mesocolic plane

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Background: At the annual meeting in 2018, some colleagues questioned whether the treatment effect of complete mesocolic excision for right-sided cancer was biased by potentially undiagnosed disseminated disease at the time of surgery and by surgery in some patients in the non-CME group being performed by a non-specialist. Furthermore, it has been questioned whether the effect of CME was solely caused by the higher proportion of dissection in the mesocolic plane. This sensitivity analyses investigate these potential biases.
Method: A population of 1069 patients, 813 undergoing conventional resection and 256 complete mesocolic excision for colon cancer during the period 2008–2013, was stepwise reduced in the following order by excluding patients with recurrence diagnosed within 6 months of the resection, having surgery performed by a non-specialist without supervision, and specimens assessed as not being mesocolic plane dissection. Primary outcome measure was risk of recurrence after 5.2 years using competing risk analyses.
Results: The absolute risk reduction of complete mesocolic excision was 6.0% (1.8–10.2; p=0.0049) after excluding patients with recurrence within 6 months of resection, 6.1% (1.9–10.4); p=0.0045) after excluding non-specialist surgery, and 7.5% (2.9–12.0; p=0.0013) after the exclusion of patients whose specimens were assessed as dissections not being performed in the mesocolic plane.
Conclusion: The absolute risk reduction of recurrence after complete mesocolic excision for right-sided colon cancer in our previous study was not biased by potentially undiagnosed disseminated disease at the time of surgery, non-specialist surgery, and was not solely caused by dissection in the mesocolic plane. Central vascular dissection with central lymphadenectomy seems a major factor for better oncological results.

Risk and prognosis of pilonidal sinus disease. An interdisciplinary approach including epidemiological and clinical trial research

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Background: Pilonidal sinus disease (PSD) is a common disorder involving the natal cleft causing chronic inflammation or acute abscess formation.
We aim to provide clinical evidence that will improve the understanding of PSD development and identify risk factors for disease severity, lack of healing, and recurrence. In addition, a randomized controlled trial will investigate the use of freshly collected autologous adipose tissue in treatment of complex PSD.
Method: Studies I-III will be conducted by linking data from existing nationwide Danish health registries and estimate risk of incident between 1977-2019, investigate the heredity of PSD and estimate the risk of treatment failure after surgical treatment.
Study IV is a single-blinded randomized controlled clinical trial comparing surgical revision and injections of freshly harvested autologous adipose tissue in non-healing pilonidal lesions after failed surgery against surgical revision alone.
Results: The study is planned to start in 2022.
Conclusion: **Perspectives:** This project will provide novel evidence improving the understanding of PSD occurrence and prognosis. We will provide proof of concept for a new and promising technique for treatment of non-healing pilonidal wounds. This will enhance the knowledge of PSD

and most likely affect clinical decision-making, treatment, patient guidance and eventually strengthen this research collaboration to the benefit of this much overlooked patient group.

Risk of infections in colorectal cancer patients with inflammatory bowel disease

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Background: Inflammatory bowel disease (IBD) is a chronic inflammation of the bowel. Both ulcerative colitis (UC) and Crohn's disease (CD) are associated with an increased risk of colorectal cancer (CRC) and are also associated with adverse prognosis in CRC patients. Infections may mediate a part of the poor prognosis. We therefor hypothesized that IBD is associated with an increased risk of infections among CRC patients.
Method: Using data linked from Danish population-based registries from 1995-2018, we conducted a cohort study including all CRC patients with a first-time IBD diagnosis and compared them with all other CRC patients without IBD (comparators). The outcome was first-recorded hospital treated (ICD-codes) or community-treated infections (prescriptions).
We expressed the absolute risk of infection among patients with and without IBD by cumulative incidence proportions (CIPs) treating death as competing risk. We used stratified Cox regression analysis to calculate hazard ratios (HRs) as estimates of relative risk, adjusted for sex, age, co-morbidities, cancer stage and year of diagnosis.
Results: We identified 93,427 patients with CRC of whom 1,637 (1.8%) had IBD and followed them for a median of 11 months until first infection (maximum follow-up of 24 years). The median ages were 68 years (95% CI 67-68) for IBD patients and 71 years (95% CI 71-72) for comparators. The 1-year and 5-year CIPs of first-recorded infections were 52.8% (95% Confidence interval (CI) 50.3-55.2) and 75.7% (95% CI 73.4-77.7) for IBD patients and 45.6% (95% CI 45.3-45.9) and 67.9 (95% CI 67.6-68.2) for CRC comparators, respectively. IBD patients had a slightly elevated risk of infections (HR 1.18, 95% CI 1.11-1.24). When we stratified into CD, UC, and unclassified IBD the adjusted HRs for infections were 1.25 (1.12-1.39), 1.15 (1.08-1.23), and 1.23 (1.03-1.41), respectively.
Conclusion: IBD is associated with an elevated risk of infection among CRC patients.

Risk of local recurrence after complete mesocolic excision for right-sided colon cancer: post-hoc sensitivity analysis of a population-based study

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Background: A causal treatment effect of complete mesocolic excision for right-sided colon cancer on the risk of recurrence has been shown, but it is still unclear whether this is caused solely by a risk reduction of local recurrence.
Method: Post-hoc analyses of data from a population-based cohort. Inverse probability of treatment weighting and competing risk analyses were used to estimate the possible causal effects of complete mesocolic excision to assess to what extent complete mesocolic excision attributes to the risk of local recurrence. Patients undergoing elective colon resections for right-sided colon cancer without distant metastases during the period 2010–2013 in four colorectal cancer centers in the Capital Region of Denmark. One center performed complete mesocolic excision, the remainder conventional resections.
The primary outcome was the cumulative incidence of solely local recurrence 5.2 years after surgery. Secondary outcomes were solely distant recurrence and both local and distant recurrence diagnosed within 180 days.
Results: 807 patients were included with 186 undergoing complete mesocolic excision and 621 conventional resections. The 5.2-year cumulative incidence of a solely local recurrence was 3.7% (95% CI: 0.5–6.1) after complete mesocolic excision compared with 7.0% (5.0–8.9) in the control group, and the absolute risk reduction of complete mesocolic excision was 3.7% (2.5–7.1; p=0.035). The absolute risk reduction on local and distant recurrence was 3.4% (1.3–5.6; p=0.0019) and on solely distant recurrence 3.1% (0.0–6.2; p=0.0516).
Conclusion: This study shows a causal treatment effect of complete mesocolic excision on the risk of a solely local recurrence and of distant recurrence with or without local recurrence.

Robotic versus laparoscopic right colectomy for colon cancer: a nationwide cohort study

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Background: The minimally invasive approach is widely adopted in Denmark. The adoption of robotic colorectal surgery is increasing, however, the advantage of a robotic approach in right colectomy is still controversial. The purpose of this study was to compare robotic right colectomy (RRC) with laparoscopic right colectomy (LRC) on a national level.
Method: This was a nationwide database study based on data from the Danish Colorectal Cancer Group (DCCG) database. Data on all patients treated with curative intend in an elective setting with either robotic or laparoscopic right colectomy from all colorectal centers in Denmark in the period 2014-2018 were retrieved. Propensity score matching was performed to adjust for confounding, and the groups were compared on demographics, disease characteristics, operative data, postoperative and pathology outcomes.
Results: In total, 4002 patients from 18 different centers were available for analysis. Propensity score matching in ratio 2:1 identified 718 laparoscopic and 359 robotic right colectomy cases. After matching, we found a higher lymph node yield in the robotic group compared to the laparoscopic group, (32.5 vs. 28.4, $P < 0.001$), while radicality, plane of dissection, and pathological disease stages showed no differences. There were no statistical differences in morbidity and mortality. Intracorporeal anastomosis (23.7% vs. 4.5%, $P < 0.001$) was more commonly performed with a robotic approach.
Post-hoc analysis only including patients from centers performing both RRC and LRC (7 centers) was performed. In this analysis, a total of 1,850 patients, constituted of 1,469 (79.4%) LRC patients and 381 (20.6%) RRC patients were available for matching. Center was added to the propensity score calculation and the matching ratio was reduced to 1:1, due to a reduced data material. In the sensitivity analysis, only the findings of increased use of intracorporeal anastomosis with a robotic approach remained statistically significant.
Conclusion: In a nationwide analysis, robotic right colectomy was associated with a significantly higher lymph node yield and similar postoperative complications when compared to laparoscopic right colectomy, although caution is warranted as this could not be confirmed in post-hoc sensitivity analysis. The use of intracorporeal anastomosis was five-fold more frequent in the robotic group.

Root-cause analysis of post-colonoscopy colorectal cancers diagnosed within the Central Denmark Region

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Background: The term Post-colonoscopy colorectal cancer (PCCRC) refers to colorectal cancers (CRC) diagnosed after a negative colonoscopy. PCCRCs are estimated to account for eight percent of all CRCs and the majority are suggested to originate from missed or insufficiently resected colorectal lesions. As occurrence of PCCRC has become an important benchmark for colonoscopy quality, the World Endoscopy Organization (WEO) recently proposed a root-cause algorithm for determining the most plausible explanation of PCCRC detected within four years after colonoscopy. We aimed to identify causes of PCCRC in the Central Denmark Region using this WEO root-cause algorithm.
Method: We searched the Danish Cancer Registry and the Danish National Patient Registry to identify cases of PCCRC, defined as those who received a first-time diagnosis of CRC recorded within 6-48 months after a colonoscopy during 1995-2015. We then reviewed medical records to obtain detailed information on clinical, pathology, and colonoscopy findings. We applied the WEO algorithm to categorize causes of PCCRC as follows: 1) possible missed lesion, prior examination adequate; 2) possible missed lesion, prior examination inadequate; 3) detected lesion, not resected; or 4) likely incomplete resection of previously identified lesion. For patients with multiple

colonoscopies recorded in the 6-48 months interval, the colonoscopy recorded closest to CRC diagnosis was regarded as index colonoscopy.
Results: We identified 232 cases of PCCRC with an available endoscopy and/or pathology report. The median age at index colonoscopy was 71 years and 50% were males. Fifty-three percent were located in the proximal colon while 64% of all individuals diagnosed with PCCRC had a record of polyps before their PCCRC diagnosis. Bowel preparation was deemed good/excellent in 93%. In the root-cause analysis, 70% of all PCCRCs were categorized as 1) possible missed lesion, prior examination adequate; 2) 5.6% as possible missed lesion, prior examination inadequate; 3) 3.4% as detected lesion, not resected; and 4) 21% as likely incomplete resection of previously resected lesion.
Conclusion: The high number of PCCRC originating from possible missed lesions and incompletely resected lesions calls for improving the quality of colonoscopy procedures and polypectomy techniques. Future research is needed to assess whether the introduction of nationwide CRC screening in 2014 has improved colonoscopy quality.

Screening for colorectal cancer: Combined value of fecal immunochemical test, blood based cancer-associated proteins and age

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Background: Colorectal Cancer (CRC) is globally the third leading cause of cancer. The incidence in 2018 was 1.849.518 (10.2% of all cancers) and responsible for 880.792 deaths. Methods to reduce the burden of CRC is - for many countries – desirable and population-based screening modalities have already been implemented. Most population-based screening methods are stool-based tests such as Fecal Immunochemical Test (FIT). However, high detection of CRC using FIT is inextricably linked to high demand of colonoscopy capacity. Therefore, methods to maintain high sensitivity without compromising the colonoscopy capacity are needed.
Method: This study seeks to investigate if a Triage concept (combination of a FIT result, blood-based biomarkers associated with CRC and the age of the person) can correctly allocate subjects to a subsequent colonoscopy. This method might be a more effective way of screening for CRC and adenomas that balances both high finding of CRC's and adenomas without compromising the colonoscopy-capacity. Eligible subjects for this study were participants from the Danish Screening Program for Colorectal Cancer, an observational prospective cohort study: The Endoscopy III study – part 1. This included 4048 positive screened individuals (FIT result of ≥100 ng/ml). A multivariable logistic regression model (Triage) was used and benchmarked versus screening relying solely of the FIT result.
Results: The Triage model for the primary outcome (CRC vs remaining) performed significantly better ($p<0.0001$) than the FIT model alone. The Triage model showed an AUC of 73.7 [70.5;77.0] vs 68.9 [65.5;72.2] for the FIT model. The difference between the Triage model vs FIT model at fixed true positives (same findings of CRC) was approximately 13%, meaning that the colonoscopy capacity could be reduced by 13% without compromising findings of CRCs.
Conclusion: The Triage model might be a promising approach to reduce the amount of needed colonoscopies in FIT screening settings without compromising sensitivity (missed CRC). However, the results must be considered an early phase towards development of a Triage concept.

Short-term mortality in colorectal cancer: 30- and 90-day mortality predictions based on the Danish Colorectal Cancer Group's database

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Background: Worldwide, colorectal cancer has an estimated incidence of 1.900.000 per year causing 935.000 deaths in 2020. Curative treatment of the disease revolves around surgery with or without adjuvant oncological therapy, however surgery comes with risks of adverse outcomes. Targeting individualized mortality risk profiles prior to surgery may improve decision-making and potentially patient outcomes.
Method: The Danish Colorectal Cancer Group database (DCCG) contains granular data on over 76.000 patients with colorectal cancer. We obtained data from 2001-2019 and converted it into the Observational Medical Outcomes Partnership Common Data Model (OMOP-CDM) provided by the

Observational Health Data Science and Informatics (OHDSI). For short-term mortality study population, we considered patients operated for colorectal cancer. The outcome was all-cause mortality within 30 and 90 days. Using the OHDSI tool ATLAS, we designed cohorts and using the PatientLevelPrediction package and R studies were executed. We trained multiple machine learning models, but settled on LASSO Logistic Regression due to best discrimination, calibration and level of explainability. The models only used preoperative covariates as input.
Results: For both 30 and 90 day mortality models, 65.612 patients were included. Within 30 days, 3557 (5,42 %) patients died and within 90 days 5596 (8,52 %) patients died. Performance was assessed by discrimination and calibration. For 30-day mortality, AUROC was 0,871 and AUPRC was 0,35. 30-day mortality calibration showed a slope of 1,02, intercept of 0,04 and Brier score of 0,04. For 90-day mortality AUROC was 0,873 and AUPRC was 0,44. Calibration for 90-day mortality showed a slope of 1,02, intercept of 0,03 and Brier score of 0,04.
Conclusion: Utilizing OHDSI tools to train prediction models for post-operative short-term mortality using only preoperative covariates, showed good discrimination and moderate calibration. This indicates that designing predictive models with good performance for use at a preoperative MDT-conference is feasible. The current model is based only on the DCCG database, but to further improve performance, we aim to integrate data from Danish national registries including the National Patient Register, the Register of Laboratory Results, the Register for Medicinal Product Statistics and the Danish Pathology Register.

Short-term outcomes after neoadjuvant chemotherapy for non-metastatic colon cancer: a nationwide cohort study

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Background: Neoadjuvant chemotherapy (NCT) for non-metastatic colon cancer is not routinely used, and currently only recommended as a treatment option for a subgroup with T4b colon cancers in clinical guidelines. However, NCT may cause downstaging of the tumor and increase resectability and furthermore eradicate micrometastases and thereby improve long-term outcomes for patients with non-metastatic colon cancer. Concerns about increased risk of short-term postoperative complications following NCT have been raised and the purpose of this study was to describe a nationwide cohort of patients receiving NCT with respect to short term postoperative outcomes, and the quality of the surgical resection.
Method: This is a register-based descriptive cohort study. Using the Danish Colorectal Cancer Group Database, data was retrieved on all patients treated with NCT for colon cancer, following segmental colon resection with curative intent in 2014 – 2019 in Denmark.
Results: The cohort included a total of 342 patients all receiving NCT, whereof 327 (95.6%) patients were operated in an elective setting and 15 (4.4%) in an emergency setting. Microradical resection was achieved in 290 patients (88.4%). In total, 68 patients (20%) experienced postoperative complications. The majority of these were surgical complications, n = 43 (12.6%), with 29 patients (8.5%) experiencing a major surgical complication. Both the postoperative 30- and 90-day mortality rates were 0.9% (3 patients).
Conclusion: Our results indicate that in this selected population undergoing NCT, the surgery-related and histopathological quality indicators are comparable to outcomes reported in the literature on patients that go directly to surgery without NCT.

Surviving rectal cancer at the cost of a colostomy - a global survey of long-term HRQoL in ten countries

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Background: Colorectal cancer is the most common indication for ostomy formation. However, a stoma may negatively impact HRQoL. Knowledge about factors affecting HRQoL in these patients is needed to improve long term follow up in patients with a colostomy. In this global survey, generic and stoma specific health-related quality of life (HRQoL) was compared in 2557 patients with a permanent colostomy after surgery for rectal cancer across ten countries. Furthermore, we investigated predictors of reduced HRQoL.
Method: Cross-sectional cohorts of rectal cancer survivors with a colostomy in Denmark, Sweden, Spain, the Netherlands, China, Portugal, Australia, Egypt, Lithuania, and Israel completed a questionnaire regarding demographic and socioeconomic factors and stoma care along with the Colostomy Impact (CI) score, EORTC QLQ-C30 and five anchor questions assessing colostomy impact on HRQoL.
Results: A total of 2557 patients were included and response rates were 51-93%. Generic HRQoL differed significantly between countries, but resembled HRQoL of reference populations. However, a total of 25.8% of patients reported that their colostomy impairs their HRQoL 'some' or 'a lot'. This group had significantly unfavourable scores across all EORTC QLQ-C30 subscales compared to patients reporting 'no' or 'little' impairment on HRQoL. Multivariable logistic regression showed that stoma dysfunction measured by the CI score, financial burden from the stoma, unemployment, being single/widowed and young age were predictors of reduced stoma-related HRQoL.
Conclusion: Overall, HRQoL is preserved in rectal cancer survivors with a colostomy. A minor proportion experienced impaired HRQoL due to their colostomy and stoma dysfunction was the most important predictor of reduced HRQoL. To improve long-term QoL in this group, stoma dysfunction should be recognized and addressed, and patient factors should guide decision-making in stoma forming surgery.

Systematisk review til belysning af faktorer, der påvirker deltagelsen i systematisk afføringsprøvebaseret kolorektalcancerscreening

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Background: Kolorektalcancer (KRC) er den tredje hyppigste cancer i verden. EU anbefaler systematisk screening for sygdommen, og mange lande har allerede implementeret screening. Da effekten heraf er afhængig af deltagelsesraten, er formålet med dette studium at identificerere barrierer, facilitatorer og modificérbare faktorer for deltagelsen i systematisk, afføringsprøve-baseret, offentligt finansieret KRC-screening.
Method: Vi søgte for både kvalitative og kvantitative studier på PubMed, Embase, MEDLINE, CINAHL, Cochrane CENTRAL, Google Scholar og PsycINFO. Barrierer og facilitatorer til deltagelse blev opsummeret og analyseret.
Results: Vi inkluderede 21 studier. Rapporterede barrierer og facilitatorer blev inddelt i syv temaer, der reflekterede følgende faktorer: Psykologi, religion, logistik, helbredsrelaterede faktorer, viden/opmærksomhed, praktiserende læger og personlige/miljømæssige faktorer. Seks studier rapporterede at manglende deltagelse ikke var forårsaget af en negativ holdning til KRC-screening.

Conclusion: Ikke alle deltagelsesbarrierer er modificérbare. Resultaterne fra dette review tyder på, at det er muligt at øge deltagelsesraten, hvis befolkningens opmærksomhed og viden om KRC-screening, afføringsprøven og KRC øges, samt logistisk støtte tilbydes.

The effect of intracorporeal versus extracorporeal anastomosis in robotic right colectomy on intestinal perfusion: *A substudy to a multicenter RCT*

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Background: Previous studies have shown that intracorporeal anastomosis (ICA) in minimally invasive right colectomy improves postoperative recovery compared to extracorporeal anastomosis (ECA). It has been hypothesized that the creation of the anastomosis extracorporeally may cause mesenteric traction and compromised intestinal perfusion. The purpose of this study was to investigate the effect on intestinal perfusion in patients undergoing robotic right colectomy with either ICA or ECA.
Method: This was a preplanned substudy of a multicenter, triple-blind randomized clinical trial comparing ICA with ECA in patients undergoing robotic right colectomy for colonic cancer. Videos from intraoperative Indocyanine Green (ICG) fluorescence imaging were analyzed postoperatively with quantitative ICG perfusion assessment (q-ICG). q-ICG was performed by extracting perfusion metrics from the time-intensity curve generated from an image analysis software: F_{MAX}: maximal fluorescence intensity, T_{MAX}: time until maximal fluorescent signal, $T_{1/2MAX}$: time until half maximal fluorescent signal, time ratio ($T_{1/2MAX}/T_{MAX}$) and *slope*. ClinicalTrials.gov NCT03130166
Results: A total of 68 patients (33 ICA and 35 ECA) were available for analysis. Basic demographics were similar between the groups, except mean arterial blood pressure at the time of ICG infusion, which was significantly lower in the ICA group. We found a significantly steeper slope in the ICA group compared to the ECA group (6.3 vs. 4.7 AU/sec, $P = .048$). There were no significant differences in F_{MAX}, T_{MAX}, $T1/2_{MAX}$, and time ratio. Post-hoc analysis showed that patients with a prolonged length of hospital stay had a statistically significantly decreased F_{MAX} (lower fluorescence intensity;$P = .046$) and a decreased *slope* ($P = .05$*),* with the latter just short of statistical significance.
Conclusion: We found evidence of improved intestinal perfusion in ICA compared to ECA. The clinical impact of this finding is uncertain, but it serves as a potential pathophysiological explanation for the clinical recovery benefits described from ICA compared to ECA in the literature.

The outcome of minimal invasive treatment of high crypto-glandular anal fistula. A randomized clinical study

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Background: Video-Assisted Anal Fistula Treatment (VAAFT) may have a recurrence rate comparable to fistulectomy and sphincter repair (FSR) in the treatment of high anal fistula and with potential advantages in wound healing, functional outcome, and quality of life. The aim and objectives of the study are to compare the outcome of VAAFT with FSR of high cryptoglandular anal fistula. Primary outcome was fistula recurrence. Secondary outcomes were anal manometry, quality of life and fecal continence.
Method: A single center open label randomized controlled trial, including adults with high anal fistula. The surgical procedures were performed as one-day surgery and with standard postoperative regimen. All included patients were scheduled for follow-up at six months postoperatively including physical examination, MR scanning, anal manometry, quality of life assessment (RAND SF 36 questionnaire) and fecal continence (Wexner score). The study was registered on ClinicalTrials.org with identification number NCT02585167, initial release on 20th October 2015.
Results: A total of 45 patients were included with 23 patients allocated in the VAAFT group and 22 patients in the FSR group. Male to female ratio was 2.5:1 and mean age 43.8 years. Recurrence rate was 65% in VAAFT and 27% in FSR, with HR 4.18 (p= 0.016), and the length of the fistula as a risk factor had a significant association with recurrence with HR 1.8 (p=0.02). Besides

recurrences, there were no other medical or surgical complications and none of the patients needed a diverting stoma. There was a significant difference in quality of life in favor of FSR and in anal manometry in favor of VAAFT and a significant improvement in Wexner score in both groups.
Conclusion: FSR is more effective than VAAFT in the treatment of high anal fistulas.

Time from diagnosis to surgery and prognosis in colorectal cancer – a national register-based study

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Background: Cancer referral pathways were introduced in an attempt to streamline the courses for cancer patients and hoping to improve survival. Other factors such as smoking, physical fitness, alcohol consumption and preoperative anemia are important for the morbidity and mortality following cancer surgery. A strict timeframe from diagnosis to surgery leaves short time for prehabilitation to modify these factors.
The aim of this study was to examine the influence of time from diagnosis to surgery on overall mortality, recurrence and disease-free survival in colorectal cancer patients.
Method: Patients diagnosed with colorectal cancer between 2004 and 2015 were identified from the DCCG database. Additional information on the cohort was obtained from the Danish Civil Registration System, the Danish National Patient Register, the Danish National Pathology Register and the Danish Cancer Register in order to be able to determine survival and recurrence. Patients were followed until the end of 2016. The analyses were stratified for colon and rectal cancer and only patients with elective surgery with curative intent were included. The study population was divided in two groups depending on whether surgery was within or after 28 days from diagnosis (the allowed time from endoscopy to surgery according to the Danish cancer referral pathway). Cox proportional hazard model was used to examine overall mortality, recurrence and disease-free survival adjusting for relevant variables.
Results: A total of 15626 patients with colon cancer were included in the analyses and 8935 patients with rectal cancer. For colon cancer 77.8% (12161) were operated within 28 days from diagnosis whereas 49.3% (4403) of patients with rectal cancer were operated within this timeframe. For colon cancer cox regression for overall mortality, recurrence and disease-free survival showed hazard ratios of 1.12 (95% confidence intervals (CI) 1.05-1.20), 1.03 (95% CI 0.94-1.13) and 1.11 (95% CI 1.05-1.18) respectively. For rectal cancer the hazard ratios were 1.13 (95% CI 1.03-1.25), 1.09 (95% CI 0.98-1.22) and 1.09 (95% CI 1.01-1.18) respectively.
Conclusion: This study showed that both patients with colon and rectal cancer experienced increased mortality when operated later than 28 days from diagnosis. However, no difference in the incidence of recurrence was seen suggesting that something else than the cancer itself might be the problem. Identifying patients in need of preoperative optimization might help improve survival.

Time-of-day variation in the diagnostic quality of screening colonoscopies: a registry-based study

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Background: The diagnostic quality of screening colonoscopies has been found to differ between morning and afternoon. Specifically, the detection rate of adenomas has been found higher in the morning. Our aim was to assess if time-of-day dependent difference in colonoscopy quality exist in a Danish screening setting. Following national screening guidelines, an individual will be quarantined from screening invitations for eight years if the colonoscopy is without pathology. Therefore, it is of utmost importance to identify factors systematically affecting the detection of lesions.
Method: This was a single-centre study on screening colonoscopies performed between 2014 and 2018. Records were retrieved from the Danish Colorectal Cancer Screening Database and coupled with local data. The adenoma detection rate and the cecal intubation rate was compared between

morning (8- 12am) and afternoon (12-16pm) colonoscopies. Analysis was done using multivariable logistic regression.
Results: 3659 screening colonoscopies were included. The adenoma detection rate was 51% in the morning and 58% in the afternoon. Multivariable analysis found this statistically significant with the "afternoon vs. morning" odds ratio for adenoma detection being 1.4 (1.17-1.68, P<.001). The cecal intubation rate was 95.6% in the morning and 94.7%, non-significantly different.
Conclusion: The adenoma detection rate of screening colonoscopies was highest in the afternoon. Our study highlights the need for local/regional evaluation of factors affecting the colonoscopy quality in order to address such issues. A clean colonoscopy quarantines the patient from subsequent screening invitations for eight years. Therefore, any observed systematic differences in the quality must be addressed and revoked.

Treatment of bowel dysfunction following pelvic organ cancer

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Background: As cancer survival improves so does awareness on functional outcomes and the impact of late sequelae on quality of life (QoL). This study aims to present results on treatment of bowel dysfunction from our pelvic organ cancer late sequelae clinic.
Method: Patients with bowel dysfunction following pelvic organ cancer were offered treatment in a nurse-led clinic according to their symptoms. Patients completed validated electronic patient-reported outcome measures assessing bowel function and QoL. Information on treatment modalities was recorded. Data were prospectively registered in an online database in REDCap. The data collection is ongoing.
Results: To date, 345 cancer patients (50% rectal, 14% gynaecological, 12% anal, 11% colonic, 10% prostate, 3% other cancers) have started treatment for bowel dysfunction in the late sequelae clinic and are included in this study. The mean age was 64 years (range; 27-93) with 54.5% women. Of all the symptoms examined, the most frequent were faecal urgency (95%), fragmentation (93%), emptying difficulties (93%), incontinence (flatus 89%, liquid 60%, solid 35%) and obstructed defecation (80%). In total, 135 patients have completed treatment. Median duration of the treatment course was 142 days (IQR; 72-239). At the end of treatment, 54% were treated with fibre supplement, 39% with anti-diarrheal medication, 21% with rectal emptying aids, 19% with oral laxatives and 24% with transanal irrigation. Six patients had a stoma and one received sacral nerve stimulation. Significant improvements in all the examined symptoms ($p<0.001$), bowel-related QoL ($p<0.001$) and generic QoL ($p<0.001$) were observed.
Conclusion: Treatment of bowel dysfunction following pelvic organ cancer in our nurse-led clinic significantly improved the symptom burden and QoL. This encourages screening for and treatment of late sequelae after pelvic organ cancer.

Treatment of fistulizing perianal Crohn's disease by autologous microfat enriched with Adipose-Derived Regenerative Cells, ADRC

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Background: Stem-cell enriched fat grafting is thought to be more efficient than standard surgical therapy in the treatment of Crohn's anal fistula. In this pilot study, we evaluated short-term efficacy and safety of using fat graft enriched with Adipose-Derived Regenerative Cells (ADRC) as a treatment of Crohn's high anal fistula, in terms of healing rate and adverse events.

Method: Adult patients with transsphincteric anal fistula and Crohn's disease in remission were included. Two simultaneous procedures were performed as a same-day surgery, starting with liposuction from the abdominal wall followed by debridement of the fistula tract and closure of the internal fistula opening. About 30-50 ml lipoaspirate was then re-injected around the fistula tract. Using an automated processing Celution® 800/IV system, ADRC were prepared and injected around the fistula tract (average of 30 million stem cells). Postoperative clinical and MRI follow-up were performed at six months.The study was registered at ClinicalTrials.org with identification number NCT03466515.
Results: 12 adult patients were included and nine (75%) had complete clinical healing and eight (67%) radiological healing of the fistula by a single treatment. Complete wound healing was achieved at 12-weeks follow-up in 67% of the patients treated. There was clear and significant improvement in the fecal incontinence score and no major adverse events were observed.
Conclusion: ADRC-enriched autologous lipoaspirate can be safely used in the treatment of high anal fistula in patients with Crohn's disease with high rate of success.

Visual characterization of bacteria in colorectal cancer – an observational study

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Background: Colorectal cancer (CRC) is the third most common cancer worldwide, and more than 5.000 patients are diagnosed each year in Denmark. CRC is a genetic disease resulting from accumulated mutations that follow well-established molecular pathways. Notably, several studies have lately indicated that gut microbiota is linked to CRC carcinogenesis. A microbial imbalance and specific bacterial species can induce genomic mutations in human cells and exacerbate tumor-promoting inflammation. Some bacterial species have gained particular attention and are suspected of being associated with CRC progression; *Fusobacterium nucleatum* and *Bacteroides fragilis.* In the development of a research strategy against CRC that not only includes cancer surgery and perioperative oncological treatment, including immune- and chemotherapy, it would thus be essential to include the gut microbiota.
Method: In this study, we wish to examine the role of *F. nucleatum* and *B. fragilis* in CRC carcinogenesis. For this purpose, we have developed species-specific, synthetic DNA probes targeting these bacteria. Using Fluorescent *in situ* Hybridization, we can investigate the bio-geography, prevalence, and proportion of these bacteria in relation to human cells in formalin-fixed paraffin-embedded tissue biopsies from patients with CRC.
Results: We have validated our probes to assure correct differentiation between species under *in vitro* investigations in spiked lung tissue explanted from minks and *ex vivo* investigations in tumor biopsies collected from patients with CRC. A methodological presentation and representative images of this qualitative process are presented at the Danish Surgical Society's annual meeting.
Conclusion: With these probes, we can process biopsies collected from patients with CRC and healthy subjects. Expected future outcomes are: 1) a higher prevalence of *B. fragillis* and *F. nucleatum* in CRC biopsies, 2) a higher bacterial biomass in CRC biopsies, and 3) bacterial tissue infiltration displaying an invasive bacterial character as compared to normal tissue and control samples where bacteria are located in the protective mucus layer of the colon.

Hepatopancreaticobilliary (HPB)

Cell-free DNA promoter hypermethylation as a diagnostic marker for pancreatic ductal adenocarcinoma – an external validation study

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Background: We recently identified a diagnostic prediction model based on promoter hypermethylation of eight selected genes in plasma cell-free (cf) DNA, which showed promising results as a diagnostic biomarker for pancreatic ductal adenocarcinoma (PDAC). The aim of the present study was to validate this biomarker profile in an external patient cohort (the Danish BIOPAC study, ClinicalTrials.gov ID: NCT03311776) and examine any additional effect of serum CA 19-9.
Method: Patients with PDAC (n=346, stage I-IV) and chronic pancreatitis (n=25) were included. Methylation-specific PCR of a 28-gene panel was performed on serum cfDNA samples. The previously developed diagnostic prediction model (age>65 years, *BMP3, RASSF1A, BNC1, MESTv2, TFPI2, APC, SFRP1* and *SFRP2*) was validated alone and in combination with serum CA 19-9 in this external patient cohort.
Results: Patients with PDAC had a higher number of hypermethylated genes (mean 8.11, 95% CI 7.70-8.52) than patients with chronic pancreatitis (mean 5.60, 95% CI 4.42-6.78, p=0.011). Validation of the diagnostic prediction model yielded an AUC of 0.77 (95% CI 0.69-0.84) compared with an AUC of 0.86 (95% CI 0.81-0.91) in the primary study. The combination of serum CA 19-9 and our test had an AUC of 0.93 (95% CI 0.89-0.96) in the primary study and an AUC of 0.85 (95% CI 0.79-0.91) in the validation study.
Testing the combined model in patients with stage I and II disease reached an AUC of 0.89 (95% CI 0.83-0.95) in the primary study and an AUC of 0.82 (0.75-0.89) in the validation study. In stage IV disease the combined model reached an AUC of 0.95 (95% CI 0.92-0.98) in the primary study and an AUC of 0.90 (95% CI 0.84-0.95) in the validation study.
Conclusion: In this validation study, PDAC was associated with a higher number of hypermethylated genes in serum cfDNA than chronic pancreatitis. Our diagnostic test was superior to the predictive value of serum CA 19-9 alone in both the primary and the validation study. The combination of our test with CA 19-9 may serve as a clinically useful diagnostic biomarker for PDAC.
Currently, we are converting the analysis to digital PCR for further optimization of the performance and to make the method less laborious.

Clinical outcomes following endoscopic management of acute pancreatitis with large (> 15 cm) walled-off pancreatic necrosis: A retrospective, single tertiary center cohort study

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Background: Development of walled-off pancreatic necrosis (WON) is associated with considerable morbidity and mortality. The use of minimally invasive techniques in the treatment of WON is well established, although data on treatment outcomes in large fluid collections are lacking. The aim of this study was to assess the clinical outcomes following treatment with minimally invasive techniques of WON > 15 cm at a single tertiary center.
Method: Consecutive patients with WON > 15 cm between 2010-2020 were identified retrospectively from a prospectively maintained database. Indication for intervention was symptomatic WON that did not respond to conservative management. Symptoms included infection, gastric outlet syndrome, and/or intractable pain. Patients with previous endoscopic drainage procedures, chronic pancreatitis, index intervention ≥ 90 days after acute pancreatitis onset were excluded. The primary outcome was in-hospital mortality and length of stay (LOS).
Results: A total of 144 patients (79 males) with WON > 15 cm with a median age of 60 years IQR (49-69) were included. The most common etiologies were gallstone (52%), alcohol (17%) and post-ercp pancreatitis (17%).The median WON-diameter was 19 cm, IQR (17-22).
Endoscopic transmural drainage was performed at index intervention in 134 (93%) patients, Video-assisted retroperitoneal debridement (VARD) in 4 (3%) patients and percutaneous self-

expandable metallic stent in 6 (4%) patients. Sixty-eight (42%) patients needed intensive care support during hospital stay. The median length of stay was 53 days (IQR 39-76) and 61 (42%) patients needed intensive care support during hospital stay. As 143 patients (99%) were managed using endoscopic techniques, only one (0.7%) patient needed an open necrosectomy. Procedure-related adverse events occurred in 10 (7%) patients. Overall, 24 patients (17%) died during admission, all due to multi-organ failure. The median follow-up was 35 months (IQR 15-63.5). Complete resolution was achieved in all remaining patients (99.3%).
Conclusion: Endoscopic treatment of WON larger than 15 cm is practical and has a high rate of success, minimal need for open necrosectomy, low morbidity, and acceptable rates of mortality.

ERCPs with single-use disposable duodenoscopes – a case series

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Background: Endoscopic retrograde cholangiopancreatography (ERCP) is an interventional procedure performed using a duodenoscope, generally in a non-sterile manner. When performing a laparoscopically assisted transgastric ERCP, the operational field, therefore, needs to be redraped before using the non-sterile reusable duodenoscope. The introduction of the new single-use disposable duodenoscope makes it possible to perform perioperative transgastric and rendezvous ERCP in a completely sterile manner. It might also decrease the risk of patient-to-patient transmission of infection in other settings. The aim of this report is to illustrate the feasibility of the single-use disposable duodenoscope in both sterile and non-sterile settings.
Method: This case series includes seven patients that underwent different types of ERCPs using the single-use duodenoscope (EXALT Model D; Boston Scientific Corporation, Marlborough, Massachusetts, USA). All patients were under general anaesthesia. All procedures were performed by expert endoscopists at Zealand University Hospital. We report the indication for all the procedures, details of the procedures, and follow-up for all patients.
Results: Using single-use disposable duodenoscopes, seven ERCPs were successfully performed, including one ERCP with SpyGlass, three perioperative rendezvous ERCPs and two transgastric ERCPs. All patients were discharged after the predicted time and no postoperative complications were reported. The single-use disposable duodenoscope was feasible in both sterile and non-sterile settings, matching the reusable duodenoscope.
Conclusion: A recent report had found that the single-use duodenoscope is comparable to a reusable duodenoscope, when ERCPs were performed by expert endoscopists. This is consistent with our own results. The introduction of the new duodenoscope makes it possible to perform a perioperative ERCP without breaking sterility during the procedure. Furthermore, the single-use duodenoscope could be a favourable alternative when it is crucial to minimize the risk of contamination in non-sterile settings. Disposable scopes are also more mobile than reusable scopes, making it possible to perform some endoscopic procedures without first moving the patient to the endoscopic unit or the operating room. Our report demonstrates the feasibility and the many potential advantages of the new EXALT disposable single-use duodenoscope.

Pancreatic cysts in North Denmark Region - a research database

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Background: Pancreatic cysts appear more often due to better and more frequently use of computer tomograhy (CT) and other radiological modalities. The pancreatic cysts are mainly benign and clinical harmless, but certain subgroups have the potential over time to transform into

pancreas cancer. International and national guidelines recommend surveillance, but the efficacy of these programmes is largely unknown.
Method: Longitudinal follow-up study of the general population in the North Denmark Region (580.000 inhabitants), with expected inclusion of 75-150 participants per year from 2021 to 2026. Follow-up until censure or 10 years. North Denmark Region is a demographically and socioeconomically representative part of Denmark. Patients with diagnosed pancreatic cysts of any kind (exept pancreatic pseudo cysts) are enrolled and followed according to current accepted national and international guidelines.
Results: **Study 1 - Prevalence:** All patients with one or more pancreatic cysts are included over a 5-year period to estimate the incidence per year and the prevalence of pancreatic cysts in the North Denmark region.
Study 2 - Characteristics: Number of cysts, size and worrisome features is registered for cancer risk assessment analysis. Patients are followed according to guidelines and progression is registered. In addition morbidity, mortality and outcome is registered among patients, who is offered surgical treatment.
Study 3 - Biomarker study: In addition to standard cancer biomarkers, DNA hyper-methylation profiles and Nuclear magnetic spectroscopy is performed and association to progression of cysts or transformation into cancer is evaluated.
Study 4 - long time follow-up: The cohort will be followed for 10 years to uncover the consequence of implementation of the guidelines. The risk of cancer development over time will be analysed.
Conclusion: These Four studies aim to make a detailed description of frequency, characteristics and malignant potential of incidental found and symptomatic pancreatic cysts in a representative cohort with focus on morbidity, mortality and selecetion of the right patients for surgery.

Preoperative high dose glucocorticoids for early recovery after liver resection: a randomized double-blinded trial

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Background: Glucocorticoids modulate the surgical stress response. Earlier studies have shown that high dose preoperative glucocorticoids reduce postoperative inflammatory markers and specific biomarkers of liver damage compared to placebo and suggest a reduced complication rate and length of stay after liver surgery. However, there are no studies with a clinical primary outcome or on early recovery outcomes. The aim of this study was to investigate whether a single high-dose of preoperative glucocorticoid reduces complications in the immediate postoperative phase after liver surgery.
Method: This study was a single-centre, double-blinded, parallel, randomized controlled trial investigating preoperative methylprednisolone 10 mg/kg (high-dose) versus dexamethasone 8 mg (standard-dose postoperative nausea prophylaxis) in patients scheduled for open liver resection. The primary outcome was number of patients with a complication in the postanaesthesia care unit, secondary outcomes included length of stay, pain and nausea during admission and 30-day morbidity.
Results: One-hundred-and-seventy-four patients (n = 88 in high-dose group, n = 86 in standard-dose group) were randomized and analyzed (mean age 65 (±12) years, 67% men, 30% had no serious comorbidities, 25% underwent major liver resection). Complications occurred in the postanaesthesia care unit in 58% (n = 51) in the high-dose group and 67% (n=58) in the standard-dose group (RR 0.859, 95%CI 0.682 to 1.082, p=0.213). Length of stay was median 4 days in both groups (p=0.160). 30-day morbidity and mortality was similar in both groups.
Conclusion: A High-dose of preoperative glucocorticoids did not reduce acute postoperative complications after open liver resection compared to a standard-dose.

Short- and long-term outcomes after multimodal treatment of pancreatic duct leakage in patients with chronic pancreatitis

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Background: In patients with chronic pancreatitis, pancreatic duct leakage is associated with a prolonged disease course and serious complications. Surgery has traditionally been the treatment of choice; however, a multimodal treatment with endoscopy as a minimally invasive primary therapy has the potential to improve outcomes. The aim of this study was to assess the efficacy of this multimodal treatment of pancreatic duct leakage.
Method: In a retrospective design, we evaluated patients with chronic pancreatitis who had an amylase content greater than 200 U/L in either ascites or pleural fluid, who were treated between 2011 and 2020. The primary endpoint was treatment success, defined as the resolution of pancreatic pleural fluid and ascites.
Results: Twenty-seven patients (22 males, median age 60, median ASA score 3) were included. Endoscopic retrograde pancreatography was performed in 23 patients (85%) and transpapillary stenting of the main pancreatic duct was carried out in 22 patients (96%). Dilation of the main pancreatic duct was carried out in 17 patients (74%), while pancreatic sphincterotomy was performed in 14 patients (61%). Twelve patients (44%) were treated with somatostatin analogues, parenteral nutrition and were "nil by mouth" for a median period of 11 days (range 4-34). Six patients (22%) had extracorporeal shock wave lithotripsy due to stones in the main pancreatic duct. One patient (4%) was referred for surgery. All twenty-seven patients (100%) were treated with success after a median of 21 days (range 5-80). Five patients (23%) experienced an adverse event due to endoscopic retrograde pancreatography – all of which were mild and successfully treated either endoscopically or conservatively.
Conclusion: Multimodal treatment of pancreatic duct leakage is effective, with a minimal need for surgery.

Oesophagogastric (ECV)

Anti reflux mucosectomy

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Background: Gastroøsofageal reflukssygdom er en folkesygdom. For behandlingsrefraktære patienter har det kirurgiske tilbud indtil nu bestået af laparoskopisk fundoplikation. Andre minimalt invasive og endoskopiske behandlingsmodaliteter, som oftest med brug af omkostningstunge devices, har ikke vundet indpas eller er taget af markedet igen.
I Japan har man konstateret, at patienter der har fået foretaget EMR ved cardia efterfølgende har færre reflukssymptomer. Denne effekt udnyttes ved anti-reflux mucosektomi (ARMS), der er en ny endoskopisk metode til behandling af refluks. Dette studie rapporterer de første erfaringer med ARMS i Danmark.
Method: ARMS er en endoskopisk teknik, hvor der foretages mucosaresektion i ventriklen under den gastroøsofageale overgang. Resektionen skal involvere ca. 270 grader af cirkumferensen. Resektionsfladen vil under opheling medføre kontrolleret striktur, der fungerer som en refluksbarriere.
Denne studie beskriver en pilotserie med otte inkluderede patienter. Alle havde verificeret patologisk refluks med symptomkorrelation ved 24-timers pH-måling, måtte maksimalt have hiatushernie på 3 cm og var behandlingsrefraktære overfor protonpumpehæmmere i maksimal dosering. Teknisk succes, per- og postoperative komplikationer blev registreret. Herudover registreredes symptomscore (0-5, hvor 0 er meget tilfreds og med ingen symptomer, og 5 er meget utilfredsstillende med konstante symptomer) forbrug af protonpumpehæmmer præoperativt og ved seks måneders follow-up.
Results: Alle otte procedurer var teknisk mulige at gennemføre. Peroperativt opstod et tilfælde af mikroperforation, som blev behandling med antibiotika og aflastende sonde uden behov for yderligere intervention. De øvrige patienter kunne udskrives i første postoperative døgn med Paracetamol som eneste analgetika. Én patient udviklede efterfølgende symptomgivende stenose, der måtte behandles med ballondilatation med god effekt.

Symptomscore blev reduceret fra gennemsnitligt 3,9 til 1 ved 6 måneders follow-up (p=0.0015). Seks patienter kunne nedsætte deres forbrug af PPI, hvoraf fire patienter blev fuldstændigt symptomfri uden behov for medicinsk behandling. Én patient havde ikke effekt af behandlingen, men heller ingen bivirkninger.
Conclusion: ARMS er en lovende og billig behandling til patienter med refluks uden større hiatushernier. Pilotseriens resultater er sammenlignelige med publicerede resultater. Yderligere studier er nødvendige for at fastligge hvor ARMS har plads i behandling af reflukssygdom.

A rare case of collagenous gastritis presenting with dyspepsia

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Background: Collagenous gastritis is a rare condition with less than 100 cases reported worldwide. It is defined as subepithelial deposition of collagen thicker than 10 micrometers. The clinical presentation differs, but abdominal pain, anemia and watery diarrhea are frequent symptoms.
Method: A 36-year-old female with persistent dyspepsia was referred for an esophagogastroduodenoscopy (ESG). She presented with globulus, dyspepsia, and a burning sensation in the stomach for 6 months, which gradually emerged also to involve the esophagus. The symptoms were most prominent in the morning especially when drinking water on empty stomach.
Results: An ESG showed changes in the mucosa in the gastroesophageal junction, raising suspicion of Barrett's esophagus. Biopsies demonstrated collagenous gastritis with collagen deposits measuring 40 micrometers. An additional ESG was performed 6 weeks later to confirm the diagnosis. The patient's symptoms were unchanged with lack of response to PPI and antacids. No mucosal changes were observed. In particular, no mucosal changes could be demonstrated at the site of the gastroesophageal junction (GEJ). Biopsies obtained from the fundus area demonstrated similar changes as initially reported from the GEJ with a similar although less pronounced subepithelial collagen band measuring >10 micrometers. Biopsies obtained from the duodenum, the antrum, the corpus and the GEJ were normal.
Conclusion: Collagenous gastritis is a rare condition with unknown pathogenesis and without consensual recommendations for treatment. This present case raises the question whether persistent dyspepsia should be examined for collagenous gastritis. Thus, further studies are needed to establish whether dyspepsia can be a symptom of collagenous gastritis.

Endoscopic calcium electroporation in patients with Barrett's esophagus high-grade dysplasia

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Background: Barrett's esophagus (BE) is a metaplastic epithelial change that can develop from low-grade dysplasia to high-grade dysplasia (HGD), possibly resulting in invasive esophageal adenocarcinoma (AC). Studies have shown that areas of BE HGD hold small foci of AC in up to 25% when endoscopic resections had been performed.
Calcium electroporation (Ca-EP) is a treatment where a local injection of calcium is combined with locally applied electrical pulses to increase the individual cells' permeability and calcium uptake. The increased levels of calcium ultimately lead to necrosis of the cell. Ca-EP has been used as an anticancer treatment in several preclinical and clinical studies.
This study presents the first results with calcium electroporation in the esophagus.
Method: Six patients with BE HGD scheduled for an endoscopic submucosal dissection (ESD) were treated with Ca-EP six weeks prior to the planned ESD. The treatments were performed at Rigshospitalet from October 2020 to February 2021. All side effects and adverse events (AEs) were registered up to two weeks after the treatment, and the patients were later evaluated with gastroscopy.
After endoscopically defining the treatment area, calcium chloride at a concentration of 225 mM

was injected into the target area. Electroporation was performed using a chamber electrode (Endove, Mirai, Ireland) attached to the endoscope. Pulses were delivered using the ePore (Mirai, Ireland), consisting of 8 pulses of 100 µs, at 1000 V.
Results: No serious adverse events were observed. Treatment was well tolerated. The observed AEs included: retrosternal pain, cough, and headache. In four patients, a hyperemic area was observed initially after Ca-EP corresponding to treated areas. Up to a week after treatment, a fibrinous coating (three patients) and ulcers (four patients) were observed. One patient had to undergo CT scans twice after treatment due to pain and a visually large fibrinous material, which showed no perforation.
Conclusion: Ca-EP in patients with BE HGD was conducted without serious adverse events. This study is the first to present results of Ca-EP in premalignant state in the esophagus and paves the way for larger studies to clarify the effects and side effects of this new treatment method.

Nøjagtighed af stadieindeling og lymfeknude spredning ved tidlig overfladisk øsofagus cancer – et retrospektivt multicenter studie

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Background: Diagnosticeret i et tidligt stadium kan overfladisk øsofagus cancer fjernes kirurgisk eller endoskopisk. T1a tumorer fjernes ofte ved endoskopisk resektion (ER), hvorimod T1b - tumorer fortrinsvis fjernes kirurgisk på grund af mulig spredning til lymfeknuder. De diagnostiske billedmodaliteter (computertomografi (CT) og endoskopisk ultralyd (EUS)), der bruges til at skelne mellem T1a- og T1b -tumorer og til at opdage maligne lymfeknuder, er imidlertid upræcise. Dette studie havde til formål at gennemgå nøjagtigheden af præoperativ lokalregional stadieindeling ved overfladisk øsofagus cancer.
Method: Dette var en retrospektiv multicenter undersøgelse, der inkluderede patienter med kliniske stadie T1 (cT1) øsofagus tumorer som blev behandlet på et højt specialiseret center i Danmark mellem 1. juni 2016 og 31. december 2020. Patienter blev enten henvist til en operation (øsofagusresektion med gastric-pull up) eller en ER. Patienter, der modtog neoadjuverende behandling, blev ekskluderet. Resultaterne fra de præoperative diagnostiske undersøgelser blev sammenlignet med patologirapporten for at fastsætte den diagnostiske nøjagtighed.
Results: 68 patienter blev inkluderet i kohorten, 34 patienter blev opereret, og 34 patienter fik foretaget ER som indledende behandling. Den positive prædiktive værdi (PPV) for CT (ved stadie inddelt som en T1-tumor) var 77% (95% CI: 0,59-0,88) og PPV for EUS (ved stadieindeling som en T1a eller T1b-tumor) var 52% (95%CI: 0,32-0,72) og 60% (95%CI: 0,36-0,82). Seks patienter havde maligne lymfeknuder i de kirurgiske resektater, men ingen af disse blev identificeret forud for operationen.
Conclusion: Hverken CT eller EUS er præcise værktøjer til at skelne slimhinde (T1a) fra submukosale (T1b) øsofagus tumorer. Ydermere er lymfeknude spredning sjælden ved de overfladiske tumorer, men når det forekommer, opdages det sjældent præoperativt.

Palliation of dysphagia in patients with non-curable esophageal cancer – a retrospective Danish study from a highly specialized center

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Background: A majority of the patients with non-operable esophageal cancer suffer from dysphagia and weight loss. Several endoscopic treatment options are available such as stent placement (most used modality), argon plasma coagulation, and esophageal dilatation. It is still debated which treatment is the most efficient and in some patients, stent placement may even negatively affect survival.
Method: This retrospective study aimed to map the use of endoscopic dysphagia relieving interventions. Data was collected at the Dept. of Surgery and Transplantation, Rigshospitalet, Copenhagen, Denmark. Patients with non-curable esophageal cancer referred to the hospital from 2016 to 2019 were included. Time and type of treatment, as well as complications and the need for repeated treatments were registered. Further, associations between treatment modality and survival outcomes were investigated.
Results: In the study, 601 patients with esophageal cancer scheduled for palliative therapy were included. Forty-five percent of the patients (272) were treated with an endoscopic procedure due to dysphagia (82% had a stent placed). The median time from diagnosis to intervention was 24 days. The overall complication rate was 35% (38% in the stent group and 20% in the non-stent group) and 13% of the patients were readmitted due to a complication. After 26% of the procedures, a repeated treatment was required. Having an endoscopic intervention was not associated with worsened survival compared with the non-intervention group. However, there was a trend indicating that the non-stent group had increased survival compared with the stent group (HR: 0.72, 95%CI: 0.50-1.03, p=0.07).
Conclusion: Complication rates after the endoscopic interventions were modest, and only a few required hospitalization. The need for repeated interventions was considerable. Regarding survival, a trend in favor of the non-stent group was seen. New interventions and tailored approaches that may positively affect functional and long-term oncological outcomes are highly warranted.

Reoperation, mortalitet og morbiditet efter antirefluksskirurgi i Danmark 2000-2017: Et nationalt registerbaseret kohortestudie af tendenser i anvendelse og resultater

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Background: Antirefluksskirurgi er en effektiv behandling for patienter, der lider af gastroøsofageal refluksssygdom og har manglende effekt af medicinsk terapi. Kirurgi indebærer risiko for komplikationer og eventuelt senere reoperation. Disse reoperationer skyldes oftest recidiv af refluksssymptomer eller paraøsofageal herniering. Eksisterende studier af reoperation, komplikationer og anvendelse af antirefluksskirurgi stammer oftest fra enkelte centre og risikerer dermed at undervurdere både reoperations- og komplikationsrate.
Formålet med dette nationale populationsbaserede kohortestudie var at undersøge reoperationsrater og komplikationer efter primær antirefluksskirurgi samt udvikling i anvendelse af antirefluksskirurgi i Danmark 2000-2017.
Method: Dette retrospektive registerstudie inkluderede alle patienter i Danmark, der fik foretaget antirefluksskirurgi 2000-2017, og indeholdte data fra nationale sundhedsregistre. Reoperationsrate 1, 5, 10 og 15 år efter primær antirefluksskirurgi i form af reoperativ antirefluksskirurgi eller operation for hiatushernie, komplikationsrate og mortalitet blev beregnet. Anvendelsen af antirefluksskirurgi i indgreb pr 100.000 indbyggere pr år blev sammenlignet med anvendelsen af protonpumpehæmmere.
Results: Studiet indeholdt 4258 procedurer udført på 3717 patienter. 465 patienter fik foretaget reoperation. 1-, 5-, 10- og 15-års reoperationsrate var 3,1%, 9,3%, 11,7% og 12,8%. Alder, køn og endoskopisk ballondilatation efter primær kirurgi var associeret med efterfølgende reoperation. 30- og 90-dages mortalitet var ens for primær kirurgi og reoperationer. Komplikationsraten var højere for reoperativ antirefluksskirurgi (7,0% vs 8,3% ved 30- og 90 dage) sammenlignet med primær kirurgi (3,4% og 4,8% ved 30- og 90 dage). Alder, Charlson Comorbidity Index >1 og brug af åben operationsteknik var associeret med postoperative komplikationer.
Anvendelsen af antirefluksskirurgi var størst i 2001 med 5,9 indgreb pr 100.000 indbyggere og mindst i 2008 med 2,8 indgreb pr 100.000 indbyggere. Forbruget af protonpumpehæmmere steg fra 3.370 brugere pr 100.000 indbyggere i 2000 til 10.284 brugere pr 100.000 indbyggere i 2017.
Conclusion: I dette nationale populationsbaserede registerstudie var reoperationsraten 15 år efter antirefluksskirurgi 12,8%. Reoperativ antirefluksskirurgi havde højere komplikationsrate

sammenlignet med primær kirurgi. Anvendelsen af antirefluksкirurgi i Danmark 2000-2017 faldt, mens forbruget af protonpumpehæmmere steg.

Sene kirurgiske komplikationer efter laparoskopisk gastric bypass og gastric sleeve: et nationalt registerbaseret kohortestudie

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Background: Bariatrisk kirurgi er på nuværende tidspunkt den mest effektive behandling af svær fedme og fedmerelaterede komorbiditeter. Indtil 2010 har man i Danmark primært opereret patienter med gastric bypass, siden da er antallet af gastric sleeve operationer steget. Gastric sleeve anses som en sikker procedure, men forholdene på lang sigt er fortsat sparsomt undersøgt. Internationale studier beskriver en øget risiko for operative interventioner på lang sigt efter gastric bypass sammenlignet med gastric sleeve.
Formålet med studiet er en detaljeret undersøgelse af sene komplikationer efter henholdsvis gastric bypass og gastric sleeve, derudover undersøgelse af risiko og risikofaktorer for udvikling af sene komplikationer.
Method: Alle patienter opereret med gastric bypass eller gastric sleeve i privat eller offentligt regi i Danmark i perioden 2008-2018 inkluderes. Undersøgelsen baseres på data fra Dansk Fedmekirurgi Register og Landspatientregisteret suppleret med data fra Danmarks Statisk, CPR-registeret og Lægemiddeldatabasen.
Langtidskomplikationer opgøres ved gennemgang og kategorisering af diagnose- og operationskoder fra Landspatientregisteret. Risiko for specifikke komplikationer bestemmes ved beregning af kumulerede incidens proportioner samt opsætning af COX regression og Kaplan Meier plots. Risiko for >1 komplikation vil bestemmes på samme vis.
Results: I alt er 18,228 patienter inkluderet i studiet, hvoraf 16,506 er opereret med gastric bypass og 1722 er opereret med gastric sleeve.
Data analyserne pågår aktuelt og de endelige resultater er klar til oktober.
Conclusion: Formuleres når alle data er analyseret.

Toxisitet og morbiditet ved behandling med laparoskopisk hypertermisk intraperitoneal kemoterapi i kombination med standardbehandling for lokal avanceret ventrikel cancer: ProPEC-I trial

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Background: Trods prognostiske fremskridt ved behandling af ventrikelcancer (VC), dør fortsat ca. 400 mennesker årligt i Danmark. Sygdommen er aggressiv og diagnosticeres ofte sent. Blandt den 1/3 af patienterne, der kan tilbydes kurativt intenderet behandling, progredierer 10-15% præoperativt, primært i peritonealkaviteten hvor systemisk kemoterapi har dårlig penetrans. Ved spredning til peritoneum er medianoverlevelsen ubehandlet 3,1 mdr., med pallierende kemoterapi 6-14 mdr., mens 2-og 5-årsoverlevelsen er hhv. 11% og 0%.
Vi undersøger en ny behandling til forebyggelse af progression under præoperativ kemoterapi (POC). Studiet introducerer laparoskopisk administreret HIPEC forud for standardbehandlingen for lokalavanceret VC. Vi ønsker at afklare, om behandlingen er gennemførlig og sikker.
Method: Randomiseret kontrolleret feasibility studie, inkluderende 14 patienter som randomiseres 1:1 til HIPEC/No-HIPEC. Kontrolgruppen modtager standardbehandling med POC, herefter standard D1+ gastrektomi. Interventionsgruppen modtager ProPEC-I regime, bestående af en cyklus laparoskopisk administreret HIPEC med 100 mg/m2 cisplatin ved 40°-41° C, givet ved diagnostisk laparoskopi. Herefter følges standardregimet.
End-points er toxisitet- og morbiditetsrater og patientrapporteret Quality of Life (QoL).
Patienterne følges mhp. 3-års progressionsfri overlevelse samt 5-års overlevelse.
Dette studie er det første i verden til at undersøge laparoskopisk HIPEC før standardbehandling for ventrikel cancer.
Results: Otte patienter er aktuelt inkluderet; heraf har fem patienter gennemført 1 års follow-up. Fire patienter har modtaget ProPec-1 regimet. De fire patienter, som har gennemført ProPEC-I

regimet, har alle påbegyndt standardbehandlingen uden forsinkelser. Een i kontrolgruppen er recidiveret og afgået ved døden inden 1-års follow-up
Conclusion: Dette studie er det første i verden til at undersøge profylaktisk laparoskopisk HIPEC før standardbehandlingen for VC. Studiet undersøger primært, om ProPEC-I er sikkert, samt om regimet giver forsinkelser ift. opstart af standardbehandlingen. Yderligere studier vil være nødvendige til vurdering af muligheden for at forebygge peritoneal progression, og dermed øge overlevelsen for VC.

Paediatric surgery

Prophylactic antibiotics in full-thickness rectal biopsies for Hirschsprung's disease

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Background: There are no general accepted guidelines on the use of prophylactic antibiotics in full-thickness rectal biopsies (FTB) in children suspected for Hirschsprung disease. The primary objective of this study was to examine the effect of prophylactic antibiotics on infectious and overall complications rate in FTB in children under the age of one year.
Method: A retrospective chart review of patients below the age of one year who underwent FTB. Two time periods were compared – one with and one without the routine use of prophylactic antibiotics. The treatment included cefuroxime 100 mg/kg and metronidazole 20 mg/kg administered intravenously at anesthesia induction followed by peroral administration of amoxicillin 50 mg/kg with Clavulanic acid 12.5 mg/kg three times a day t.i.d. for three days postoperative.
Results: In the group with prophylactic antibiotics the infectious complications rate was 3.3% compared to 13.4% in the group without (p=0.03). The overall complication rate was 11.3% and 15.2%, respectively (p=0.43). Ninety percent of children who developed fever presented themselves within the first 48 hours after biopsy, and no positive blood cultures were found.
Conclusion: In FTB performed in children under 1 year of age prophylactic antibiotics significantly reduced the rate of infectious complications, but not the overall rate of complications.

Hernia

Alterations in the abdominal wall musculature after endoscopic anterior and open posterior component separation

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Background: Effects of component separation (CS) on abdominal wall musculature have only been investigated in smaller case series. The study aimed to compare abdominal wall alterations following endoscopic anterior component separation (EACS) or transverse abdominis release (TAR).
Method: Computed tomography scans were evaluated in patients who underwent open ventral hernia repair with TAR or EACS. Lateral abdominal wall muscle thickness and displacement were compared with preoperative images after bilateral CS and the undivided side postoperatively after unilateral CS.
Results: In total, 105 patients were included. The mean defect width was 12.2 cm. Fifty-five (52%) and 15 (14%) underwent bilateral and unilateral EACS, respectively. Five (5%) and 14 (13%) underwent bilateral and unilateral TAR, respectively. Sixteen (15%) underwent unilateral EACS and contralateral TAR. Complete fascial closure was achieved in 103 (98%) patients. The external oblique and transverse abdominis muscles were significantly laterally displaced with a

mean of 2.74 cm (95% CI 2.29-3.19 cm) and 0.82 cm (0.07-1.57 cm) after EACS and TAR, respectively. The combined thickness of the lateral muscles was significantly decreased after EACS (mean decrease 10.5% [5.8-15.6%]) and insignificantly decreased after TAR (mean decrease 2.6% [-4.8-9.5%]), mean reduction difference EACS versus TAR 0.22 cm (-0.01-0.46 cm). One (1%) patient developed an iatrogenic linea semilunaris hernia after EACS. The recurrence rate was 19% after mean 1.7 years follow-up.
Conclusion: The divided muscle was significantly more laterally displaced after EACS compared with TAR. The thickness of the lateral muscles was slightly decreased after EACS and unchanged after TAR.

Higher risk of complications after umbilical hernia repair in patients with liver cirrhosis compared with other high-risk patients

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Background: Umbilical hernia is a common condition in patients with liver cirrhosis and it may have serious consequences. This national registry-based cohort study aimed to evaluate the risk of reoperation for complications, readmission, and mortality after emergency and elective umbilical hernia repair in patients with liver cirrhosis compared with patients with other severe comorbidities.
Method: All patients with liver cirrhosis who underwent elective or emergency repair for an umbilical hernia between 1st of January 2007 and 31st of December 2018 were identified. The patients were propensity score matched 1:2 with patients undergoing emergency or elective repair having other severe comorbidities (Charlson-Index ≥ 3) but no liver cirrhosis. The primary outcome was reoperation for complications within 30 days. Secondary outcomes were readmission, and mortality. Univariate and multivariate regression analyses were performed to identify independent risk factors for reoperation for complications, readmission, and mortality.
Results: A total cohort of 756 patients were included of whom 252 (33 %) patients had liver cirrhosis and 504 (66 %) patients had other severe comorbidities. The median follow-up time was 4.79 years. A total of 42% (106/252) of the patients with liver cirrhosis underwent emergency repair. In total, 164 of the 756 patients underwent reoperation for complications within 30 days. The risk of reoperation for complications was significantly higher in patients with cirrhosis compared with the non-cirrhosis group (47.6 % vs. 29.4 %, P<0,001). Readmission within 30 days was significantly higher in patients who underwent emergency repair, but no difference was found comparing the cirrhosis and the non-cirrhosis patient groups. Mortality within 90 days was significantly higher after emergency repair but without differences between patients with or without cirrhosis.
Conclusion: More than 40% of patients with liver cirrhosis undergo emergency umbilical hernia repair. Emergency repair is associated with higher risk of morbidity and mortality. Patients with cirrhosis have a higher risk of reoperation for complication compared with patients with other severe comorbidities.

High rate of incisional hernia observed after mass closure of burst abdomen

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Background: This study investigated the development of incisional hernia after implementation of a standardized surgical treatment strategy for burst abdomen in abdominal midline incisions with a continuous mass closure technique. Due to earlier results on the technique showing low rates of acute re-dehiscence, a long term follow up study was performed to document the development of incisional hernias.

Method: The study was a single-center, observational study evaluating all patients treated for burst abdomen between June 2014 and April 2019 with a long-term follow-up in October 2020. In June 2014, a standardized surgical treatment for burst abdomen involving a monofilament, slowly absorbable suture in a continuous mass-closure stitch with large bites of 3cm and small steps of 5mm was introduced. The occurrence of incisional hernia was investigated and defined as a radiological-, clinical- or intraoperative finding of a hernia in the abdominal midline incision at follow-up.
Results: 94 patients suffered from burst abdomen during the study period. 80 patients were eligible for follow-up. The index-surgery prior to burst abdomen was an emergency laparotomy in 78% (62/80) of the patients. 19 patients died within the first 30 postoperative days and 61 patients were available for further analysis. The long-term incisional hernia rate was 33% (20/61) with a median follow up of 17 months (min 4, max 67 months).
Conclusion: Standardized surgery for burst abdomen with a mass-closure technique using slow absorbable running suture results in high rates of long-term incisional hernias, comparable to the hernia rates reported in the literature among this group of patients.

Less pain after tack fixation of mesh than with self-gripping mesh following laparoscopic inguinal hernia repair: a randomized clinical trial

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Background: Acute pain following transabdominal preperitoneal inguinal hernia repair (TAPP) may be attributed to mesh fixation. The aim of the present study was to determine short and long-term complications following laparoscopic TAPP repair using either a self-gripping mesh or a tacked mesh.
Method: Healthy male subjects referred for unilateral inguinal hernia repair were randomized to a TAPP procedure using either a tacked mesh (Parietix, Medtronic; AbsorbaTack, Medtronic) or a self-gripping mesh (ProGrip™, Medtronic). Acute postoperative pain and short and long-term complications were recorded using an e-mail generated questionnaire preoperatively and at days 1 and 7 and at 1, 3, 6 and 12 months postoperatively. Acute pain was assessed using the visual analogue scale (VAS).
Results: A total of 333 male subjects underwent elective repair of a medial (n=107, 32%) or a lateral (n=226, 68%) inguinal hernia. Patients were randomized to either a tacked (T=178) or non-tacked procedure (N=155). Mean follow-up time was 141 days. Mean number of tacks applied was 2.7 per operation. Mean preoperative VAS score was 2.21 (T) vs 1.78 (N) (P=0.06). Postoperatively, the mean VAS-score (average within the observation period) was 2.80 (T) vs 3.12 (N) (P<0.01), resulting in a 10% lower VAS-score following the tacked repair compared to the self-gripping mesh (P<0.01). Patient-reported signs of recurrence at 12 months was 4.7% (T) vs 7.5% (N) (P=0.35).
Conclusion: Postoperative acute pain after laparoscopic inguinal hernia repair is lower following a tacked than after a non-tacked (self-adhesive mesh) procedure. Patient-reported recurrence did not differ between groups.

Mortality following emergency versus elective groin hernia repair: a systematic review and meta-analysis

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Background: Emergency groin hernia repair is associated with an increased risk of mortality, but the exact risk is unknown. A systematic review has not yet been performed on mortality following groin hernia repair in an emergency or elective setting. This review aimed to investigate 30- and 90-day postoperative mortality in patients who had undergone emergency or elective groin hernia repair.

Method: This review was reported after the PRISMA 2020 guidelines. A protocol (CRD42021244412) was registered to PROSPERO. Three databases (PubMed, EMBASE, and Cochrane CENTRAL) were searched in April 2021. The identified studies were screened for eligibility and included if they reported 30- and/or 90-day mortality following emergency or elective groin hernia repair. Meta-analyses were conducted when possible, and a subgroup analysis on patients undergoing bowel resection was made.
Results: We included 37 studies with a total of 30,740 patients receiving emergency repair and 457,253 receiving elective repair. A meta-analysis could not be conducted for the two repair settings separately due to heterogeneity. However, the 30-day mortality ranged from 0–11.8% following emergency repair and from 0–1.7% following elective repair. Risk of 30-day mortality following emergency repair was estimated to be 26-fold higher than after elective repair (RR=26.0, 95% CI 21.6–31.4, I^2=0%). A subgroup meta-analysis on bowel resection in emergency repair estimated 30-day mortality to be 7.9% (95% CI 6.5–9.3, I^2=6.4%). Identified sources of heterogeneity were variations in defining emergency groin hernia repair and methods of follow-up for outcome assessment.
Conclusion: Emergency groin hernia remains a challenging and potentially fatal surgical emergency. This review emphasizes the importance of performing hernia repair in an elective setting to prevent a potential acute presentation with acute surgical intervention. Patients presenting with symptoms of emergency groin hernias should receive particular attention to minimize the high risk of mortality and morbidity following emergency repair.

Physical complaints as indication for surgical treatment for post pregnancy diastasis recti

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Background: Rectus Diastasis (RD), widening of the intra-muscular distance of the abdominal muscles, is a physiological part of pregnancy and the immediate post-pregnancy period.
RD can be corrected surgically and has been performed for aesthetic purposes for years, but knowledge of the functional problems associated with RD, as well as the outcomes, rate of recurrence and complications has been limited, especially regarding the use of absorbable sutures for plication and whether or not to use a net/mesh for support.
This study aimed at evaluating the results of our surgical practice on abdominoplasty and plication of the abdominal muscles.
Method: All 47 patients operated for diastasis recti at Department of Plastic Surgery at Herlev Hospital since 2014 were in 2020 invited for a clinical re-examination and ultrasound measurement of the width of their diastasis as well as filling out a study specific questionnaire regarding their symptoms before and after surgery as well as the Swedish Ventral Hernia Pain Questionnaire.
Results: 42 patients responded to the questionnaire, 40 patients were seen for re-examination and ultrasound. Mean follow-up was 38 months (5.3-80.9).
Mean inter-muscular distance was reduced from 5.5 cm (3.4-16.5) to 1.7 cm (0.12-3.59) after surgery.
The most common complication was post-surgical nausea and/or vomiting (Clavien-Dindo Grade 1). 2 patients experienced a grade 3A and 3B complication, respectively.
Of the 40 examined patients one had recurrence of the diastasis.
90% of patients responded that the operation had completely or partially alleviated their primary complaint (be it pain, muscle fatigue, cosmetic or something else), and we found statistically significant reduction to every physical and cosmetic complaint asked in our questionnaire. Patients were significantly less limited in work, spare-time and training activities and took less medication after surgery.
Conclusion: Diastasis recti is not only a cosmetic issue and future indication for operation should to a much higher extend focus on the patients' functional and physical complaints.
Diastasis Recti can safely be operated using single row plication with a size 0-0 slowly absorbable loop suture with a strict postoperative limitation of physical activity, with a low grade of complications and recurrence, a good cosmetic result and high levels of patient satisfaction.

Postoperative outcomes that matter to patients undergoing inguinal hernia repair: a qualitative study

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Background: Assessment of postoperative outcome of inguinal hernia surgery has not been sufficiently investigated, and the patients' perspective has often been neglected. We aimed to explore which postoperative outcomes are important to patients operated for inguinal hernia to gain a better insight into the patient experience going through surgery.
Method: This was a qualitative study based on phenomenology and hermeneutics and using semi-structured individual interviews. Participants were all male, between 44–66 years of age, and had undergone inguinal hernia repair. Patients were interviewed either shortly after surgery (≤ 10 days) or 3–6 months postoperatively. Data were analyzed with directed content analysis based on six domains defined a priori based on the literature. The study was reported according to the COnsolidated criteria for REporting Qualitative research (COREQ) and Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0).
Results: Ten patients were included and interviewed. Identified domains were: function, sensation, expectations, appearance, social aspects, and satisfaction with surgeon/staff. Preoperative functional limitations were the main motivation for seeking surgery, and postoperative functional improvement seemed to be the most important factor determining overall patient satisfaction.
Conclusion: Patients consider a wide range of factors when assessing the outcome of their inguinal hernia repair. Our results suggest that the current practice of outcome assessment of inguinal hernia repair with focus on recurrence may be too narrow and may not adequately reflect the patients' experience. This study is part of an ongoing development of a Core Outcome Set for inguinal hernia research.

Quality of life following robotic-assisted retromuscular ventral hernia repair

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Background: Robotic-assisted ventral hernia repair (rVHR) has emerged as an alternative to current open and laparoscopic procedures. The present study aims to determine the effect of rVHR on postoperative quality of life.

Method: Patients undergoing elective rVHR from 01/01 2017 until 12/6 2020 were identified from the hospital´s electronic medical record system. Patient demographic, clinical presentation, location of the hernial defect and postoperative complications were obtained from the case notes. A phone interview was also conducted to assess postoperative life quality using the EuraHS-QoL questionnaire. The pre and postoperative life quality assessment was performed to determine the effect of robotic-assisted ventral hernia repair on 1. Pain at the site of the hernia, 2. Restrictions of activities due to pain or discomfort at the site of the hernia and 3. Esthetical discomfort. Moreover, patients were asked whether they felt their overall quality of life had improved, deteriorated or was unaltered after the procedure. A Wilcoxon signed rank test was conducted to determine the effect of the repair on postoperative life quality.
Results: 85 out of 99 patients completed the interview and were included in this case series. The survey revealed a highly significant improvement of life quality in all categories (P<0. 01). 86% of the participants reported that their overall quality of life had improved, 13% reported no change and 1% felt that it had deteriorated.

Conclusion: Robotic-assisted retromuscular ventral hernia repair is a safe procedure that is associated with a significant improvement of patient quality of life.

Results from patient-reported outcome measures are inconsistently reported in inguinal hernia trials: a systematic review

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Background: Patient-reported outcome measures have been gaining increased attention in inguinal hernia research in recent years. In contrast to the traditionally reported hernia recurrence rates, patient-reported outcome measures directly implicate the patients in the evaluation of their treatment, improve appropriateness of treatment and care in surgery, and have the potential to guide surgical decision-making. However, there are several methodological limitations impeding their full utilization in inguinal hernia research. In the current study, we aimed to evaluate the current use, results, and reporting of patient-reported outcome measures specific to patients undergoing inguinal hernia repair.
Method: A systematic review was performed and reported according to the PRISMA 2020 statement. A protocol was registered at PROSPERO (CRD42021243468). Systematic searches were performed in PubMed and EMBASE. We only included randomized controlled trials that involved postoperative administration of a hernia-specific patient-reported outcome measure. Risk of bias was evaluated with the Cochrane risk of bias-tool 2.0.
Results: Twenty trials and four different instruments were included: the Carolinas Comfort Scale (nine studies), Activities Assessment Scale (six studies), Inguinal Pain Questionnaire (seven studies), and Surgical Pain Scales (one study). Included trials used patient-reported outcome measures and compared either different surgical approaches (11 studies), types of mesh/fixation (seven studies), or types of anesthesia/analgesia (two studies). Results were reported using several different methods including means, medians, or proportions of either overall results, results from subscales, or results from single questionnaire items. Seven of the 20 included studies specified a patient-reported outcome measure as a primary outcome and provided clear reporting of sample size calculation.
Conclusion: Reporting of results from patient-reported outcome measures in inguinal hernia research was characterized by heterogeneity. Results were reported using several different methods, which impedes proper evidence synthesis. Only half of the included studies applied a patient-reported outcome measure as primary outcome. Ultimately, the heterogeneity in outcome reporting is an important methodological problem obstructing the full utilization of patient-reported outcome measures in inguinal hernia research.

Short- and long-term complications following robotic-assisted retro-muscular ventral hernia repair

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Background: Robotic-assisted ventral hernia repair (rVHR) has become an attractive alternative to current laparoscopic and open procedures. The present study aims to determine short-and long-term complications following rVHR.
Method: Patients undergoing rVHR from 01/01 2017 until 21/06 2020 were identified from the electronic medical record system. The medical case notes were reviewed and a telephone interview conducted to determine short and long-term complications. Patients with symptoms related to the repair were examined by a specialist in hernia surgery. US or CT scan was performed to determine the presence of absence of complications.
Results: 85 patients were included. Mean age was 57.8 years, 54 were males (63.5%). Mean ASA-score was 2.12 and BMI was 30.2 kg/m^2. 11 patients (13%) had diabetes, 22 (26%) were active smokers, 37 (44%) had hypertension and 7 (8%) were taking anti-coagulants. The mean hernial defect was 16.1 cm^2 and the mesh size was 205.4 cm^2. Mean length of stay was 0.5 days and the follow-up time was 94 weeks. Hematoma was encountered in 10 (11.8%) patients. 8 (9.4%) reported of seroma and 1 (1.2%) of a superficial wound infection complicated by skin necrosis. 5 patients (5.9%) reported of chronic pain. 2 patients (2.3%) developed recurrence.
Conclusion: The study demonstrates that rVHR is feasible and associated with few complications and a very low recurrence rate. Patients who had pain before surgery were likely to have less pain following the procedure. Due to the short hospital stay the procedure is suitable as an outpatient procedure.

Spin is present in the majority of the articles evaluating robot-assisted groin hernia repair: a systematic review

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Background: The number of articles published each year is increasing, resulting in greater competition to get work published. Spin is defined as specific reporting strategies used to distort the readers' interpretation of results so that they are viewed more favourable. However, prevalence of spin in studies comparing robot-assisted groin hernia repair with traditional methods is unknown. The aim of the study was to determine the frequency and extent of misrepresentation of results, spin, in the studies assessing robot-assisted groin hernia repair.
Method: This systematic review was reported according to PRISMA guidelines, and a protocol was registered at PROSPERO before data extraction. Database search included PubMed, EMBASE, and Cochrane Central.
Results: Of 35 included studies, spin was present in 57%. Within these, 95% had spin present in the abstract and 80% in the conclusion of the article. There was no association between study size and spin ($p>0.05$). However, presence of spin in studies positively minded towards robot-assisted hernia repair was higher ($p<0.001$) compared with those against or being neutral in their view of the procedure. Furthermore, being funded by or receiving grants from Intuitive Surgical were associated with a higher prevalence of spin ($p<0.01$) compared with those who were not.
Conclusion: Spin was found to be common in articles reporting on robot-assisted groin hernia repair, and presence of spin was higher in studies funded by or receiving grants from the robot company. This suggests that readers should be cautious when reading similar literature.

Acute care surgery

Ændring i incidens for Akut Appendicitis under den Nationale Lockdown under COVID-19 Pandemien i Danmark

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Background: Almindelige infektionssygdomme spiller muligvis en rolle i patogenesen for akut appendicitis, hvilket er indikeret af sæsonvariationen på incidensraten af akut appendicitis. Spredningen af disse infektionssygdomme faldt under den national lockdown-periode under COVID-19 pandemien i Danmark i foråret 2020. Således havde vi en oplagt mulighed for at undersøge incidensraten for akut appendicitis i et miljø, som ikke blev påvirket af almindelige infektionssygdomme.
Method: Dette studie er et nationalt registerbaseret kohortestudie af hele den danske population på 5,8 millioner mennesker. Forskellen på incidens af akut appendicitis i en population påtvunget kontrolleret lockdown med social distance i foråret 2020 (studiegruppe) blev sammenlignet med en population, som ikke blev påtvunget kontrolleret lockdown i foråret 2017, 2018 og 2019 (referencegruppe).
Results: Den relative risiko for akut appendicitis under lockdown var 0,92 (95% CI: 0.82–1.03, p=0.131). Den relative risiko for kompliceret appendicitis under lockdown var 0.68 (95% CI: 0.49–0.93, p=0.02). Incidensen for ukompliceret appendicitis var ikke signifikant ændret under den nationale lockdown periode.
Conclusion: Under den nationale lockdown i Danmark i foråret 2020 grundet COVID-19 pandemien blev incidensen for kompliceret appendicitis reduceret signifikant sammenlignet med tidligere år. Dette indikerer, at infektionssygdomme muligvis spille en rolle i patogenesen for kompliceret akut appendicitis.

Akut abdomen med massive mængder fri luft på baggrund af perforeret leverabsces

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Background: Lever abscesser er en relativt sjælden tilstand, men associeret med høj morbiditet og mortalitet. Mortaliteten for ikke perforerede abscesser er omkring 10%, men stiger til op mod 40% ved perforation. Ætiologien bag leverabscesser kan være svær at finde, men infektion er den hyppigste, ofte i sammenspil med komorbiditeter som diabetes, hjertekar-sygdom, malignitet og levercirrose. Fri luft i abdomen giver næsten aldrig mistanke om leverabsces.
Method: Kasuistik. Sygehistorie; Multimorbid 45-årig mand, kendt med depression, ADHD og alkoholoverforbrug indlægges med smerter i abdomen igennem nogle dage, samt kvalme og opkastninger. Efter kort tid i skadestuen bliver patienten tiltagende dårlig og lavtrykket på trods af væskebehandling. Blodprøverne viste laktat på 14,7, CRP 226 med normale leukocytter, ALAT 172 og bilirubin 27. Akut CT abdomen afslørede fri luft og en kæmpe stor leverabsces med stærk mistanke om transkapsulær gennembrud. Patienten opereres akut med eksplorativ laparotomi og der findes et fuldstændig vitalt tarmgebet uden tegn til perforation. Der findes derimod en perforeret leverabsces med 3 liter pus i peritoneum. Der ilægges dræn direkte i absceskaviteten, bughulen skylles og bugvæggen lukkes med abdominal VAC-forbinding.
Patienten overflyttes til intensiv hvor han udvikler behandlingsrefraktær septisk shock med behov for ekstraordinært høj dosering af pressestoffer. Ved "second-look" operation findes et misplaceret dræn. Efter 6 dages VAC behandling med skiftninger hver 2. dag, lukkes abdomen og efterlades med passivt dræn. Patienten behandles på intensiv i yderligere 17 dage, hvor han genoplives en gang pga hjertestop. Han får ligeledes påvist adscederende, nekrotiserende pneumoni, samt svær kardiomyopati med EF omkring 15-20% (som tolkes som alkoholisk kardiomyopati).
Results: Efter i alt 37 dage udskrives patienten velbefindende til rehabiliteringscenter.
Conclusion: Lever abscesser behandles normalt med ultralydsvejledt drænage og antibiotika, men ved perforation er operation en nødvendighed for at sikre overlevelse. Denne adgang gav os mulighed for at drænere abscessen, skylle bughulen og udelukke en anden årsag til fri luft.
En af de hyppigere årsager til leverabsces med fri luft er klebsiella pneumoniae, men prevotella intermedia påvist ved første dyrkning fra bughulen er også beskrevet ved flere artikler som mulige patogen. Vækst af candida albicans fra blod og prevotella intermedia fra bughulen, tolkes som et udtryk for patientens påvirkede immunforsvar.

Botulinum Toxin A in conjunction with negative pressure wound therapy and mesh-mediated fascial traction provides high rate of fascial closure in patients with open abdomen

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Background: Presentation of our data on Vacuum-Assisted Wound Closure and Permanent Onlay Mesh-Mediated Fascial Traction (VAWCPOM) in combination with Botulinum Toxin A (BTX-A) injection in the lateral abdominal wall as a treatment of the open abdomen (OA).
Method: This is a retrospective case series including patients treated for OA from January 2017 till March 2021 with VAWCPOM and BTX-A. Patient records were collected from medical charts, incl. age, sex, body mass index (BMI), comorbidity, initial fascial defect size, time until fascial closure, complications and, when available, outpatient follow-up.
Results: A total of 33 patients with OA were included. The mean age was 62,5 years, male/female ratio was 15:18, with a mean BMI of 35,4 kg/m^2. The mean width of the fascial defect was 13,5 cm (5 - 25cm). The rate of fascial closure was 96,9%, achieved within a mean of 22,7 days. Fascial closure was not attainable in one patient who developed enterocutaneous fistula under treatment. 22 patients experienced in-hospital complications. Short-term follow-up was conducted in 22 patients, with hernia recurrences in three.
Conclusion: Treatment of OA remains a surgical challenge. This case series shows promising results with a high rate of fascial closure using a combination of VAWCPOM and BTX-A and an acceptable rate of postoperative complications in this severely challenging patient group. The rate of primary closure indicates that this may be the future management of open abdomen.

Early laparoscopic cholecystectomy for acute cholecystitis is safe regardless of timing

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Background: The optimal timing for laparoscopic cholecystectomy for acute cholecystitis (AC) has not been resolved.
In the revised Tokyo Guidelines from 2018 (TG18) early laparoscopic cholecystectomy (ELC) is recommended regardless of the duration of symptoms.
The aim of this study was to evaluate the safety of ELC compared with delayed laparoscopic cholecystectomy (DLC) for AC. In addition, we assessed the perioperative outcomes after ELC based on duration of symptoms.
Method: A retrospective cohort study of patients operated for acute calculous cholecystitis from January 1st 2017 to June 30th 2018 at Copenhagen University Hospital, Herlev. ELC were divided into three subgroups based on the duration of symptoms from onset to operation, ≤ 72 hours, >72-120hours, >120 hours.
Results: 222 patients underwent ELC and 26 (10,5%) patients underwent DLC. We found no difference in mortality, morbidity, conversion rate or bile duct injuries between DLC and ELC or in the subgroups based on duration of symptoms. We found significantly longer total hospital length of stay for patients with symptoms >72 hours (4.1-5.6 days) compared to ≤ 72 hours (3.1days) and the longest in DLC (9.9 days). 23% of DLC needed an emergency operation in the waiting period with a high conversion rate of 1/3.
Conclusion: ELC for AC even beyond 5 days of symptoms is safe and not associated with increased complications. The duration of symptoms in AC is not an independent predictor and should not influence the surgeons' decision to perform an ELC. Delaying cholecystectomy has a high failure rate.

Effect of remote ischemic preconditioning on fibrin formation and metabolism in patients undergoing hip fracture surgery: a randomized clinical trial

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Background: Remote ischemic preconditioning (RIPC) has shown promising results in protecting tissues and vital organs from injury during non-cardiac surgery. RIPC is most often induced by brief cycles of extremity ischemia and re-perfusion performed with an inflatable tourniquet. Although the effect of RIPC has been investigated for more than 25 years in both experimental and clinical studies, the mechanisms responsible for the protective effect of RIPC are still unclear.
RIPC prior to surgery has recently been shown to reduce myocardial injury after hip fracture surgery and there are evidence of RIPC affecting the hemostatic system in an anti-thrombotic direction after surgery. In the present study, we investigated whether RIPC initiated anti-thrombotic mechanisms to clarify if alterations in the central part of hemostasis are related to the cardio-protective effect of RIPC in patients undergoing hip fracture surgery.
Method: This trial was a predefined sub-study of a multicenter randomized clinical trial. Adult patients with cardiovascular risk factors undergoing hip fracture surgery between September 2015 and September 2017 were randomized 1:1 to RIPC or control. RIPC was initiated before surgery with a tourniquet applied to the upper arm. The procedure consisted of four cycles of five minutes of forearm ischemia followed by five minutes of re-perfusion. The outcomes including surgery-induced changes in thrombin generation, fibrinogen/fibrin turnover, tissue plasminogen activator, plasminogen activator inhibitor-1 and fibrin structure measurements were determined preoperatively (prior to RIPC) and two hours postoperatively.
Results: One-hundred-and-thirty-seven patients were randomized to RIPC (n=65) or control (n=72). See figure. There were no significant changes in thrombin generation, fibrinogen/fibrin turnover, or fibrin structure measurements determined pre- and postoperatively between patients in the RIPC and control groups. Subgroup analyses on patients not on anticoagulant therapy (n=103), patients receiving warfarin (n=17), and patients receiving direct oral anticoagulant therapy (n=18) showed no significant changes between the RIPC-patients and controls.
Conclusion: RIPC did not affect changes in thrombin generation, fibrin turnover, or fibrin structure in adult patients undergoing hip fracture surgery suggesting that the cardiovascular effect of RIPC in hip fracture surgery is not related to alterations in fibrinogen/fibrin metabolism.

Effekt efter implementering af en perioperativ protokol til større akut abdominal-kirurgi – Etårs mortalitet og komplikations-indeks.

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Background: Efter større akut abdominal-kirurgi, er der en høj risiko for post-operativ mortalitet og en høj komplikationsrate. Formålet med dette studie var at evaluere om implementering af en perioperativ protokol reducerede mortalitet over længere tid, og om det reducerede "the comprehensive complication index".
Method: Vi udførte et prospektivt kohorte-studie der blev sammenlignet med data fra en historisk kohorte fra samme hospital. Protokollen blev iværksat, hvis en patient var under mistanke for en tilstand der ville føre til større akut abdominal-kirurgi. Før operationen iværksatte vi flere profylaktiske tiltag og patienter undergik prioriteret diagnostik. Under operationen blev patienter stratificeret til enten standard eller intensiveret post-operativt forløb. Under det post-operative forløb modtog patienter bl.a. fysioterapi og tilpasset ernæring. Der blev anvendt notat-skabeloner til opstart af protokollen, planlægning af operationen, operations-beskrivelsen og den post-operative stuegang.
Results: Vi inkluderede 120 patienter i interventions-kohorten og 258 i den historiske kontrol-kohorte. Et-års mortaliteten faldt fra 28.3% til 21.7%, p = 0.215 (Justeret OR 0.81 (CI95% 0.41-1.56)). 30-dages mortaliteten faldt til 6.7% fra 18.5%, p = 0.002 (justeret OR 0.31 (CI95% 0.1 – 0.84)). The comprehensive complication index faldt fra 21 (IQR 0-36) til 8.7 (IQR 0-34) p = 0.331.
Conclusion: Implementering af en multidiciplinær protokol i større akut abdominal-kirurgi var statistisk associereret med reduceret 30-dages mortalitet. Det var også en association med reduceret comprehensive complication index og en forbedring i 1-års mortalitet, disse associationer var dog ikke statistiske signifikante.

Glycemic profile and quality of recovery after major emergency abdominal surgery

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Background: Severe physiological stress may induce postoperative hyperglycemia in non-diabetic patients, and the association between postoperative hyperglycemia and postoperative morbidity is well documented. However, the majority of the studies are retrospective using only single glucose measurements. Hence, the duration of postoperative hyperglycemia and the glycemic fluctuations are unknown.
We aimed to investigate the postoperative glycemic profile for 30 days in non-diabetic patients undergoing major emergency abdominal surgery using continues glucose measurements (CGM). In addition, the relation between CGM-metrics and patient reported quality of recovery was investigated.
Method: The study was a prospective, explorative cohort study with repeated measurements. Non-diabetic adult patients undergoing acute, major abdominal surgery were included. A CGM device (Dexcom G6) was attached on the abdomen within 24 hours of surgery, measuring interstitial glucose levels for 30 days. The validated questionnaire 'Quality of Recovery-15' (QoR) was used to assess patient-reported recovery on postoperative day 10, 20 and 30. Descriptive statistics and mixed models for repeated measurements were used to report the distribution and change in CGM metrics over time and the association with QoR.
Results: 40 patients were included, and 27 completed the study (68%) according to the protocol. Median CGM completeness for 30 days was 79% (IQR: 69.9%-84.7%). 25/27 (92.6%) patients experienced at least one glucose measurement above 10.0 mmol/L within the initial five postoperative days. Median 'time in range 3.9-10.0 mmol/L' was significantly different at hospital vs after discharge (91.9% vs 99.0%, p>0.001). In the mixed model analysis, increased mean glucose level, coefficient of variation (CV%) and time above 10,0 mmol/L were significantly associated with poorer QoR score (estimates: -0.2 (p=0.028), -1.47 (p<0.001) and -0.96 (p<0.001), respectively).
Conclusion: Stress-induced hyperglycemia is frequent after major emergency abdominal surgery. Both postoperative glucose level and glycemic variations are associated with patient-reported quality of recovery.

Peroral versus intravenous postoperative antibiotics after surgery for complicated appendicitis: a cluster randomized cluster-crossover non-inferiority study

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Background: Appendicitis is the most common reason for acute abdomen and affects all age groups[1]. According to numbers from Danish National Patient Register, 6000 patients undergo surgery for appendicitis in Denmark annually. Usually, the treatment of complicated appendicitis is a postoperative course of intravenous antibiotics. There is, however, lacking studies that confirm the results of retrospective studies showing that the post-operative use of oral antibiotics is not inferior to intravenous antibiotics after laparoscopic surgery[2].
Method: The Peroral versus Intravenous Postoperative Antibiotics (PIPA)-trial after surgery for complicated appendicitis is a prospective, multicentre, cluster-randomized cluster-crossover non-inferiority study designed to test whether a three-day postoperative course of oral antibiotics is non-inferior to an intravenous treatment of the same duration after laparoscopic surgery for complicated appendicitis[3]. Participating hospitals are either randomized to six months with an oral antibiotic regime followed by six months with an intravenous antibiotic regime or the same treatment in reverse order. The primary endpoint is the risk of developing intra-abdominal abscesses within 30 days after surgery.
Results: As of 13 September 269 patients from six centres have been included, and 10 surgical departments are successively participating in this large national, multicentre study. We aim to have up to 12 participating hospitals by the end of the year 2021. Positive, negative, and inconclusive results will be published, and the results will form the basis for manuscripts submitted for future publications. The study is approved by the Danish Data Protection Agency and by the National/Regional Committee on Health Research Ethics.
Conclusion: We have successfully included most hospitals in Denmark performing laparoscopic appendectomies in emergency surgical admissions. It is commendable that a small country as Denmark can collaborate and implement a research protocol simultaneously. We hope this large, national, multicentre study will influence clinical practice in this specific patient group.

Sarcopenia is associated with increased risk of burst abdomen after emergency midline laparotomy: a matched case-control study

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Background: Burst abdomen is a serious complication commonly observed after emergency midline laparotomy. Sarcopenia has been associated with increased morbidity and mortality after abdominal surgery. This single-center, retrospective, matched case-control study aimed to investigate the association between sarcopenia and burst abdomen in patients undergoing emergency midline laparotomy.
Method: Patients who had burst abdomen after emergency midline laparotomy were matched 1:4 with controls based on age and sex. Abdominal wall closure was standardized in the study period with the small bites, small stitches technique. CT assessed psoas cross-sectional area was used as a surrogate measure of sarcopenia. Sarcopenia was defined as the sex-specific lowest quartile of psoas cross-sectional area adjusted for body surface area. The primary outcome was the incidence rate of sarcopenia amongst cases and controls. Secondary outcomes were risk factors for burst abdomen and death that were identified using multivariate logistic regression analysis.
Results: Overall, 67 cases were matched to 268 controls during May 2016–December 2019. BMI > 30 kg/m^2, liver cirrhosis, smoking, high ASA score and peritonitis were more frequently observed among cases. Multivariate analysis revealed that sarcopenia (odds ratio (OR) 2.3, p = 0.01), active smoking (OR 2.3, p = 0.006) and liver cirrhosis (OR 3.7, p = 0.042) were significantly associated with burst abdomen. ASA score ≥ 3 (OR 5.5, p = 0.001) and ongoing malignant disease (OR 3.2, p = 0.001) were significantly associated with increased 90-day mortality.

Conclusion: Sarcopenia is associated with increased risk of burst abdomen after midline laparotomy. Prospective trials are needed.

Surgical patients suitable for Emergency Department healthcare

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Background: Aiming the physician in Emergency Medicine in frontline, requires a bride knowledge in medicine as in surgical critical illness and management. Emergency medicine (EM) is still developing in Denmark. We have established the principle that patients who are better off being treated in specialty departments, e.g. neurology, pulmonary medicine etc, should expeditiously be referred out of the Emergency Department (ED), while patients who are well off treated in the ED should stay.
Method: In collaboration with the Department of Surgery we have assessed the suitability of treating patients with surgical disease in the ED that do not need an invasive procedure. We have developed flowcharts for surgical conditions, which can be handled in the ED.
Results: We have identified the following surgical conditions that may be treated and discharged from the ED: Gall stones without jaundice or fever, uncomplicated diverticulitis, irreducible hernia, hemorrhoids, minor rectal bleeding, rectal prolapse and kidney stones. We have developed treatment algorithms for doing so. These treatment algorithms also support an educational purpose in the trainee program.
Conclusion: It is feasible to treat patients with surgical disease in the ED that do not need an invasive procedure. We also gain educational benefits supporting the further development of EM in Denmark.

Breast surgery

Benefits of neoadjuvant treatment in Early Breast Cancer – survival and axillary disease

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Background: Prognosen ved brystkræft bliver bedre og bedre formentlig grundet bedre diagnostik og bedre behandling. Det betyder, at rigtig mange lever med senfølger af behandlingen for brystkræft og derfor øges betydningen af at undgå eller nedsætte risikoen for senfølger. Brugen af neoadjuverende kemoterapi (NACT) er stigende, da studier har vist at NACT kan minimere eller fjerne tumor i både brystet og axillen og dermed reducere den operative behandling. Det debatteres dog om NACT forbedrer overlevelsen sammenlignet med adjuverende behandling. Brystkræftbehandlingen tilrettelægges ud fra flere faktorer, hvor identificering af axil metastaser er vigtig i forhold til om patienten tilbydes NACT eller ej. Udredning af axillen involverer oftest ultralyd og finnålsbiopsi ved suspekte fund. Overvægt kan muligvis spille en rolle i forhold til identificering af axil metastaser før operationen. Omvendt har NACT stor betydning for behandlingen af axillen. I de tilfælde hvor axil metastaser først konstateres i forbindelse med sentinel node dissektion (SLND), tillades en større grad af metastasering såfremt patienten ikke har modtaget NACT.
OBS fremlæggelse af ph.d. beskrivelse.
Method: **Studie 1:**

- Undersøge om NACT forbedrer den kræftfrie overlevelse sammenlignet med adjuverende kemoterapi?
- Case-control studie med sammenligning af patienter fra Vejle med patienter fra øvrige DK.
- Ca. 400 i den lokale database i Vejle med patienter fra 2004-2015. Follow-up tid min 5 år. Control gruppe identificeres via DBCG, suppleres med data fra Patobank, Patientregistret og CPR.

- Formålet er at bidrage med viden på området.

Results: **Studie 2**

- Vurdere risikoen for yderligere sygdom i axillen ved patienter behandlet med NACT, hvor der konstateres axillær sygdom ved SLND, der ikke var erkendt tidligere.
- Registerstudie med data fra DBCG og Patobank. Population 2016 - d.d. Estimeret ca. 400 patienter.
- Hjælp til at guide behandlingen af patienter med sygdom i axillen efter NACT - kan en de-eskalering af den kirurgiske behandling være på sin plads?

Conclusion: **Studie 3**

- Evaluere sammenhængen mellem BMI og nøjagtighed af UL kombineret med finnåls biopsi
- Registerstudie med data fra DBCG, Patobank og Patientregistret. Patienter diagnosticeret 2010-2020, min 7100 patienter for at få en power 80 % og signifikans niveau 5%
- Formålet er at vurdere, om vi tilbyder den optimale udredning/behandling til en gruppe af patienter der er i øget risiko for at udvikle komplikationer i forbindelse med den kirurgisk behandling?