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Double-barrelled wet colostomy following exenteration for locally advanced and recurrent pelvic cancer: Early experience

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Objective: In patients undergoing pelvic exenteration for advanced cancer, two stomas are usually required – a colostomy and ileal conduit. Whilst inconvenient for the patient, this approach limits options for perineal flap reconstruction. We describe the technique, and our early experience of, the double-barrelled wet colostomy (DBWC) as an alternative option.

Methods: Exenterations were undertaken via a midline incision, with proximal vasculation, lymphadenectomy, on bloc organ resection and removal of specimen via the perineum. Each DBWC was constructed by anastomosing the ureters separately, over infant feeding tubes, into a 15 cm blind length of colon distal to the colostomy site. Following Vertical Rectus Abdominis Muscle (VRAM) flap mobilisation and abdominal closure, the DBWC was exteriorised and matured over a bridge in the left iliac fossa, recovering the infant feeding tubes to drain into a colostomy bag.

Results: Eight patients (6 males, median age 61) underwent exenteration and DBWC over a 9 month period. Pathologies were: locally advanced primary rectal cancer with prostatic invasion (5 patients); recurrent rectal cancer or anal cancer with vaginal and urethral involvement (2 patients); prostate cancer invading rectum (1 patient). Seven patients received preoperative chemotherapy and 7 had perineal reconstruction with a VRAM flap. Median hospital stay was 21 days. Procedure-related complications included: urinary sepsis which resolved after urostomy stent removal (2 patients), and one collection around a VRAM flap needing drainage.

Conclusion: Early experience with DBWC following exenteration is encouraging. No major complications were seen, urinary sepsis does not appear to be a significant risk, as faecal and urinary streams do not mix, and patient satisfaction is high. Avoidance of a second stoma eliminates the risk of ileal conduit complications and allows the harvesting of a VRAM flap for perineal reconstruction.

Industry bias in randomised controlled trials in general and abdominal surgery: An empirical study

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Objective: Industry sponsorship has been identified as a potential source of bias in several fields of medical science. Until today the influence of industry sponsorship in the field of general and abdominal surgery has not been evaluated.

Methods: A systematic literature search in the Cochrane Library, MEDLINE and EMBASE and additional band searches in relevant citations was conducted. In order to cover all relevant fields of general and abdominal surgery a multi-PICO search strategy has been performed. Randomised controlled trials published between January 1985 and July 2014 were included. Information on funding source, outcome, study characteristics and methodological quality were extracted. Association of industry sponsorship and positive outcome was expressed as odds Ratio (OR) and tested by a chi-squared test and additionally in a multivariate logistic regression model.

Results: 7934 articles were screened and 444 eligible RCT were included. 165 trials (37%) disclosed their funding source and were included into quantitative analysis. 88 of 115 (77%) industry sponsored trials and 19 of 50 (38%) non-industry funded trials reported a positive outcome (OR 5.3, 95% confidence interval 2.6 to 10.9, p < 0.0001). This effect remained significant after adjustment for co-variables (multinational trials, methodological quality, number of study centres, journal impact factor, sample size) in a multivariate logistic regression analysis (p < 0.0001). Comparing industry funded and non-industry funded trials no significant differences existed for methodological quality, but trials funded by industry significantly more often reported favourable conclusions of the experimental intervention without underlying statistical superiority (p = 0.0002).

Conclusion: This is the first study to evaluate industry bias in the field of general and abdominal surgery and proofs that industry bias is a huge concern. Industry funded trials are about five times more likely to report positive outcomes compared to non-industry funded trials. This study emphasises the necessity for declaration of funding source and potential conflict of interest, which is in need of worldwide synchronisation.

Closure of protective ileostomy 2 vs. 12 weeks following total mesorectal excision for rectal cancer: Interim analysis of a multicentre, prospective, randomized, controlled study

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Objective: To compare the feasibility, safety and quality of life (QOL) in patients (pts) undergoing protective ileostomy closure after 2 weeks with a closure after 12 weeks.

Methods: In three surgical departments between 2007 and 2013, 72 pts with total mesorectal excision and coloanal or low colorectal anastomosis for rectal cancer were randomly assigned to closure of their protective ileostomy after 2 weeks (group A, 37 pts) or 12 weeks (group B, 35 pts). One day before planned stoma closure, the coloanal/colorectal anastomosis was checked by palpation, contrast enema via ileostomy and, in case of hazards, by proctoscopy. Perioperative data was assessed prospectively using numeric values, visual analogue scales (VAS, 0 = lowest value, 10 = highest value) and QOL-index (GQLI, max. 144 points). Complications were recorded prospectively.

Results: Group A and B were comparable with regard to age, sex distribution, ASA-score, body mass index, radiotherapy, pouch procedure and median distance of coloanal/colorectal anastomosis from anal verge. Median operating time (min) was 130 (60–240) in group A vs 110 (60–239) in group B (p = 0.18). The following VAS-values were assessed in group A vs B: adhesions of everted ileum to abdominal wall 68 (3–100) vs 48 (12–95) (p = 0.04), tendency of oozing 29 (4–79) vs 15 (0–74) (p = 0.02), intraduodenal adhesions 32 (0–100) vs 41 (0–81) (p = 0.4), QOL before stoma closure was 110 (39–145) in group A vs 117 (69–142) in group B (p = 0.52), while 6 weeks postoperatively QOL was 108 (55–110) in group A vs 110 (71–137) in group B (p = 0.44). In group A, 4 stoma closures could not be performed after 2 weeks due to subclinical anastomotic leakage, detected only by digital and/or radiological examination. In the remaining 33 pts of group A, 2 leakages of the colonic anastomosis and 1 rectovesical fistula developed after stoma closure. Hence, the concept of group A failed in 7/33 patients (19 %) vs none in group B (p = 0.01). Additionally, 2
leakages of the ileal anastomosis and 2 wound infections at the stoma closure site occurred in group A (p = 0.5) vs none in group B.

**Conclusion:** Early closure of protective ileostomy is not feasible in a significant number of patients and is affected with an increased complication rate. Pts undergoing early closure did not benefit from higher QOL. Closure of protective ileostomy after 2 weeks is not recommended therefore, we intend to close the study.

**No benefit of ultrasound guided transversus abdominis plane (TAP) blocks over local anaesthetic wound infiltration in elective laparoscopic colonic surgery: results of a double blind randomised controlled trial**

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**Objective:** Advances in laparoscopic techniques combined with enhanced recovery pathways have led to faster recuperation and discharge after colorectal surgery. Peripheral nerve blockade using Transversus Abdominis Plane (TAP) blocks reduce opioid requirements and provide better analgesia than inactive controls for laparoscopic colectomies. This double-blind randomized study was performed comparing TAP blocks to standardised wound infiltration with local anaesthetic (LA).

**Methods:** 71 Patients were randomised between either TAP-block or wound infiltration. The TAP blocks were performed by experienced anaesthetists who infiltrated the transverse abdominal wall with 40 ml of 0.125% Bupivacaine using ultrasound guidance. Pain scores at 6, 12, 24 and 48 hours after surgery. Primary outcome was overall morphine use in the first 48 hours.

**Results:** Of the 71 patients 20 underwent a right hemicollectomy and 51 a high anterior resection. The modified intention-to-treat analysis showed no significant differences in overall morphine use (47.3 [36.2–58.5] mg vs 46.7 [36.4–53] mg, Mean [95% CI]; p = 0.8663) in the first 48 hours. Pain scores were similar at 6, 12, 24 & 48hours after surgery. Primary outcome was overall morphine use in the first 48 hours.

**Conclusion:** In elective laparoscopic colectomies standardised wound infiltration with LA has the same analgesic effect as TAP blocks.

**Laparoscopic sleeve gastrectomy and Roux-Y-Gastric Bypass are equally effective up to three years. Results of the prospective randomized Swiss Multicentre Bypass Or Sleeve Study (SM-BOSS)**

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**Objective:** Laparoscopic Sleeve Gastrectomy (LSG) is performed almost as often in Europe as Laparoscopic Roux-Y-Gastric Bypass (LRGB). We present the 3-year results of this randomized clinical trial comparing the two procedures.

**Methods:** Initially 217 patients (LSG, n = 107; LRYGB, n = 110) were randomized to receive either LSG or LRYGB at four bariatric centres in Switzerland. Mean BMI of all patients was 44 ± 11 kg/m², mean age was 43 ± 5.3 years, and 72% of patients were female. Minimal follow-up was three years with a rate of 94% and 92% at two and three years after surgery, respectively. Both groups were compared for weight loss, co-morbidities, quality of life according to GIQLI and BAROS score, and complications.

**Results:** Excessive BMI loss was similar between LSG and LRYGB at each time point (one year: 72 ± 22% vs 77 ± 21%, p = 0.2, two years: 72 ± 25% vs 77 ± 23%, p = 0.2; three years: 69 ± 24% vs 74 ± 21%, p = 0.1). Prevalence of comorbidities was significantly reduced after both procedures except for GERD, which showed a higher resolution rate after LRYGB. Quality of life increased significantly in both groups after one and three years post surgery. Within three years of follow-up there was no difference in number of complications treated by reoperation (LSG, n = 7; LRYGB, n = 12, p = 0.3) and number of complications treated conservatively: peptic ulcer (LSG, n = 0; LRYGB, n = 1), stricture (LSG, n = 0; LRYGB, n = 1), kidney stones (LSG, n = 2; LRYGB, n = 1), micronutrient deficiencies (LSG, n = 86; LRYGB, n = 92).

**Conclusion:** LSG and LRYGB are equally efficient regarding weight loss, improvement of comorbidities, quality of life, and complications up to 3 years after surgery.

**Anastomotic leakage after curative rectal cancer resection has no impact on long-term survival: A propensity score analysis**

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**Objective** Anastomotic leakage (AL) is a severe and frequent complication of rectal cancer resection, with an incidence rate of approximately 9%. Although the impact of AL on morbidity and short-term mortality has been established, the literature is contradictory regarding its influence on long-term cancer-specific survival. The present investigation assessed the long-term survival of 584 patients with stage I-III rectal cancer.

**Methods** The ten-year overall survival and cancer-specific survival were analyzed in 584 patients from a single tertiary center. All patients had undergone curative rectal cancer resection between 1991 and 2010. Patients with and without AL were compared using both a multivariate Cox hazards model and propensity score analysis.

**Results** A total of 64 patients developed AL (11.0%, 95% CI: 8.7–13.8%). The median follow-up was 5.2 years for all patients; and 7.4 years for patients still alive at the end of the investigated period. AL did persistently not impair cancer-specific survival based on unadjusted Cox regression (hazard ratio of death (HR) = 1.27, 95% CI = 0.65 to 2.48; P = 0.498), risk-adjusted Cox regression (HR = 1.10, 95% CI = 0.54 to 2.20, P = 0.799), and propensity score matching (HR = 1.18, 95% CI = 0.57 to 2.43, P = 0.660).

**Conclusion** Based on the present propensity score analysis, the oncologic outcomes in patients undergoing curative rectal cancer resections were not impaired by the development of anastomotic leakage.

**Liver transplant in high risk candidates - futile or utility driven?**

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**Objective** Allocation of liver graft triggers emotional debate, as those patients not receiving an organ are prone to death. Most countries have switched to allocation of a specific graft to a patient by severity rather than to a center with the freedom to use the graft to their “best” recipients. Liver allocation by MELD, however, directs grafts to sicker patients, and as a consequence many candidates present nowadays with multi-organ failure at the time of liver transplantation (LT).

**Methods** We analyzed a high MELD cohort (lab MELD ≥ 30, n = 100, median lab MELD of 34 (IQR: 31–37) of LT recipients transplanted in our center over the last ten years. Endpoints of our study were morbidity, cost, post-transplant kidney and liver function. Median follow up was 3.5 years. Results: Median ICU and hospital stays were 8 and 26 days, respectively, after LT, with a high morbidity (median comprehensive complication index 52.6 points (max point: 100) and high cost (median 146.300€)). Kidney function, however, recovered completely within 3 months in 95% of cases. One year after transplant, only 5% of patients remained one year still alive at the end of the investigated period. AL did persistently not impair cancer-specific survival based on unadjusted Cox regression (hazard ratio of death (HR) = 1.27, 95% CI = 0.65 to 2.48, P = 0.498), risk-adjusted Cox regression (HR = 1.10, 95% CI = 0.54 to 2.20, P = 0.799), and propensity score matching (HR = 1.18, 95% CI = 0.57 to 2.43, P = 0.660).

**Conclusion** Based on the present propensity score analysis, the oncologic outcomes in patients undergoing curative rectal cancer resections were not impaired by the development of anastomotic leakage.
on dialysis, and two patients eventually received a kidney transplant. Five-year outcome of kidney function was excellent (GFR > 60 ml/min, median creatinine of 101 μmol/l) and patient survival rates after 5 years were not different, when compared to ELTR cohorts (71 vs 71%).

**Conclusion:** While high MELD recipients demonstrate higher morbidity and cost, outcome appears comparable in the long-term, and there is no need for later kidney replacement. Based on this observation, high MELD liver transplants remain justified.

**Reverse treatment of synchronous colorectal metastases: Analysis of oncological and surgical results in a homogeneous population**

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**Objective:** Synchronous advanced colorectal liver metastases (SA-CRLM) have a poor prognosis, generally because the LM progress during treatment of the primary tumour. To solve this problem, our group developed an original approach consisting chemotherapy first, followed by liver resection and by surgery of the primary last. From the initial report, we collected a more homogenous cohort treated with a more standardized chemotherapy and surgical approach. The objective of this study is to report the safety, efficacy and pitfalls of the pre-operative oxaliplatin based chemotherapy (OCFL) or OCFL-bevacizumab: OCFL-B followed by a surgical reverse approach.

**Methods:** Retrospective analysis of a prospective database of 49 patients treated with an oxaliplatin based chemotherapy and the reverse surgical approach from 1999 to 2014.

**Results:** There were 26 males and 23 females (male: 53%). The median age was 65 years (range 38–83). OCFL was used in 20 pts and OCFL-B, in 29 pts. The primary tumour was in the rectum (n = 23: 46%), distal colon (n = 23: 46%) and proximal colon (n = 3: 6%). The distribution of the CRLM was bilobar (n = 31: 63%), 19 pts had more than 3 LM (38%) and 22 pts have at least one LM greater than 3 cm (44%). CEA was >200 mcg/l in 24% of patients. After completion of neoadjuvant chemotherapy, >20% decrease in CEA (biologic response rate) and in greater diameter of the greater LM (radiologic RR) were 93% and 79%, respectively. Grade 3–4 toxicity was observed in 14% of patients. Surgical resection consisted in 40 major (>3 segments) and 16 minor hepatectomies, with 7 two-steps hepatectomies. There was no postoperative mortality. Major complications (Dindo-Clavien score >II2) occurred in 3 cases. The primary tumour could be operated in all patients. Local recurrences were observed in 5 patients so far, all with rectal primary tumour. After a median follow-up of 32.7 months, 3 and 5 year overall survival were 64% and 55%, respectively, with a median progression-free survival of 14.4 months.

**Conclusion:** Intensified pre-operative (OCFL-based) chemotherapy followed by a surgical reverse approach in patients with AS-CRLM was effective, safe, well tolerated and allowed more than half of patients to be alive at 5 years after diagnosis. These results confirm the clinical validity of this original multidisciplinary strategy in the treatment of advanced colorectal cancer.

**Modest overall survival improvements from 1998 to 2009 in metastatic gastric cancer patients: A population based SEER analysis.**

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**Objective:** An increasing fraction of gastric cancer patients presents with distant metastasis at diagnosis. We assessed the survival rates in patients with and without palliative gastrectomy over a period of 11 years.

**Methods:** Patients with metastatic gastric cancer were identified from the Surveillance, Epidemiology, and End Results (SEER) database between 1998 and 2009. Time trend and impact of palliative gastrectomy on survival was assessed using both multivariate Cox proportional hazards model and propensity score matching (PSM).

**Results:** 8'249 patients with stage IV gastric cancer were identified. The rate of metastatic disease increased from 31.0% in 1998 to 37.5% in 2009 (P < 0.001). The palliative gastrectomy rate dropped from 18.8% in 1998 to 10.2% in 2009 (P = 0.004). Median survival rates for patients with N ≥ 1, 432 (17.4%) and without (N = 6,817, 82.4%) palliative gastrectomy were 7 and 3 months. There was an increase in median overall survival from 2 months (1998) to 3 months (2009) in the non-gastrectomy group, and from 6.5 months (1998) to 8 months (2009) in the gastrectomy group. Three-year cancer-specific survival rates were 9.4% (95% CI 7.8%–11.2%) with gastrectomy and 2.1% (95% CI 1.7%–2.5%) in patients not undergoing surgery (P < 0.001). Palliative gastrectomy was associated with an increased cancer specific survival in unadjusted (hazard ratio (HR) = 0.54, 95% CI 0.51–0.57), multivariable risk-adjusted (HR = 0.53, 95% CI 0.50–0.57) and PSM-adjusted (HR = 0.50, 95% CI 0.46–0.53) Cox regression analyses (All P < 0.001).

**Conclusion:** On a population-based level, only modest improvements in prognosis for metastatic gastric cancer were observed. Considering the low rate of midterm survivors in both groups, palliative gastrectomy should be performed with caution in metastatic gastric cancer patients.

**SWISS DRG threatens outpatient treatment for inguinal hernia, generates economically higher costs and conflicts patient demand**

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**Objective:** In inguinal hernia repair implementation of SWISS DRG produced an incentive to hospitalize patients for longer than necessary to generate the maximum institutional income. This incentive conflicts patient demand and is deleterious for reducing total health care costs.

**Methods:** A retrospective case control analysis of the outcome and costs in 300 patients receiving inguinal hernia repair either in-hospital or in an outpatient setting from January 2013 to November 2014 in a single surgical center. The groups were allocated according to surgical feasibility and patients demand; but in 2013 the official hospital direction favored outpatient treatment, whereas this policy was changed to favor in-hospital treatment plans in 2014.

**Results:** 300 patients underwent open or laparoscopic inguinal hernia repair either in-hospital or as outpatients. The mean age of the patients of both groups was comparable (58y vs. 58.2y). The male/female ratio differed (outpatient 90.5% male vs. 64.4% in-hospital). The outpatient had a higher rate of ASA 1 classification (75% vs. 50%). Outpatients had a higher rate of endoscopic hernia repair (61.9% vs. 56.7%). The overall readmission rate was lower in the outpatient setting (9.5% vs. 13.3%). The mean operations time was lower in outpatients (69.9min. vs. 82.7min.). The return to work time was clearly shorter in the outpatient setting (14.2d vs. 21d). 90% of outpatients would choose the same approach, whereas 60% of hospitalized patients would have preferred the outpatient setting. The mean hospitalization time was 2.2 days. The national institutional revenue was lower in the outpatient group (3745 CHF vs. 6656 CHF) generating an annual institutional financial short coming of 243'078 CHF vs. an annual gain of 107'015 CHF in the in-hospital treatment as exemplified for this study in our individual institutional calculations.

**Conclusion:** To receive maximal revenues for hernia repair, surgical institutions have the incentive to hospitalize patients longer than necessary, despite patient demands and medical necessity. Despite lesser total economic costs of outpatient treatment it is unattractive for surgical institutions due to lower revenues for hernia repair. Furthermore, most patients would favor outpatient treatment and are urged to in-hospital treatment.

**Postoperative urinary retention in colorectal enhanced recovery patients: An analysis of risk factors**

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**Objective:** Enhanced recovery (ERAS) guidelines for colorectal surgery request early removal of urinary catheters regardless of the use of epidural analgesia (EDA) and claim low rates of urinary retention. The aim of the
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The initial Zurich experience with partial-ALPPS in patients with non-resectable liver tumors
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Objective: A new two-stage hepatectomy with parenchymal transaction at stage 1, named as associating liver partition and portal vein ligation for staged hepatectomy (ALPPS), has been increasingly performed in patients with primarily unresectable liver tumors worldwide. Despite the great oncological potential of this procedure, ALPPS has been challenged by major safety concerns. Here, we report our initial experience with another ALPPS variant in which the liver parenchyma is only partially transected at stage 1 (partial-ALPPS).

Methods: Between June 2011 and September 2014, all patients undergoing elective colorectal resection were treated according to our institutional standard-ized ERAS protocol. Clinical data, functional outcomes (including first flatus and stool, postoperative ileus), compliance with ERAS items, complications and length of stay were prospectively registered. In a retrospective analysis, we compared outcomes between right and left colectomy.

Results: Patients with right colectomy (N = 85) did well match with left-sided resections patients (N = 118) for age, BMI and ASA. Overall compliance with the ERAS protocol was similar in both groups (76% for right vs 77% for left colectomy, p = 0.492). First flatus occurred in both groups after a median of two postoperative days (p = 0.077); first stool was observed after a median of 3 and 2 days, respectively (p = 0.189). Twenty patients (24%) needed postoperative nasogastric tube placement after right colectomy compared to 11 (8%) after left colectomy (p = 0.002). Overall, 42 patients with right colectomy (49%) and 51 patients with left colectomy (37%) developed postoperative ileus (p = 0.071). Median postoperative length of stay was 6 days (IQR 4–9) after right and 5 days (IQR 4–7) after left colectomy (p = 0.020) but 4 days (IQR 3–5) in patients of both groups without complications (p = 0.252).

Conclusion: Overall compliance with the protocol was equally high in both groups, showing that ERAS protocol is appropriate for right and left colectomy. Functional recovery however, tended to be slower after right than after left colectomy, and postoperative ileus was significantly more frequent, suggesting that an adaptation for right colectomy may be considered.

Compliance with an enhanced recovery pathway after colorectal surgery decreases the need for nasogastric drainage and improves outcome
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Objective: Enhanced recovery (ERAS) protocols advocate removal of nasogastric tubes before extubation after colorectal surgery. However, postoperative ileus requiring NGD remains debated. The aim of the present study was to identify risk factors for the need of postoperative nasogastric drainage (NGD) and to analyse the outcome of these patients.

Methods: Since 2011, data about all consecutive colorectal surgeries within the ERAS pathway were prospectively recorded. In a retrospective analysis, demographic and surgical items and compliance to protocol were analysed, uni- and multivariate risk factors for NGD were identified and functional and surgical outcome between the two groups (NGD vs no NGD) were compared.

Results: One hundred and twenty-eight (25%) out of 513 patients needed postoperative NGD because of postoperative ileus. Patients in the NGD group were sicker (ASA score 1–2: 23% vs 50%, p = 0.001, mobility WHO score > 2: 16% vs 7%, p = 0.002) and had longer operations (220 ± 100 min vs 190 ± 90 min, P = 0.006) and surgical approach (minimally invasive: 34% vs 52%, P = 0.001). Among ERAS related items, fluid overload (2.1 ± 1.2 l vs 1.8 ± 1 l, P = 0.006), oral bowel preparation (9% vs 4%, P = 0.013) and abdominal drains (33% vs 19%, P = 0.003) were risk factors. Patients with urinary drainage were less mobile (mobilisation day 1 > 4 h: 56% vs 72%, P = 0.002) and gained more weight (3 ± 3 kg vs 1.5 ± 3 kg on day 1, P = 0.003).

Multivariate analysis identified postoperative EDA as independent risk factor (OR 2.2; 95%CI 1.13–4.33) and minimally invasive approach (OR 0.56; 95%CI 0.3–0.94) as protective factor.

Conclusion: UR occurs in over 20% of our colorectal enhanced recovery patients and impedes mobilisation and recovery. EDA and invasive surgery were independent risk factors for urinary retention. The use of epidurals within ERAS pathways should be reconsidered.

Enhanced recovery pathway for right and left colectomy: Comparison of functional outcomes
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Objective: It is today demonstrated that Enhanced Recovery (ERAS) protocols improve outcome after colorectal surgery. However, some differences in recovery between right and left colectomy are suspected, that could make an adaptation of the protocol necessary. The aim of the present study was to compare compliance with a standardized ERAS protocol and to assess functional and clinical outcomes after right or left colectomy.

Methods: Since 2011, prospective documentation of over 100 items related to demographics, surgical details, compliance and outcome was performed of all consecutive colorectal surgical patients, which constituted the cohort for this retrospective analysis. The aim was to describe the incidence of UR and to identify associated risk factors. Urinary retention risk factors were entered in a multinominal logistic regression model.

Results: One hundred and ten (21%) out of 513 patients developed post-operative UR needing urinary drainage. Baseline characteristics were comparable between the group of patients with UR and the remaining patients. In patients with EDA, 35% developed urinary retention compared to 14% of patients without EDA (P = 0.001). Further, risk factors associated with UR were previous abdominal surgery (56% vs 44%, P = 0.026), duration of the operation (220 ± 110 min vs 190 ± 90 min, P = 0.006) and surgical approach (minimally invasive: 34% vs 52%, P = 0.001). Among ERAS related items, fluid overload (2.1 ± 1.2 l vs 1.8 ± 1 l, P = 0.006), oral bowel preparation (9% vs 4%, P = 0.013) and abdominal drains (33% vs 19%, P = 0.003) were risk factors. Patients with preoperative NGD were less mobile (mobilisation day 1 > 4 h: 56% vs 72%, P = 0.002) and gained more weight (3 ± 3 kg vs 1.5 ± 3 kg on day 1, P = 0.003).

Multivariate analysis identified postoperative EDA as independent risk factor (OR 2.2; 95%CI 1.13–4.33) and minimally invasive approach (OR 0.56; 95%CI 0.3–0.94) as protective factor.

Conclusion: UN occurs in over 20% of our colorectal enhanced recovery patients and impedes mobilisation and recovery. EDA and invasive surgery were independent risk factors for urinary retention. The use of epidurals within ERAS pathways should be reconsidered.

The initial Zurich experience with partial-ALPPS in patients with non-resectable liver tumors
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Objective: We analyzed all ALPPS procedures in non-cirrhotic and non-cholestatic patients who also had a prolonged hospital stay (stage 1 and 2 was 11 days (range 7–21 days) in p-ALPPS 61%) within a median time of 7 days. The median interval between stage 1 and 2 was 11 days (range 7–21 days) in p-ALPPS and 9 days (range 7–69 days) in ALPPS. Outcome was analyzed in terms of mortality.

Results: The median age of the p-ALPPS and ALPPS group was comparable (59 vs. 59 years). The median standardized FLR before stage 1 was comparable for both groups (p-ALPPS 0.25 vs ALPPS 0.23). As observed in ALPPS, p-ALPPS resulted in comparable rapid FLR hypertrophy (p-ALPPS 60% vs. ALPPS 61%) within a median time of 7 days. The median interval between stage 1 and 2 was 11 days (range 7–21 days) in p-ALPPS and 9 days (range 7–69 days) in ALPPS.
Irreversible electroporation in cancer treatment – a new ablative modality with great potential

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Objective: Irreversible electroporation (IRE), also called Nanoknife®, is a new non-thermal ablating with promising effects on local tumor treatment. The electrical energy induces cell death while sparing vessels, bile ducts, nerves and other structures. In contrast to microwave and radiofrequency ablation, this technique does not cause heat-sink effect, and has been increasingly applied as an alternative treatment for different type of cancers. The goal of this study was to evaluate feasibility and safety of this novel ablation treatment.

Methods: Patients treated with IRE ablation were prospectively included. Safety and feasibility were assessed based on adverse effects and technical success. Complications were scored by Clavien-Dindo classification from I to V.

Results: The procedure was feasible in all 20 cases. However, one patient had incomplete ablation due to generator system problems. The most common type of tumor was colorectal liver metastasis nearby hepatic vein or portal vein (40%) followed by unresectable pancreatic cancer (25%), recurrent cholangiocarcinoma in the hilum (15%) and others (20%). During IRE application, 3 (15%) patients presented arrhythmia. Post-ablation complications were pancreatic fistula (n=1, grade IIIa), biliary stenosis (n=1, grade IIIa), portal vein thrombosis (n=2, grade II). There was no death related to the procedure. Local free survival rate at 3, 6 and 12 months was 90%, 86%, 52% respectively.

Conclusion: IRE ablation appears to be a novel, low risk, ablative therapy. This initial study demonstrates feasibility for unresectable local tumors in proximity of vessels and bile duct in situation without other alternative approach.

Impact of hypothermic oxygenated perfusion (HOPE) on human DCD liver transplants compared to static cold storage - an international matched case analysis

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Objective: Exposure of donor liver grafts to long periods of warm ischemia before procurement causes intrahepatic cholangiopathy and graft loss. Due to unavoidable long warm ischemia time in DCD donation in Zurich due to local legislative regulations, all DCD liver grafts in Zurich were pretreated with the new machine perfusion: “HOPE” (Hypothermic Oxygenated PErfusion) in an attempt to improve graft quality before implantation. Feasibility in the first 8 patients has been reported earlier last year. To investigate the impact of this new machine liver perfusion approach (HOPE), outcome data were compared with un-perfused DCD liver transplantations.

Methods: All HOPE treated DCD livers (n=25) were matched (1:2) with normally preserved (static cold preservation) DCD liver grafts (n=50) from two well-established European programs from 2 different countries. Criteria for matching included donor warm ischemia and key confounders summarized in the Balance of risk (BAR) score (donor-& recipient age, MELD, cold preservation-time, re-transplantation, life-support). The primary endpoint was biliary complication within one year after LT. Secondary endpoints included liver function and graft survival. Fifty liver grafts from standard brain dead donors (DBD) were also matched to the BAR score, serving as negative controls.

Results: HOPE treatment of DCD livers significantly decreased graft injury compared to matched cold stored DCD livers regarding peak ALT (1239 vs. 2065U/l, p=0.02), intrahepatic cholangiopathy (0 vs. 18%, p=0.03), biliary complications (20 vs. 46%, p=0.042) and 1-year graft survival (92 vs. 69%, p=0.04). No graft failure due to intrahepatic cholangiopathy or non-function occurred in HOPE treated livers, while 16% of cold stored DCD livers needed re-transplantation. Consistent with dramatic protective effects, HOPE perfused DCD livers achieved similar results as control DBD livers in all endpoints.

Conclusion: This first comparison of HOPE perfused vs. cold stored DCD livers suggests that HOPE offers important benefits in preserving higher risk DCD liver grafts.
Conclusions: During long-term follow-up, SPK/PAK as well as SIK/IAK as a result of a sustained improvement of glycemic control with slightly higher glycated hemoglobin in the SIK/IAK group. While insulin independence is more common in whole organ pancreas recipients, islet transplantation can be conducted with a lower surgical complication rate.

Implementation of an enhanced recovery program for pancreas head resection is highly cost-effective – results of a cost-benefit analysis of 161 patients

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Objective: Enhanced recovery (ERAS) programs have shown a decrease of complications and length of hospital stay after different types of surgery. Cost-effectiveness of ERAS programs was demonstrated mainly for colorectal surgery, but no data are yet available for pancreas surgery. The study aimed to assess the economic aspects of an ERAS program for pancreaticoduodenectomy (PD).

Methods: ERAS for pancreas surgery was implemented in our division in October 2012. From October 2012 to October 2014 all consecutive PD patients were recorded as ERAS group. They were compared in terms of costs to all PD performed between January 2010 and October 2012 (pre-ERAS group).

Preoperative, intraoperative, and postoperative costs were collected for every patient via the hospital administration. They were compared between the two groups using a bootstrap independent T-test. Specific ERAS-related costs (i.e., ERAS database, full-time ERAS-dedicated nurse, ERAS meetings, carbohydrates drinks, and ERAS logbooks) were calculated.

Results: Seventy-four ERAS patients matched well in terms of demographic and surgical details with 87 patients in the pre-ERAS group. Overall complication rate was 68% (50/74) and 82% (71/87) in the ERAS and pre-ERAS groups, respectively (p = 0.046). Median hospital stay was shorter for the ERAS group (15.5 vs. 19 days, p = 0.029).

Specific ERAS-related costs were 922 euros per patient. Mean total costs per patient were 34,120 euros for the ERAS group and 62,112 euros for the pre-ERAS group (p = 0.262). The mean intensive care unit (ICU) and intermediate care costs per patient were 9,119 euros and 13,791 euros for the ERAS and the pre-ERAS groups, respectively (mean difference: -4,654 euros, p = 0.151).

Conclusion: ERAS implementation for PD was cost-effective in our cohort. Savings can be explained by a reduction of postoperative complications and hospital stay. Furthermore, fewer patients in the ERAS group required an ICU stay, and the duration of the ICU stay was shorter.

Statins potentially improve survival of patients undergoing curative resection for pancreatic ductal adenocarcinoma

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Objective: There is good experimental evidence that statins (e.g. simvastatin) have antineoplastic properties. Inhibitions of angiogenesis and tumor growth, as well as induction of apoptosis are main effects; of note, the cytostatic effects can already be achieved with low doses similar as those used to treat hyperlipidemia.

The present study aimed to assess the relationship between statins and overall survival (OS) in patients with pancreatic ductal adenocarcinoma (PDAC) undergoing surgical resection with curative intent.

Methods: Out of 295 pancreatoduodenectomies performed from January 2008 to December 2013, 128 patients (68 male, 60 female, median age of 68 years) with PDAC were identified from a prospective single-centre database. Kaplan-Meier method was used to determine the impact of statins on overall survival (OS).

Logrank test and Hazard Ratio (HR) were used to determine significance of the different survival rates with adjustment for nodal status, resection margins, tumor size and adjuvant gemcitabine therapy.

Results: Twenty-five patients (11 male, 14 female, median age of 70 years) were statins users (20%). Atorvastatin, simvastatin and pravastatin were most frequently used. Prognostic factors were similar in statins users compared to the non-users (N0 20% vs. 21%, R0 76% vs. 65%, tumor size >20 mm 8% vs. 21%, adjuvant gemcitabine therapy 76% vs. 75%, respectively). Median OS was
Delayed gastric emptying (DGE) syndrome is a frequent complication after pancreaticoduodenectomy (PD). The reported incidences are ranging from 20% to 40%. Although several studies have evaluated potential risk factors for DGE, no clear evidence are currently established. The aim of this study was to evaluate the role of the gastroenteric reconstruction type (antecolic versus retrocolic) after PD on the incidence of DGE.

**Methods:** A systematic review of the literature was made according to the PRISMA guidelines. Randomized controlled trials (RCT) comparing antecolic vs. retrocolic reconstruction were included irrespective of the PD techniques (classic PD, pylorus-preserving PD, and subtotal stomach-preserving PD). A formal meta-analysis was then performed.

**Results:** Seven RCT including 623 patients were identified for the meta-analysis. The overall quality was good (five RCT with a Jadad score ≥ 3, two with a score < 2). General risk of bias was low. DGE was significantly less frequent with antecolic reconstruction (OR: 0.70, 95% CI [0.49-1.00], p = 0.05). The other main surgery-related complications (i.e., pancreatic fistula, hemorrhage, intra-abdominal abscess, bile leak, and wound infection) were not dependent on the reconstruction route (OR: 0.87, 95% CI [0.62-1.21], p = 0.40).

**Conclusion:** This meta-analysis shows that antecolic reconstruction after PD is superior to retrocolic reconstruction in terms of DGE. This type of reconstruction should therefore be recommended.

**Effect of antecolic versus retrocolic reconstruction after pancreaticoduodenectomy on delayed gastric emptying: A meta-analysis of seven randomized controlled trials**


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**Objective:** Delayed gastric emptying (DGE) syndrome is a frequent complication after pancreaticoduodenectomy (PD). The reported incidences are ranging from 20% to 40%. Although several studies have evaluated potential risk factors for DGE, no clear evidence are currently established. The aim of this study was to evaluate the role of the gastroenteric reconstruction type (antecolic versus retrocolic) after PD on the incidence of DGE.

**Methods:** A systematic review of the literature was made according to the PRISMA guidelines. Randomized controlled trials (RCT) comparing antecolic vs. retrocolic reconstruction were included irrespective of the PD techniques (classic PD, pylorus-preserving PD, and subtotal stomach-preserving PD). A formal meta-analysis was then performed.

**Results:** Seven RCT including 623 patients were identified for the meta-analysis. The overall quality was good (five RCT with a Jadad score ≥ 3, two with a score < 2). General risk of bias was low. DGE was significantly less frequent with antecolic reconstruction (OR: 0.70, 95% CI [0.49-1.00], p = 0.05). The other main surgery-related complications (i.e., pancreatic fistula, hemorrhage, intra-abdominal abscess, bile leak, and wound infection) were not dependent on the reconstruction route (OR: 0.87, 95% CI [0.62-1.21], p = 0.40).

**Conclusion:** This meta-analysis shows that antecolic reconstruction after PD is superior to retrocolic reconstruction in terms of DGE. This type of reconstruction should therefore be recommended.
Results: A multicenter retrospective cohort study has been designed to assess several surgical techniques used to correct complex perineal disorders. 12 patients (11 men) with a median age of 52 (IQR 42–60) years have been included in an intention-to-treat setting. Of those, one patient was converted to a laparoscopic-assisted procedure due to adhesions. While the mean resting pressure dropped from a preoperative median of 66 (55–78) mmHg to 46 (31–59) mmHg at 6 months (p = 0.028), the squeeze pressure remained unchanged (p = 0.13). The rectal capacity was 153 (118–180) cc preoperatively and 150 (140–175) (p = 0.9) at 3 and 180 (153–180) at 6 months (p = 0.49) respectively. The baseline Vaizey score was 0 (0–10) and did not change after 3 (0.5 (0–3); p = 0.77) and 6 months (0 (0–2.5); p = 0.49). There was no change in stool frequency after 3 (p = 0.77) and 6 months (p = 1.0). However, there was a tendency towards an increase of nocturnal defecation after 3 months (p = 0.09) that normalized within 6 months (p = 1.0). Preoperatively 25% of patients were complaining of occasional incomplete evacuation. This proportion did not change after 3 months (50%, p = 0.18) and 6 months (43%, p = 0.62).

Conclusion: Transrectal Hybrid-NOTES sigmoidectomy does not impair clinical continence. Though, comparable to the published findings after transanal endoscopic microsurgery, the resting pressure was significantly reduced 3 and 6 months after surgery. Stool frequency and evacuation did not change. In conclusion, anorectal function is not clinically affected by transanal specimen removal.

Does surgical treatment for complex perineal disorders affect women's sexuality?

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Objective: Several surgical techniques are used to correct complex perineal disorders. Complications of these techniques are well documented, except on women’s sexuality. The purpose of this study is to compare two surgical approaches on women’s sexuality.

Methods: A multicenter retrospective cohort study has been designed to assess the impact of two approaches:

- A single abdominal approach (SA) in cases of rectal prolapse +/- vaginal prolapse (rectoepy+/- promontofixation)
- An abdominal and vaginal approach in cases of a rectocele + rectal prolapse (Marti-Zacharin procedure, MZ).

Results: 338 female patients who underwent SA or MZ surgery were asked to answer the French version of the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire PISQ-12 before and after surgery. We also investigated whether patients had changed their sexual activity after surgery through a visual analog score (VAS). We compared the answers before and after surgery within each group and performed comparisons of the two groups. To assess anal incontinence, Miller score was used.

Results: 73 patients refused to participate to the study, 57 were unreachable and 38 were unable to answer (psychiatric causes or death). 170 patients had completed the questionnaire; 58 patients were still sexually active but the data of 1 was not complete. 55 patients were included; 24 patients were operated through a MZ procedure and 31 through a SA procedure. MZ group showed more dyspareunia (3.14 vs 2.45; p = 0.02) and loss of sexual excitement (3.24 vs 2.71; p = 0.04) after surgical procedure. SA group had less urinary loss during intercourse after the operation (3.14 versus 3.45; p = 0.26).

Comparing the 2 groups, the SA procedure had less urinary incontinence during sexual intercourse than the MZ procedure (3.79 versus 3.14; p = 0.01). The SA group did not reduce frequency of sexual intercourse due to a vaginal mass (3.78 versus 3.19; p = 0.05).

Other PISQ-12 answers, VAS, Miller score and comparisons between groups were not statistically significant.

Conclusion: Our study suggests that the MZ procedure has more negative impact on women’s sexuality than the SA procedure. The vaginal approach is probably responsible for these negative effects.

However, a perineal surgical approach is mandatory in cases of sphincter damage and will be considered in the future only for these indications.

Survival after CRS/HIPEC for colorectal and appendicular peritoneal malignancy

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Objective: Cytoreductive Surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) is a treatment option for well-selected patients with peritoneal carcinomatosis (PC). Despite an increasing number of centers, survival data from Switzerland is scarce.

Methods: Data of 130 patients with colorectal or appendicular carcinomatosis from two centers (A: n = 26, 1996–2008, and B: n = 139, 2009–2014) were prospectively collected and analyzed. Patients with malignant disease were selected (extent of PC, no extra-abdominal disease, performance status), and received standard perioperative chemotherapy. Patients with low-grade appendix tumors were directly operated. HIPEC was indicated after successful cytoreduction (CC-score 0, no viable tumor). Follow-up included a clinical exam, tumor markers and CT scan every six months.

Results: Patients had carcinomatosis from appendix tumors in 63% (82/130), including low-grade (40/82) and high-grade (44/82) tumors, and colorectal cancer in 37% (48/130). Cytoreductive surgery was possible in 71% of patients, major morbidity and mortality were 8.1% and 2%, and follow-up was 25 months. For colorectal PC, median overall (mOS) and disease free (DFS) survival were 34 and 12 months, and 3-year survival was 48%. For low-grade appendix tumors, mOS and DFS were 100% and 87% at 3y. For high-grade appendix tumors, mOS was not reached, DFS was 28 months, 56% were disease free and 69% alive at 3 years. Signet ring differentiation was a highly negative prognostic factor for survival for colorectal and appendix tumors (p < 0.001).

Conclusion: Outcomes after curative CRS/HIPEC are excellent for appendix tumors, and a majority of well-selected patients with PC from colorectal cancer have a survival benefit. Patients with signet ring differentiation have worse outcomes.

Incidence and risk factors for anastomotic leakage after esophagectomy for cancer

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Objective: Anastomotic leakage still represents a feared complication after esophagectomy for cancer with potentially important sequelae in the long-term course. As diagnostics is not yet standardized and not all fistulas are symptomatic, the reported incidences of anastomotic leakage are ranging from 5% to 35%. This study aimed to assess pre-, intra- and postoperative risk factors (RF) that may impact on the occurrence of anastomotic fistula. Risk factors that can be actively influenced were of particular interest.

Methods: Our prospective database of patients undergoing esophageal surgery was used to identify possible risk factors. Patients who underwent oncological esophagectomy for cancer from 2000 to 2013 were included and more than 30 possible risk factors were assessed.

Univariate and multivariate analysis were performed to assess RFs. Only RFs that were statistically significant in the univariate analysis were included for multivariate analysis. A p value of <0.05 was considered statistically significant.

Results: There were 153 patients (119 male, 34 female patients, median age 64yrs, range 46–84yrs). Anastomotic leakage occurred in 31 patients (20%, 24 male, 7 female patients, median age 65yrs, range 50–82yrs). Among the assessed RFs, active smoking, positive history of smoking, level of the anastomosis (cervical vs. intrathoracic), type of anastomosis (hand sutured vs. stapled), and the intraoperative fluid load measured as ml/kg/h were statistically significant at the univariate analysis. Neosalbutam therapy (NAT) was not significant.
Methods: We evaluated the safety and efficacy of routine upper endoscopy 

Conclusion: This study confirmed smoking as most important RF in esophageal cancer surgery, as well as the known fact that cervical anastomoses and suture anastomosis by hand are at increased risk for postoperative leakages. The most underestimated factor is an intraoperative fluid overload, which needs particular attention during surgery.

The prognostic value of PET/CT and endoscopic ultrasound in oesophageal cancer patients after neoadjuvant radiochemotherapy

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Objective: Integrated F-18-fluorodeoxyglucose positron emission tomography with computed tomography (PET/CT) and endoscopic ultrasonography (EUS) are widely used as standard staging modalities for oesophageal cancer. Most of the resectable oesophageal cancer patients undergo neoadjuvant radiochemotherapy. There is only few data available about the prognostic value of PET/CT and EUS staging after neoadjuvant treatment.

Methods: We assessed the prognostic value of PET/CT and EUS in FDG positive oesophageal cancer patients after neoadjuvant radiochemotherapy between June 1999 and February 2014 using histopathological findings as a reference standard. Sensitivity, specificity, and accuracy of T-staging and N-staging were compared.

Results: A total of 100 patients with resectable oesophageal cancer had a neoadjuvant chemotherapy or concurrent chemo-radiation therapy before surgery. 72 patients received restaging with EUS and 51 with PET/CT after neoadjuvant therapy. In the EUS examinations group 26.4% of patients had a squamous-cell carcinoma and 73.6% had an adenocarcinoma. Among the patients in the PET/CT examination group 19.6% had a squamous-cell carcinoma and 80.4% suffered from an adenocarcinoma. In the EUS examinations 36.1% had correct T staging, EUS overstaged the T stage in 50% and under staged it in 13.8%. In the PET-CT examination 33.3% had correct T staging. PET-CT over stage the T stage in 56.8% and under staged it in 9.8%.

For the N-staging EUS revealed a sensitivity and specificity of 80.7% and 63%, while PET/CT showed a sensitivity and specificity of 66.7% and 84.8%, respectively.

Conclusion: PET-CT and EUS revealed a similar and moderate diagnostic value for the T-staging after neoadjuvant radiochemotherapy. The specificity regarding the N-staging is considerably higher in PET/CT compared to EUS after neoadjuvant treatment.

Routine upper endoscopy to detect anastomotic leakage after esophagectomy with intrathoracic esophagogastronomy

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Objective: To evaluate cosmesis and body image after single-port laparoscopic cholecystectomy (SPLC) vs. conventional 4-port laparoscopic cholecystectomy (4PLC). The impact of SPLC in reducing operative trauma, improving cosmesis and body image has not been evaluated in double-blinded randomized controlled trials (RCT). This approach is therefore remained controversial.

Methods: Between 10/2011-02/2014 patients from 2 centers undergoing elective cholecystectomy were randomly assigned to SPLC or 4PLC. Primary endpoints were the validated cosmesis (5–20 points) and body image (3–24 points) scores after 12-weeks. Secondary endpoints included operative duration, postoperative pain (VAS), complications (CCI), quality of life (SF-36), and length of hospital stay. Patients, physicians, and nurses were blinded until the seventh postoperative day. Sample size calculation performed by estimating a difference of cosmesis of 20% (α = 0.05, β = 0.90) resulted in a number of 49 patients needed per arm.

Results: After randomization of 103 patients, 96 patients (7 dropouts) were included in the final analysis (48 per arm). Patient demographics were equally distributed between both groups (mean age: 46yrs., SD 14, 62 females and 34 males). The SPLC-group showed superior mean cosmesis and body image scores compared to the 4PLC-group at 12-weeks (23 vs. 17, p = 0.017 and 5 vs. 6, p = 0.002, respectively) and at 1-year (23 vs. 17, p = 0.017 and 5 vs. 6, p < 0.001, respectively) follow-up. Operation duration was higher in the SPLC-group (mean 101 min vs. 90 min, p = 0.001). Even though postoperative pain was lower in the SPLC-group (mean VAS 1 vs. 2, p = 0.001), there were no significant differences in complications, quality of life and length of hospital stay.

Conclusion: This is the first double-blinded RCT reporting superior short- and long-term cosmesis and body image results in patients undergoing SPLC. Although technically more demanding, SPLC can be regarded as standard of practice for selected patients with benign gallbladder disease.

Comparative long-term outcomes of three bariatric procedures: Sleeve gastrectomy, Roux-en-Y gastric bypass, and bilipancreatic diversion with duodenal switch

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Objective: Laparoscopic sleeve gastrectomy (LSG) as a single-stage bariatric procedure is becoming increasingly popular, especially in patients who are at high risk and/or super obese (BMI > 50 kg/m²). Preliminary results have
Enteroendocrine cell population is reduced in obesity and restored after sleeve gastrectomy (LSG)

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Objective: Morbidly obese patients exhibit impaired secretion of satiation hormones cholecystokinin (CCK), glucagon-like peptide 1 (GLP-1) and peptide YY (PYY), which may contribute to the development of obesity. Bariatric surgery is associated with weight loss and dramatic increase in the secretion of satiation hormones, but the underlying mechanism remains unknown. A better understanding of mechanisms involved will assist in development of non-invasive therapeutic strategies.

Methods: Gastric and intestinal mucosa were collected by endoscopy from 14 obese subjects (mean BMI 48.2) before and 3 months post LSG (N = 8, mean BMI 38) and 12 lean controls (mean BMI = 21.9). Tissue morphology was determined by morphometric analysis. Expression of enteroendocrine cell (EEC) population possessing chromogranin A (marker of EECs), ghrelin, CCK, PYY, GLP1 and GLP-2 was assessed by immunohistochemistry and quantitative PCR. Expression of defensin (a marker of Paneth cells), mucus 2 (goblet cells) and Na+/glucose co-transporter 1 (SGLT1) (absorptive enterocytes), at mRNA and protein levels, was determined.

Results: Duodenum: The total number of EECs was significantly (p < 0.05) lower in obese vs. lean subjects and was almost (96%) restored post-op. There was a 50% decline in ghrelin expressing cells (almost fully restored post-op), a 54% decrease in CCK cells (restored by 80%), and a decline by 40% and 34% in GLP-1 and GLP-2 cells (increased post-op: 89%). We report for the first time that human duodenum expresses PYY, and that there was a 54% decrease in PYY-containing cells in obese subjects (restored by 54% post-op).

There were no changes in villus height/crypt depth suggesting that the decline in EECs is not due to any changes in surface area. There were no regional alterations in expression of SGLT1 and defensin, but dramatic increase in MUC 2 (was restored post-op by 44%) compared to lean controls. Stomach: There was a decline in the total number of EECs (partially restored post-operatively), reflected in 50% decline in ghrelin (restored by 65%).

Conclusion: In obesity, there is a deregulation in developmental programming of EECs expressing various gut hormones. By some as yet unknown mechanism this programming is partly restored post-operatively leading to an increase in the secretion of gut hormones.

Factors influencing the surgeon’s decision to comply or not to comply with the assigned randomization for rectal replacement in a prospective randomized trial SAKK 40/04 comparing side-to-end anastomosis, colon-J-pouch, and straight coloanal anastomosis in patients with rectal cancer


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Objective: It was planned and anticipated that for a certain number of patients, the randomized reconstruction technique will not be “feasible”. In these cases, the surgeon was allowed to choose one of the two remaining techniques. Aim of this study was to evaluate factors influencing the surgeons’ decision to comply or not to comply with the assigned randomization.

Methods: This prospective, randomized trial compares the results of coloanal reconstruction utilizing the same form of resection (Total mesorectal excision, TME) and three currently practiced techniques for rectal reconstruction: 5 cm colon-J-pouch, the side-to-end anastomosis, and the straight coloanal anastomosis. Reasons for noncompliance with the assigned randomization were recorded. Stratification factors: sex, distance of the tumor margin from the dentate line, age, BMI, distant metastatic disease and neoadjuvant treatment.

Results: A total of 336 patients were included. Of these patients, 112 were randomized to arm A (5 cm colon J-pouch), 112 to arm B (side-to-end anastomosis) and 112 to arm C (straight coloanal anastomosis). In 20.3% of the all patients a non-randomly assigned type of reconstruction was performed. This results in 65 patients in arm A, 123 patients in arm B and 134 patients in arm C respectively which were analyzed in this study. There were more “changes of plan” in patients who had been randomized to the J-pouch reconstruction. Logistic regression of factors associated showed a statistical significance only for distant metastatic disease (p < 0.001) while gender, distance of tumor from dentate line, age, neoadjuvant treatment or BMI did not reach statistical significance.

Conclusion: In our study only the presence of distant metastatic disease (worse compliance for M1) has a significant impact on the surgeon’s decision to perform or not to perform the most complex reconstruction (J-pouch) and as a result of this to switch to the more simple reconstructions as side-to-end or end-to-end anastomosis.

Definition, diagnosis and treatment of postoperative ileus: (an attempt for) International consensus using the Delphi method

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Objective: Postoperative ileus (POI) is one of the most frequent complications after abdominal surgery. Nonetheless, POI remains poorly defined. As a consequence, diagnostic algorithms, preventive and therapeutic measures underlie wide variations. The aim of the present study was to achieve an international consensus among leading colorectal surgeons on the definition, prevention and treatment of POI.

Methods: Thirty-five experts from 23 countries/5 continents participated in a 3-round Delphi process. In round 1, experts answered open-ended questions on (I) the definition and diagnosis of POI and postoperative nausea and vomiting
(PONV), (II) indications and removal of nasogastric (NG) tube, and on (III) preventive measures and treatment of POI. Round 2 consisted of closed-ended questions, and in round 3 experts rated their agreement with the use of a 5-point Likert scale. Consensus was defined when items were rated as agree or strongly agree by at least 70% of the experts.

**Results:** Experts reached consensus: POI is a temporary inhibition (86%) of gastro-intestinal motility after a surgical intervention due to non-mechanical causes (89%); it prevents sufficient oral intake (96%). Abdominal distension and tenderness are its more relevant clinical signs (71%). PONV can occur during the entire post-operative period (74%). NG tube placement is not mandatory (78%), indications are abdominal distension/discomfort and vomiting. The NG tube can be removed without previous clamping (81%) or previous gastrointestinal contrast study (100%). Preventive measures are recommended to decrease the risk of POI (96%): narcotic sparing analgesia (89%) and fluid optimization (74%). Treatment of POI should include stimulation of ambulation (96%) and stop of opioids (74%). Total parenteral nutrition is recommended from the 7th day without sufficient oral intake (81%). There was no consensus on the ranking of POI's symptoms, on the imaging modality of choice for the diagnosis of POI, neither on the difference between POI and PONV.

**Conclusion:** This Delphi study achieved partial expert consensus on POI: a practical and concise definition got distilled along with agreement on key steps of preventive, supportive and therapeutic interventions. However, experts’ opinion differed on the necessity and on the modality of radiologic imaging for the diagnosis of POI and on POI’s distinction from PONV, giving opportunity for further research.

**Decreasing leak rate in colorectal surgery using near infra-red (NIR) imaging: A multicentric prospective phase II study**

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**Objective:** Anastomotic leak is a devastating complication of colorectal surgery. There is no widespread means of assessing the viability of a laparoscopic anastomosis. We described recently the feasibility of microvasculatisation assessment with near-infra red technology (NIR). We present the implementation of this technique in a prospective series of patients undergoing colorectal resection.

**Methods:** Multicentric prospective study of patients undergoing colorectal resection. After vessel division and after colorectal anastomosis, indocyanine green (2.5 mg/ml) was injected intravenously and anastomotic microvasculatisation assessed with the PinPoint NIR system.

**Results:** 175 procedures have been performed so far, mainly for cancer (n = 106), Crohn’s (14), ulcerative colitis (6), 36 for complicated diverticular disease and 13 for other indications. 65 high anterior resection were performed, 38 low anterior resection, 5 pouches, two IRA, 47 right hemicolectomy, 9 Hartman’s reversal and 11 others. Median time of ICG circulation to reach the anastomosis was 30 seconds (10–107 sec) and the median added time per procedure was of 4 minutes (3.9 min). The perfusion was satisfactory in every patient. There was a change of attitude in 8 cases (4.5%). Only 4 postoperative leaks occurred during the study period (2.2%).

**Conclusion:** NIR Laparoscopy with ICG perfusion imaging allows a rapid assessment of the anastomosis. This study shows that this technology offers the patient a safe and reliable anastomosis assessment tool as well as a change of attitude in about 5% of the procedures preventing anastomotic leak.

**Outpatient treatment of uncomplicated diverticulitis: Safe but underused**

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**Objective:** Outpatient treatment (OT) of acute uncomplicated diverticulitis (UD) is possible. However, prognostic risk factors for failure are unknown.

The present study aimed to assess the one-month failure rate of OT for UD compared to inpatient treatment (IT) and to identify prognostic risk factors for failure.

**Methods:** All consecutive patients diagnosed with acute UD by CT-scan from 01/2006 to 12/2012 were retrospectively analyzed. Acute UD was defined as absence of the following elements: abscess > 4 cm, fistula, extraluminal contrast, pneumoperitoneum > 2 cm under the diaphragm, and immediate percutaneous drainage or surgery. Treatment failure was defined as the need for drainage/surgery or (re)hospitalization during the first month after treatment onset. All patients were contacted using a standardized questionnaire assessing one-month failure and recurrence.

**Results:** Out of 540 UD patients, IT was offered to 369 patients (68%), median length of stay 4 days, IQR 3–5 and OT to 171 patients (32%). OT increased over time from 13% in 2006 to 38% in 2012, p < 0.01. The IT group had a higher median age (61.7 vs. 53.5 years, p < 0.01) and included more women (50% vs. 39%, p = 0.03). The number of first episodes of UD was 71% vs. 72% in each group (p = 0.92). Immediate failure requiring drainage or surgery during the hospitalization was 1% (n = 10) in the IT group. Response rates to the questionnaire were 56% (IT) vs. 62% (OT), p = 0.18. Failure rates were 31% in the IT group vs. 10% in the OT group, p < 0.01. Among the patients with failure there was no difference between IT and OT regarding age, gender, percentage of first UD, Ambrosetti CT staging including abscess size, CRP/leucocyte values, nor length of antibiotic treatment. Extraluminal air was associated with higher failure rate of IT (p = 0.02), and UD episode number > 2 with higher rate of OT failure (p = 0.02). With a median follow-up of 60 and 47 months in the IT and OT groups, recurrent diverticulitis (> = 1 month after index episode) occurred in 42% vs. 41% (p = 1), and elective surgery was performed in 18% vs. 13% (p = 0.39), respectively.

**Conclusion:** Outpatient treatment for acute uncomplicated diverticulitis had a low one-month failure rate and did not increase the risk of recurrence in the long term. Patients presenting with more than two previous episodes of diverticulitis had a higher failure rate of outpatient treatment.

The role of the number of regional lymph nodes for staging and survival in 103,254 non-metastatic colorectal cancer patients. A population-based propensity score SEER analysis

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**Objective:** Regional lymph node (RLN)-involvement is the most important prognostic factor in non-metastatic colon cancer and crucial to decide about adjuvant therapy.

There is an ongoing debate if 12 nodes are adequate for staging and to predict prognosis. The aim of this study was to elaborate the optimal number of lymph nodes on a population-based level.

**Methods:** Patients with resection of non-metastatic colon cancer were identified from the Surveillance, Epidemiology, and End Results (SEER) database between 2004 and 2011.

The impact of the extend of the lymphadenectomy on survival was assessed using both univariable and multivariable Cox regression and propensity score matching (PSM).

**Results:** 103,254 patients with non-metastatic colon cancer were included. 133,722 positive out of a total of 656,329 retrieved RLN were found in 363,337 patients with positive-node cancer. The rate of positive RLN on all retrieved RLN for positive-node cancer with T1, T2, T3, and T4 carcinomas was 13.2%, 13.7%, 20.2%, and 25.5%. When modelling these rates with a geometric distribution, a sample of 12 RLN would contain positive RLN in only 81.7%, 82.9% for T1 and T2, and 93.3%, resp. 97.1% for T3, and T4 carcinomas. On the other hand a sample of 20 RLN would contain positive RLN in 94.1%, 94.7%, 98.9%, and 99.7% for T1, T2, T3, and T4 carcinomas. These theoretical considerations were confirmed by the observations in the SEER database. In patients with a minimum of 12 retrieved RLN, the number of retrieved RLN further correlated with the rate of positive-node cancer. In patients with node-negative colon cancer, extended lymphadenectomy of 20+ RLN was associated with an increased cancer-specific survival in unadjusted (hazard ratio (HR) of death = 0.81, 95% CI = 0.76-0.87, P < 0.001), multivariable adjusted (HR = 0.85, 95% CI = 0.80-0.91, P < 0.001), and PSM-adjusted Cox regression.
Objective: Germine mutations in DNA mismatch repair (MMR) genes MLH1, MSH2, MSH6, PMS2 cause autosomal dominantly inherited Lynch syndrome, characterised by early development of colorectal cancer, endometrial cancer and various other cancers. Lynch syndrome (LS) patients and their families benefit from life-saving intensive cancer surveillance. Approximately one of 10 colorectal cancers arises in the setting of Lynch syndrome. The objective of this study was to assess the detection rate of Lynch syndrome at our institution after introduction of systematic immunohistochemical (IHC) screening of colorectal cancers in 2011.

Methods: Following the EGAPP recommendations, beginning in June 2011, all colorectal cancers were prospectively tested by IHC for the presence of the four MMR proteins MLH1, PMS2, MSH2 and MSH6, independent of clinical criteria. In case of loss of MLH1, the BRAF mutation V600E was assessed by molecular testing and/or IHC. In patients suspected to be LS carriers (i.e. tumors showing loss of MLH1 expression combined with absence of BRAF V600E, loss of PMS2, MSH2 or MSH6), clinical follow-up was evaluated (tumorboard recommendations, transferal to genetic counseling and testing).

Results: Of all patients who underwent colorectal cancer surgery from 2011 to 2014 (n = 444), loss of MMR expression was found in 66 (14.9%) tumors. The mean age (MA) of all these patients was 75 years (±13 years). Out of the 444 patients 24 (5.4%) were classified as potential LS carriers (MA 69 ± 14 years), the mean age in patients with a sporadic MMR deficiency was 78 ± 18 years. In the 24 potential LS carriers genetic counselling and germline testing was recommended based on tumorboard decision. Out of the tested potential LS carriers 60% were positive for LS. This corresponds with a LS rate of 3.2% out of all our colorectal cancer patients.

Conclusion: In our patient series implementation of systematic IHC screening for LS leads to the identification of approximately 5% of potential LS-associated colorectal cancer patients. Tumorboard protocols should systematically evaluate IHC status of all colorectal cancers and include recommendations for genetic counseling and testing for all suspected LS patients.

Human mesenchymal stromal cells improve survival and function of pancreatic islets by cell-to-cell contact

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Objective: The aim of this study was to evaluate the survival and function of human pancreatic islets co-encapsulated with human Mesenchymal Stromal Cells (MSC) both in vitro and in vivo after transplantation in diabetic mice.
Methods: Human MSC and islets (or pseudo-islets, obtained after digestion and reaggregation of islet cells) were coencapsulated in new hydrogel microspheres composed of calcium alginate and covalently crosslinked polyethylene glycol. Cell function was tested in vitro by static incubation for islets of pseudo-islets alone and together with MSC. Encapsulated cells were transplanted intraperitoneally in streptozotocin-induced diabetic mice. Islet function was evaluated by intraperitoneal glucose tolerance test (IPGTT). Grafts were retrieved after 15 days for morphological analysis.

Results: In vitro, insulin secretion was significantly improved when MSC were in cell-cell contact with islets (or pseudo-islets) compared to islets that were only in paracrine contact with MSC (co-culture in dual chambers, p < 0.05). Encapsulated islets alone reversed diabetes in mice after intra-peritoneal transplantation after 2 days and allowed to maintain normoglycemia up to 70 days, compared to free islets, that were rejected in 6 ± 1 days (p < 0.0001, Mantel Cox). Transplantation of co-encapsulated islets and MSC maintained normoglycemia in mice up to 90 days (p < 0.05, Mantel Cox). IPGTT was performed at day 15 and mice transplanted with combined MSC-islets showed an improved glycemic response compared to mice with islets alone (p < 0.0001). Graft histology showed MSC located within and around the islets (or pseudo-islets), serving as stromal structure.

Conclusion: MSC co-encapsulated with islets improve survival and function of endocrine cells by cell to cell contact.

General Surgery and Traumatology

Immediate versus delayed laparoscopic cholecystectomy for acute cholecystitis with more than 72 hours of symptoms

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Objective: In acute biliary cholecystitis, there was a dogma that patients should be operated within 72 hours of evolution. However, retrospective studies suggested that laparoscopic cholecystectomy even after 72 hours was safe. Moreover, some randomized controlled-trials did not find any differences in term of complications between early and delayed cholecystectomy, however none of these studies did separate patients according to the onset of symptoms. The aim of our present study was to compare the clinical outcomes of immediate versus delayed cholecystectomies for acute cholecystitis with more than 72 hours of symptoms.

Methods: Prospective randomized study. All consecutive patients admitted to the surgical department with acute biliary cholecystitis with more than 72 hours symptoms were proposed the study. Exclusion criteria were pregnancy, acute pancreatitis, cholangitis, perforated gallbladder, immunosuppression and severe sepsis. In the immediate group, laparoscopic cholecystectomy was performed at hospital admission. In the delayed group, a standardized treatment by antibiotic was initiated and an elective cholecystectomy planned at least 6 weeks after the initial diagnosis. Primary outcome was overall morbidity. Secondary outcomes were postoperative complications, operative time, and length of stay. Both groups were compared by intention-to-treat analysis.

Results: The randomization included 86 patients (42 in the immediate group versus 44 in the delayed). Both groups were similar according to age, gender, BMI, ASA, and duration of symptoms. In terms of overall morbidity after primary diagnosis, there was a statistically significant difference favoring immediate cholecystectomy 6 (14.3%) versus 18 (40.9%) patients for the delayed group (p = 0.008). There was no significant difference in terms of operative time (p = 0.910) and postoperative complications rate (p = 1.000). Regarding total length of stay and antibiotic duration, a statistically significant difference favor the immediate group (median 4 days; interquartile range [IQR] 1-4 and median = 2 days; IQR = 1-5) versus delayed (median = 7 days; IQR = 5-11 and median 10 days; IQR = 10-14) were found respectively.

Conclusion: Immediate laparoscopic cholecystectomy for acute biliary cholecystitis even after 72 hours of symptoms is safe. It generates less global complications, shorter stay and shorter antibiotic duration compared to delayed cholecystectomy.

Significant reduction of hospital stays after laparoscopic appendectomy due to the implementation of the ERAS protocol

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Objective: Implementing the Enhanced Recovery After Surgery (ERAS®) protocol in colorectal surgery has proven to be highly effective by lowering morbidity, length of hospital stay and costs. The aim of this study was to analyze the potential benefits of the implementation of the ERAS protocol for patients undergoing appendectomy.

Methods: All patients undergoing appendectomy were systematically included in our ERAS® protocol from June 2012 to May 2014. A Case–control study was conducted comparing the prospective ERAS-database to a consecutive group of patients collected retrospectively before the ERAS era. The endpoint of the study was the comparison of the length of hospital stay, the 30 days morbidity and the reoperation/readmission rate, respectively.

Results: 310 patients were included, 165 patients in each group. The baseline characteristics of these two groups were similar. The mean length of hospital stay was 3.8 days and 2.9 days (p < 0.0001) in the ERAS group and control group, respectively. Furthermore, there was a tendency in lowering the “high outliers” (>6 days) in the ERAS group to 7 patients (4.2 %) when compared to 25 patients (15.1 %) in the control group. Readmission (1.8 % vs 1.2 %) and reoperation rates (0.6 % vs 1.2 %) as well as the 30 days morbidity (4.2 % vs 5.4 %) were not significantly different.

Conclusion: The implementation of the ERAS protocol for patients undergoing appendectomy reduced significantly the length of hospital stay and the high outliers without increasing morbidity, readmission and reoperation rates.

EPSiT (Endoscopic Pilonidal Sinus Treatment) described by Meinerz: a well-tolerated mini-invasive approach to the pilonidal sinus disease. Feasibility in a community hospital.

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Objective: Standard techniques for pilonidal sinus treatment like wide excision, marsupialization, different kinds of flaps, are often characterized...
by postoperative pain, huge wounds, bad aesthetic result and long recovery time. With the EPSiT (Endoscopic Pilonidal Sinus Treatment) introduced by Piercarlo Meinero, we have a minimally invasive under-vision technique with the removal of all hairs, the feasibility of which we analyzed.

**Methods:** Between November 2012 and December 2014 EPSiT was performed on 19 patients referred to surgery with fistula in pilonidal disease. Mean age was 28.8 years and the percentage of male was 80%. Cases with acute abscesses were excluded. One patient presented with multiple recurrences, four other cases with complex fistulas (multiple orifices). The EPSiT procedure was divided in two steps: first the diagnostic fistuloscope to retrieve hairs and further occult incomplete fistulous tract, second the operative phase with therapeutic removal of all hairs and destruction of the found inflammatory fistula wall tracts by under-vision electrocautery and debridement with a Volkmann spoon, leaving open the surgical access wound. Surgery initially was performed under spinal anesthesia, then, progressively, under local anesthesia with endovenous analgesia. Antibiotics were not used. The post-operative home wound care consisted of daily self-irrigation of the wound with water (jet-wash like) with a 20 ml syringe.

**Results:** Hairs were found in all cysts operated. No major or minor complications were observed. Post-operative mean maximum pain experienced was 2.8/10 on a VAS scale. All patients were discharged in the same or next day after the operation. The average return to work time was 6.6 days. We observed only one recurrence at a median follow-up of 3 months. Aesthetic result was rated very good by all the patients.

**Conclusion:** EPSiT revealed to be a safe and feasible mini-invasive method to treat the pilonidal sinus disease, with promising low short term recurrence rate (5% in our experience), a low post-operative pain, a low complication rate (none in our small sitting group) allowing a quick return to work and a very good aesthetic result.

**Video assisted anal fistula treatment (VAAFT): Analysis of the results achieved in the Mendrisio hospital**

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**Objective**: The sphincter saving VAAFT technique is becoming more and more common as a minimally invasive treatment in patients with complex perianal fistulas due to its feasibility and low risk of complications. We started to treat the complex perianal fistulas since April 2012. We hereby present our results compared with the international literature.

**Methods:** A retrospective analysis of a consecutive series of patients with complex perianal fistula who underwent VAAFT procedure, performed between April 2012 to December 2014 was done. We collected data about vital statistics, type of fistulas, presence of chronic abscess, identification of the internal orifice, internal orifice closing technique, aid of TRUS (trans-anal ultra-sound), percentage of recurrence.

**Results:** In an about 2-year period, 41 patients with complex anal fistula were treated by VAAFT technique. Mean age was 50 ± 30, 30 patients had chronic abscess (73%), 8 had transphincteric fistula (92%). In 29 patients the internal orifice was detected during the procedure (70%). The internal orifice was closed in 5 cases with a stapler (12%), in 11 cases with a flap (26%) and in 25 cases closing the muscular layer with stitches (51%). Only one patient was lost at follow up as he died for heart attack (not in relation with the operation). 34 patients achieved healing trough VAAFT procedure (82.9%). Seven patients had recurrence (17.1%) and were treated trough re-VAAFT procedure resulting in a secondary healing rate of 100%. No patient worsened the Wexner incontinence score after the procedure.

**Conclusion:** The VAAFT procedure for complex anal fistula is confirmed to be an effective, well tolerated and feasible technique. The procedure can be safely performed in day surgery. Our results are aligned with the international literature and, in case of recurrence, re-VAAFT can be safely used for healing achievement with good results.

**Arthroscopic repair of traumatic glenoid fractures: A consecutive case series of eleven patients with a one-year follow up**

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**Objective:** In the actual discussion about the optimal treatment of large glenoid fractures in traumatic shoulder dislocations, we wondered if an arthroscopic regimen is effective. Whether all the concomitant pathologies can also be addressed safely was also of interest.

**Methods:** From July 2009 until November 2011 eleven patients (9 male, 2 female) with a mean age of 45 years (31–66 yrs.) were treated arthroscopically at this single institution as a consecutive case series. Indication for surgery was recurrent instability, a humeral head which was not centred after closed reduction. Five patients sustained their fracture during a first time anterior dislocation while another five patients fractured their glenoid during a recurrent dislocation. One patient suffered a complex shoulder trauma. According to the Idelberg classification 9 patients presented with a type Ia, one with a type I and one other with a type III glenoid lesion. Eight patients (73%) showed concomitant lesions such as SLAP-PASTA – or only PASTA –, massive lesions or a complex fracture of the clavicle. All patients were operated arthroscopically in standardized fashion after a mean time of 14 days (range 3–25 days). Postoperative (po) immobilisation was according to the lesion in a handshake brace or an abduction pillow. Follow-up of one year including x-rays, Constant-Murley-score (CMS), Rowe-score (RS) and Dwyer-Walch-score (DWS) was completed in all patients.

**Results:** In ten patients the bony fragment was healed in conventional ap., auxilliary pro and de Bernageau projections. Radiologically a partial resorption was evident in one patients x-ray without any clinical influence (CMS 91, RS 95, DWS 95 points). The mean CMS one year po was 82 points (range 32–100), the RS was 81 points (range 40–100) and the DWS was 84 points (range 40–100) respectively. Nine patients (82%) returned to their previous level of occupancy. While one patient returned 50% back to work, another one unfortunately was not able to. In this patient an arthroscopic arthrolysis and glenohumeral infiltrations were performed without any benefit. One patient sustained a proximal humeral 3 part fracture 100 days po with a subsequent capsulitis. No infectious complications were observed.

**Conclusion:** While the arthroscopic glenoid repair is a demanding procedure it provides excellent clinical results. Concomitant pathologies can be addressed in the same procedure.

**Propionibacterium spp. as a strong influential factor on the outcome of arthroscopic shoulder surgery**

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**Objective:** There is evidence in recent literature that patients with chronic shoulder pain after surgery suffer more frequently of a chronic low-grade infection than patients after other joint surgeries. It was the purpose of this study to assess infection rate in patients with chronic or acute shoulder disorders after an earlier arthroscopic shoulder surgery.

**Methods:** At this single institution a total of 480 shoulder arthroscopic therapies were performed from June 2009 until July 2014. Re-interventions were performed in 58 (12%) shoulders. These patients were divided in two groups: In Group A 29 patients showed persisting pain or stiffness, which did not improve conservatively within the first year after a primary in-house arthroscopic procedure. The 29 patients of Group B underwent a re-arthroscopy due to instability, failed AC-stabilization or cuff re-ruptures. In this group the majority of the primary intervention was performed at another institution (22 patients, 75.9%). One single surgeon performed all revision surgeries. In all revisions tissue samples for bacteriologic examination were taken.

**Results:** In group A an infection was found in 15 cases (51.7%), of which 12 samples (80% of all positive samples) were positive with Propionibacterium spp. and one with Staphylococcus aureus. Two positive cases of contamination were not treated with antibiotics. Of the 29 patients in group B 14 (48.3%) positive samples were found, of which 11 (78.6% of all positive samples) were positive with Propionibacterium spp. In one case we had to treat an infection of Corynebacterium acnes. Two positive cases of suspected contamination were not treated with antibiotics.

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Conclusion: We clearly could demonstrate the high incidence of low-grade infections in patients with unsatisfying results after primary arthroscopic shoulder therapy. Interestingly we found a similar rate of low-grade infections in Group B although most of these patients had a good result after the primary shoulder operation. Propionibacterium was the most common bacterial cause for low-grade infections in our cohort. Prolonged pain, stiffness, loss of function and previous shoulder surgery go along with a high risk of low grade infection. Regarding our data we recommend strongly to be aggressive in searching and curing low grade infections in the above mentioned situations.

Cost efficacy in the severely injured - Who is paying the bill for HSM in Trauma?
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Objective: In 2011 legal restraints restricted highly specialized medicine in Switzerland. In 2012 hospital reimbursement via diagnosis related groups (DRG) introduced competition on lowering costs between hospitals. The present study investigated the cost recovery for the treatment of severely injured patients in a HSM-trauma centre.

Methods: A retrospective analysis of patients with an ISS >19 and/or AIS Head >2 admitted to a HSM-trauma centre in 2012 and 2013 was performed. A cost recovery analysis including calculated expenses and basic insurance returns was undertaken, with uni- and multivariable analysis to reveal possible risk factors for deficit cases.

Results: During the study period 661 patients with a minimum new ISS (NISS) >8 were treated in the institution of which 303 met HSM-criteria. Mean age and ISS was higher in the HSM-group (58y ± 23 (SD), ISS 19 ± 2 (p < 0.001). Expenses and basic insurance returns were higher for HSM-patients (p = 0.001) but both groups lead to a median financial loss per case of CHF –2174 for non-HSM- vs CHF –1376 for HSM-patients (p = 0.08). In the HSM-cohort 57% (n = 172) were deficit cases. Patients in deficit cases were older (mean 61y ±22 vs 54y ±23 p = 0.004). There was a tendency towards more low energy trauma in deficit cases (59,5% vs 51,9% p = 0.119). Head trauma was a predictor of higher returns while spine injury lead to higher deficits (Pearson correlation coefficient 0.224 vs –0.243). Deficit cases had a greater length of stay (mean 11,7 ± 10.7 vs 7.9 ± 6.9, days p < 0.001) and a trend for greater nursing efforts (LEP, p = 0.11). While mortality was lower than predicted according Revised Injury Severity Classification Score in the deficit group (15% vs. 19%) this relation tended to be inverse for the beneficial cases (22% vs 17%). In multivariable analysis, none of the other investigated risk factors (e.g. ISS, Simplified Acute Physiology Score, emergency surgery, intubation) showed a significant correlation to the amount of deficit.

Conclusion: Treatment of trauma patients under HSM-criteria may lead to structural deficits for the treating institutions independently of injury severity. Surprisingly, the current reimbursement system seems to reward worse outcomes and only early referral or discharge may prevent deficit cases.

Correction of coagulopathy with fresh frozen plasma promotes the development of systemic inflammatory response syndrome in patients with polytrauma
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Objective: Coagulopathy is one of the main issues when treating severely injured patients. The correction of this condition with fresh frozen plasma (FFP) is efficient but can cause undesirable side effects. Here, we investigated the role of FFP in the development of inflammatory complications.

Methods: A total of 2033 patients with polytrauma and an ISS > 16 points and aged 16 years were included. The population was subdivided into two groups: those who received FFP and those who did not. The Data were analysed using SPSS® version 22.0; analysis of variance (ANOVA) was used for continuous normally distributed data, and the Kruskal–Walls test was used for categorical data. Associations between the data were tested using Pearson’s correlation analysis. The predictive quality of FFP treatment was analysed using receiver operating characteristic (ROC) curves. Independent predictivity was analysed by binary logistic regression. Data were considered as significant if p < 0.05.

Results: The ISS was significantly higher in the group that received FFP (36.6 ± 12.7 vs. 31.0 ± 12.0; p < 0.001) and the prothrombin time at admission was significantly lower (68.5 ± 23.3 vs. 81.8 ± 21.0% normal; p < 0.001) in the group receiving FFP. The application of FFP led to a more severe systemic inflammatory response syndrome (SIRS) grade (3.0 ± 1.2 vs. 2.2 ± 1.4; p < 0.001), to a higher infection rate (48% vs. 28%; p < 0.001) and to a higher sepsis rate (29% vs. 13%; p < 0.001) in the patients receiving FFP. The correlations between SIRS and the incidences of infections and sepsis increased with the amount of FFP applied (p < 0.001). The area under the ROC curve was 0.664 (p < 0.001) for the maximal SIRS value.

Conclusion: Thus, the application of FFP to patients with polytrauma contributed to the development of SIRS and to infectious complications.

S-100 B concentrations are a predictor of decreased survival in patients with major trauma independently of head injury
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Objective: Major trauma remains one of the principle causes of disability and death throughout the world. There is currently no satisfactory risk assessment to predict mortality in patients with major trauma. The aim of our study is to examine whether S-100 B protein concentrations correlate with injury severity and survival in patients with major trauma, with special emphasis on patients without head injury.

Methods: Our cross-sectional data analysis comprised adult patients admitted to our emergency department with a suspected major trauma between 1.12. 2008 and 31.12.2010. S-100 B concentrations were assessed routinely in major trauma patients.

Results: A total of 378 (27.7%) of all patients had major trauma. The median ISS was 24.6 (SD 8.4); 16.6% (63/378) of the patients died. S-100 B concentrations correlated overall with the ISS (p < 0.0001). Patients who died had significantly higher S-100 B concentrations than survivors (8.2 μg/l versus 2.2 μg/l, p < 0.0001). Polytraumatised patients with and without head trauma did not differ significantly with respect to S-100 B concentration (3.2 μg/l (SD 5.3) versus 2.9 μg/l (SD 3.8), respectively, p = 0.63) or with respect to ISS (24.8 (SD 8.6) versus 24.2 (SD 8.1), respectively, p = 0.56). S-100 B concentrations correlated with survival (p < 0.0001) in all patients and in both subgroups (p = 0.001 and p = 0.006, respectively).

Conclusion: S-100 B concentrations on admission are of considerable diagnostic value in the evaluation of injury severity and survival of major trauma patients. S-100 B concentrations are not significantly different in major trauma patients with and without head injury. Death is associated with increased S-100 B concentrations, regardless of concomitant head trauma.

The infusion therapy in polytrauma patients with polymeric blood expanders promotes systemic inflammatory response syndrome and sepsis as an independent factor
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Objective: Polytrauma is a systemic condition whose symptoms can resemble those of the systemic inflammatory response syndrome (SIRS). The aim of this study was to investigate whether infusion therapy with polymeric blood expanders (colloids) influences the development of SIRS or sepsis in polytrauma patients.

Methods: A total of 2969 polytrauma patients with an Injury Severity Score (ISS) >16 and aged 16 years were included. The patients were classified into three groups according to colloid use in the first 48h: no colloids, ≤5L of...
colloids, and >5L of colloid. The data were analysed using SPSS® version 22.0. ANOVA was used for continuous normally distributed data, and the Kruskal–Wallis test was used for categorical data. Receiver-operating characteristic (ROC) curves were analysed to determine whether colloid treatment predicted outcomes. Independent predictors were identified by binary logistic regression. Data were considered significant at P<0.05. Data are expressed as mean±SD.

**Results:** The ISS was significantly higher in the group that received colloids (28.1±14.3, 26.8±13.4, and 33.8±13.4 for the patients who received no colloids, <5L of colloid, and >5L of colloids, respectively; P<0.001). The APACHE II score was significantly higher in the group that received colloids (15.5±9.8 vs 12.6±7.2 vs 16.8±7.4; P<0.001). The SIRS maximum score increased according the volume of colloid used (1.9±1.4, 2.4±1.2, and 3.2±0.9, respectively; P<0.001). However, the predictive ability was low (area under the ROC curve, 0.693 for SIRS and 0.669 for sepsis; P<0.001). Logistic regression showed that colloid use was an independent predictor of the development of SIRS and sepsis (odds ratios, 3.325 and 8.984, respectively; P<0.001).

**Conclusion:** These data suggest that colloids should not be used for haemodynamic resuscitation of polytrauma patients within the first 48h.

Rectal disruption from abdominal seatbelt injury – description of cases and discussion of injury mechanism

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**Objective:** Hollow visceral injury following vehicular blunt abdominal trauma is well recognised but relatively unusual, and injury to the intraperitoneal rectum is rarely seen. Delayed diagnosis of a rectal injury following blunt abdominal trauma can have fatal consequences. We report three consecutive cases of rectal injury following blunt abdominal trauma.

**Methods:** The first patient was a 56-year-old seat-restrained female driver in a head-on collision. Emergency CT scanning revealed open comminuted right iliac wing fracture and closed left iliac fracture. Small bowel and right colon were seen to have herniated through the right iliac wing defect.

The second patient was a 77-year-old seat-restrained female front-seat passenger involved in a head-on collision. Emergency CT scanning revealed an open fracture of the left iliac wing and also a pneumoperitoneum from a possible rectal perforation with associated mesenteric injury.

The third patient was an 18-year-old seat-restrained rear seat female passenger involved in a head-on collision sustaining a rectal and small bowel perforation and dislocated fractures of L3/L4 vertebrae.

**Results:** All patients underwent laparotomy after resuscitation. The first patient had a complete seromuscular degloving of the rectosigmoid and associated mesenteric injury. The second patient had transection of the upper rectum, and the third patient showed retroperitoneally a perforation of the rectosigmoid and a section of the ileum. In all patients the perforated part of the rectum was resected and the closed stapled ends were left inside the abdomen. Perforated and ischaemic small bowel was also resected and left unjoined. In all patients the abdomen was temporarily closed. At planned re-look laparotomy after 48 hours, all patients underwent stapled colorectal re-anastomosis.

**Conclusion:** Damage Control Surgery was used effectively in managing these patients’ abdominal injuries, the emphasis being on resuscitation and correction of deranged physiology rather than immediate restoration of normal anatomy. Leaving the abdomen open aimed to prevent intraabdominal hypertension and abdominal compartment syndrome. Rectal injury in blunt abdominal trauma probably occurs through a combination of mechanisms, including stress and shear waves generated by abdominal compression.

What does matter nowadays for surgical residents – a nationwide survey

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**Objectives:** Surgical departments suffer from a shortage of residents. Many initiatives have been launched to improve attractiveness of surgical disciplines, whereas work hours regulations have been enforced. Still, little is known about what does truly matter for the upcoming generation of surgeons during residency. This survey investigated the key factors that determine the choice of a teaching hospital from the perspective of surgical residents.

**Methods:** Participants to the mandatory first step of surgical qualification (Basisprüfung Chirurgie) were surveyed using a 81-item questionnaire investigating hospital/residency attractiveness, hospital organization, internal communication, teaching culture, working hours, and hospital teaching status and location. Results were reported as mean, standard deviation (SD), and range (R) from a 1–6 scale (1 worst, 6 best).

**Results:** A total of 608 questionnaires from the 2013 and 2014 nationwide examinations (return rate of 82.7%) were evaluated. Male:Female ratio was 1.63 with 320 men (62%) and 196 women (38%) answering the survey. Participants were residents (n=509, 95.7%) with a mean age of 30 (SD 3.4, R 24–51), who were aiming for a specialist title in general surgery (n=176, 35.6%), orthopaedics (n=165, 33.4%), urology (n=40, 8.1%), neurosurgery (n=10, 4.9%), plastic surgery (n=30, 4.9%), or hand surgery (n=22, 3.6%).

When queried about the most important factors in hospital/residency attractiveness, residents put first a structured teaching environment with active learning and involvement in surgical cases (5.58, SD 0.64, R 3–6), second was interest and fun in everyday’s work (5.57, SD 0.62, R 3–6), third good working relationships (5.44, SD 0.67, R 1–6), and fourth good traffic connections (5.35, SD 0.91, R 1–6). Enough leisure time for family and friends (5.04, SD 0.97, R 1–6), the hospital teaching status/category (5.04, SD 0.98, R 1–6), and a constant increase in salary (4.94, SD 0.93, R 1–6) were further points raised.

**Conclusion:** Residents of surgical disciplines value most a structured teaching environment with active involvement in the operating room, fun and interest in everyday’s work, and good working relationships. These key domains can and shall be influenced by surgical leaders who commit to teach the next generation of surgeons. Conversely, working hours appeared to be less influential, albeit not without importance in this nationwide survey.

General Surgery in Switzerland - A need for structured mentoring programs?

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**Objective:** Mentorship has been found as a key factor for a successful and satisfying career in academic medicine and surgery. Following the historical meaning, mentorship is characterized as the provision of support from a senior to a junior person to promote the professional and personal development of the less experienced trainee.

The present study was conducted to describe the current situation of mentoring in the surgical community of Switzerland, to evaluate gender differences regarding the impact of mentoring on career success and professional satisfaction, and to assess the availability of structured mentoring programs.

**Methods:** The study was designed as an anonymous national survey to all members of the Swiss Surgical Society in 2011 (820 ordinary and 49 junior members). It was a 25 item questionnaire addressing mentor-mentee relationships and its impact on the professional career.

**Results:** The response rate of 869 surveyed surgeons was 58.9% (512 responses). Overall, there were 344 (68.1%) mentor-mentee relationships and 23 (6.7%) structured mentoring programs. Compared to individuals without mentors, male mentees exhibited significantly higher subjective career advancement (5.4±1.2 vs. 5.0±1.3; p=0.03) and objective career development (5.7±1.9 vs. 5.5±1.7; p=0.01) scores, but the differences for female mentees were not statistically significant (4.7±1.1 vs. 4.3±1.2; p=0.16, 2.5±1.6 vs. 1.9±1.4; p=0.26, respectively). A significant increase in the mentoring experience (i.e. networking and career planning) was noted for structured programs for male participants (3.5±1.3 vs. 2.6±1.2; p=0.01), but not for their female counterparts (3.1±0.6 vs. 2.7±1.2, respectively; p=0.33).

**Conclusion:** The support of a mentor has a positive impact on the career advancement of male surgeons. However, mentoring also provides lifelong

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Intraoperative monitoring of the recurrent laryngeal nerve in thyroid surgery

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Objective: Thyroidectomy is a potential risk of lesion to the recurrent laryngeal nerve (RLN). Intraoperative neural monitoring (IONM) is valuable aid in the reduction of RLN injury. The aim of this retrospective study is to evaluate the results of IONM in thyroid surgery

Methods: From 2000 to 2014 373 patients (mean age 50 years, 312 F/61 M) with 589 nerves at risk underwent thyroid surgery and were included in this study. 193 patients underwent surgery for benign, 180 patients for malignant disease. Total thyroidectomy were 216, partial 157. RLN was identified in all procedures. Intermittent IONM was routinely used since 2008, continuous IONM since March 2014. All patients underwent pre and post-operative laryngoscopy.

Results: In 589 nerves at risk we observed 9 (1.52%) transient and 1 (0.16%) permanent palsies. In the non-IONM group (135 nerves at risk) the transient palsies were 2 (1.48%), permanent 0. In the IONM group (454 nerves at risk) the transient palsies were 7 (1.54%), permanent 1 (0.22%).

Conclusion: In our experience IONM didn’t change the number of RLN damage. Risk ratio 1.04; 95%-CI 0.22 to 4.95; p NS However IONM leads to decision making in bilateral procedures, as we don’t continue the operation in case of loss of signal occurred in the first side.

Research

Inositol trispyrophosphate (ITPP) and its anti-hypoxic potential in colorectal metastases of the liver


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Objective: The hypoxic tumor response not only promotes angiogenesis, but also a number of other processes associated with malignant behavior. Therefore, inhibition of hypoxia rather than angiogenesis may be a potent anticancer strategy. The recently designed molecule ITPP promotes oxygen release from hemoglobin under hypoxic conditions. We assessed whether ITPP can inhibit hypoxia and improve outcome in a mouse model of colorectal cancer (CRC) liver metastasis.

Methods: Two syngeneic orthotopic mouse models of hepatic CRC metastasis were established by selective portal vein injection of CRC cells. Small animal MR imaging was used to follow metastatic development in vivo. Oxygen dissociation kinetics from hemoglobin were determined by tonometry. Localization of hypoxic areas was achieved by pimonidazole staining on histological sections.

Results: Mice treated with ITPP had a significant survival benefit along with a reduced tumor burden. ITPP had an antihypoxic effect as demonstrated by pimonidazole staining, HIF downregulation, inhibition of the Warburg effect, inflammatory changes, the normalization of systemic angiogenesis/metastasis markers, and reduced cancer cell invasiveness. Notably, the ITPP effects persisted following cessation of treatment. Combining ITPP with standard chemotherapy significantly (p = 0.001) prolonged survival by three times and was superior to chemotherapy plus targeted anti-angiogenic therapy.

Conclusion: ITPP is a potent inhibitor of the hypoxic tumor response. Its anti-hypoxic action favors a more benign tumor phenotype that is accompanied by reduced tumor invasiveness and increased survival. ITPP appears to act synergistically with cytotoxic agents. A planned Phase Ib/IIa clinical trial will reveal whether ITPP holds promise as a novel anti-hypoxic agent.

Rebound pathway activation by cancer cells following targeted therapies: Therapy discontinuation promotes tumor growth

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Objective: Targeted therapy is a promising approach in cancer. However, the development of resistances does considerably limit the anticancer efficacy of this approach. Whereas most studies have identified several resistance mechanisms that occur concomitantly with the treatment, little is known about the behavior of cancer cells following cessation of targeted therapies. In this study, we have investigated the effect of withdrawal of agents that target the PI3K signaling pathway.

Methods: A panel of cancer cells was exposed to chemical inhibitors of PI3K for varying time periods. Following drug withdrawal, signaling pathway activation was determined by Western Blot. Cell proliferation was analyzed by BrDU incorporation assay and cell survival by ELISA in vitro or in vivo.

Results: A cessation of PI3K inhibitors resulted in a significant overactivation of downstream targets of this kinase (OR 11.1, p < 0.001, densitometric analysis, Western Blot). A previous length of treatment of 3 hours (but not inferior) was sufficient to induce this signaling amplification. An overstimulation was present as early as 15 minutes after therapy discontinuation, peaked after 3 to 12 hours and persisted up to 72 hours. Retreatment with the inhibitor was effective. In accordance, pretreated cells displayed an increase of proliferation after therapy cessation (median increase of 24% after 48 hours, range 18 – 37%, p < 0.001).

This rebound pathway activation was mediated by IGF1R, as demonstrated by its prevention in the presence of an IGF1R inhibitor. Furthermore, IGF1R phosphorylation was increased in treated cells versus control cells. Combining an IGF1R inhibitor with the PI3K inhibitor potentiated its antiproliferative effect.

Conclusion: Discontinuation of PI3K targeting therapies promotes tumor growth. The underlying signaling amplification following the removal of PI3K inhibitors was induced by IGF1R. Combining PI3K with IGF1R inhibitors results in a persistent tumor growth inhibition that warrants clinical evaluation.

Local heat preconditioning to prevent wound breakdown and skin necrosis: A translational study in bilateral reduction mammoplasty

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Objective: Wide dissections or flap transfers depend on sufficient tissue perfusion, particularly within the randomly perfused areas distant to the vascular inflow. As a function of the procedure, inadequate perfusion is associated with a rate of wound breakdown of up to 68% respectively skin necrosis of up to 45%. Tissue preconditioning (PC) has shown to effectively replace “surgical delay”, known as a potent but invasive and long-lasting approach to reduce ischemia-induced morbidity of the tissues. Tissue PC increases ischemic tolerance and/or maintains microvascular perfusion within the tissue at risk. This translational study aims at analysing the efficacy of local heat PC in standard reduction mammoplasty (RMP).

Methods: Prospective randomised trial including 20 patients (mean age: 42 years, mean BMI: 26 kg/m²) undergoing bilateral RMP. Local heat PC was initiated ~17 hours prior to surgery, using a plausible water-cuff heated up to 43 °C and moulded to the breast for three 30-min cycles, interrupted by 30-min cooling-cycles at room temperature. The contralateral breast was kept un-heated, serving as control. Tissue perfusion (laser-Doppler), rate of wound breakdown, skin necrosis and total healing time and expression of Heat-Shock Protein (HSP)-70 (ELISA) were assessed. “Wound break down” was defined as incomplete re-epithelialization of the wound at day 14 postoperatively.
Results: No burns were induced by the heating device. Mean resection weight of both breasts was comparable (594 g; 200-1334 g). Local heat PC resulted in a significant reduction of wound breakdown from 35% to 10% (p < 0.05). Tissue perfusion was only increased directly after heat application when compared to the un-heated controlateral breast and not before surgery the next day.

Conclusion: Local heat PC of the skin is a simple, non-invasive and effective method to thwart ischaemia-induced complications, including prolonged healing and wound breakdown. The tissue protective effects are associated with an induction of HSP-70 increasing ischaemic tolerance rather than maintaining tissue perfusion.

Remote ischemic preconditioning is protective in complex liver surgery of the elderly: an experimental study

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Objective: Ischemia-reperfusion (IR) injury is the most common cause of liver damage during surgery and transplantation. The aged liver is particularly susceptible to ischemic injury and resistant to ischemic preconditioning strategies effective in younger patients. A novel approach based on reversible ischemic injury performed distally to the liver (RIPC) confers strong hepatoprotection in young animals. Whether RIPC also protects old livers is unknown. The aim of this study is to test whether remote ischemic preconditioning (RIPC) protects old livers from postoperative damage.

Methods: Standardized mouse models of hepatic IR (partial 60 min ischemia) and RIPC to the femoral vascular bundle were applied with appropriate control groups in old mice (aged 18–20 months). Intermittent clamping (4x15 min ischemia with intermittent 5 min reperfusion) served as a ‘standard of care’ control. Serum liver enzymes and histology were assessed at 6 h after reperfusion. Pathways involving serotonin, Vegf, and downstream protective molecules were analyzed. Neutralizing antibodies were used to test the contribution of the serotonin-Vegf axis.

Results: RIPC conferred strong protection akin to intermittent clamping. In contrast, other preconditioning approaches were ineffective in old livers. RIPC stood out with its ability to promote an anti-inflammatory repair phenotype of Kupffer cells and the expression of the cytoprotective proteins Mmp8/Il10 in the liver. These effects were dependent on RIPC-induced elevations in circulating Vegf, emphasizing the importance of the serotonin-Vegf axis in hepatoprotection.

Conclusion: RIPC is the first preconditioning strategy effective in aged liver likely owing to its ability to activate the hepatoprotective serotonin-Vegf axis. These promising findings call for a rapid assessment in clinical trials.

ALPPS: From human to mice highlighting accelerated and novel mechanisms of liver regeneration

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Objective: The surgical technique of ALPPS ( Associating Liver Partition and Vein Ligation for Staged Hepatectomy) combines portal vein ligation (PVL) with liver transection (step I) followed by resection of the deportalized liver (step II) within two weeks after the first surgery. This approach induces accelerated hypertrophy of the liver remnant to enable resection of massive tumor load. To explore the underlying mechanisms, we designed the first animal model of ALPPS in mice.

Methods: The ALPPS group received 90% PVL combined with parenchyma transection. Controls underwent either transection or PVL alone. Renegation was assessed by liver weight and proliferation-associated-molecules. PVL-treated mice were subjected to splenic, renal or pulmonary ablation instead of hepatic transection. Plasma from ALPPS-treated mice was injected into mice after PVL. Gene expression of auxiliary mitogens in mouse liver was compared to patients after ALPPS or PVL.

Results: The hypertrophy of the remnant liver after ALPPS doubled relative to PVL, while mice with transection alone disclosed minimal signs of regeneration. Markers of hepatocyte proliferation were 10-fold higher following ALPPS, when compared to controls. Injury to other organs or ALPPS-plasma injection combined with PVL induced liver hypertrophy similar to ALPPS. Early initiators of regeneration were significantly up regulated in human and mice.

Conclusion: ALPPS in mice induces an unprecedented degree of liver regeneration, comparable to humans. Circulating factors in combination with portal vein ligation appear to mediate enhanced liver regeneration, associated with ALPPS.

Vascular

Treatment of abdominal aortic aneurysm with AorfixTM stent-graft – early results

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Objective: To report our early results with the AorfixTM stent-graft in repairing abdominal aortic aneurysms, especially with severe neck angulation.

Methods: Retrospective review of all patients with endovascular aneurysm repair using the AorfixTM system between May 2013 and December 2014. Aneurysm morphology, technical success, 30-day mortality, intra- and postoperative complications including endoleaks (EL), aneurysm sac growth, graft migration and secondary interventions were assessed. Patients were followed postoperatively with contrast-enhanced ultrasound (CEUS) or with computed tomography (CT) after 1, 6 and 12 months.

Results: Thirteen patients (11 males, mean age 74 years, range 56–87) were treated. Mean aneurysm diameter was 61 mm (range 53–82) with a mean neck angulation of 45° (range 20–96). Six patients (46%) had neck angulation ≥ 50°, three of them with ≥ 60°. Initial technical success was 91% (n = 12) with one iliac extension deployed too distally, accidentally covering the internal iliac artery. This patient experienced moderate buttock claudication and recovered fully after 6 months. In one patient an additional iliac branched device for common iliac artery aneurysm was deployed and in three patients intraoperative coil embolisation of the inferior mesenteric artery was also performed. 30-day mortality was 7%, one patient died after severe cerebral bleeding following an accidental fall on the stairs and emergency craniotomy. No type I or III EL was registered intra- and postoperatively. Four type II EL were diagnosed after one and six months, in both CEUS and CT, and were treated conservatively. Mean follow-up was 8 months (range 1–19) for 11 patients (92%). One patient denied follow-up. In all followed patients a stable or decreased aneurysm sac diameter was found. No graft migration was identified and no secondary intervention was required during follow-up.

Conclusion: Early results of abdominal aneurysm repair with the AorfixTM stent-graft are promising showing no signs of migration and type I or III EL even in challenging aortic anatomies with more angulated aneurysm neck.

Heterogeneity of surveillance after Endovascular Aneurysm Repair amongst Swiss vascular surgeons

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Objective: Imaging surveillance after endovascular aortic aneurysm repair (EVAR) is accepted as mandatory. Nevertheless no definitive protocol has been validated, as modality of imaging and timing of surveillance remain controversial.

The aim of the present study was to report the nature of routine imaging surveillance following EVAR and to identify the degree of variation amongst Swiss vascular surgeons.

Methods: Vascular surgeons were identified through the Swiss Medical Association and Swiss Society for Vascular Surgery directories.
Abdominal aortic aneurysm (AAA) screening of 65–80 years old men: A single centre feasibility study
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Objective: Several randomized trials have shown the effectiveness of screening programs in reducing AAA mortality at a moderate cost. The present pilot study is focused on the technical feasibility and acceptability of a screening program in a defined group of the population in our region.

Methods: An ongoing web-based survey was started in December 2014. Data collected included imaging modality and timing of surveillance during follow-up. Results: To date 21 of the 76 identified surgeons answered the survey. 19/21 surgeons scheduled the first control within one month, respectively 11/21 before hospital discharge and 8/21 during the first month. The timing of the second control took place at one/three/six/twelve months for 2/21, 8/21, 6/21, 5/21 surgeons respectively. Thereafter a majority of surgeons (17/21) relied on a yearly control.

For the first control imaging modality, 19/21 preferred contrast enhanced CT scan, 6/21 ultrasound with Duplex, 2 surgeons relied on duplex surveillance for the entire follow-up. For the second control 16/19 pursued with contrast enhanced CT scan. When endoleak was excluded on previous control, 10/19 surgeons switched to Duplex or contrast enhanced Duplex.

Conclusion: Preliminary results showed discrepancy in the timing and imaging modality of surveillance during the first year, thereafter timing but not imaging modality was homogenous.

Further there can be a sevenfold difference of radiation exposure or a threefold increase number of control depending on individual surgeon’s habits.

It might be time for a national consensus to ensure patient safety in terms of aortic related complications, imaging iatrogenicity and cost effectiveness.

Synchronous carotid and coronary bypass surgery using minimal extracorporeal circulation
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Objective: Patients necessitating both carotid endarterectomy (CEA) and coronary artery bypass grafting (CABG) have higher post-operative risk of complications than those only requiring a CEA. Minimally invasive extracorporeal circuits (MECC) have been developed in the early 2000 showing some clear advantages to conventional ECC regarding systemic inflammatory response, postoperative myocardial infarction and atrial fibrillation rate, and an overall recovery. Accordingly, we hypothesized in the present study that synchronously performed CEA/CABG using MECC may contribute to reduce the rate of postoperative complications down to the results obtained with isolated CEA performed under general anesthesia (GA).

Methods: In the current single-center retrospective observational study, we aimed at comparing in-hospital stroke rate following isolated CEA performed under GA with results obtained after CEA performed in a single-stage procedure with a concomitant CABG between January 2005 and December 2012.

Results: A total of 367 patients with a CEA were considered from which 46 were excluded (33 CEA combined with CABG and valve repair, 10 CEA combined with valve repair and 3 combined with other procedures). Out of 321 patients, 138 were operated under GA, 74 (21.3%) having a CEA performed synchronously with a CABG using MECC and 64 (19.9%) having an isolated CEA. The rest 183 CEAs (57.0%) were performed under LA. Both groups were comparable except for gender distribution (significantly higher rate of females in the combination group) and the rate of symptomatic stenosis and history of stroke (significantly higher in the isolated CEA group). Three strokes (4.1%) occurred during the in-hospital stay in the combined CEA/CABG, two ipsilateral and one contralateral. In comparison, two strokes (3.1%, p = n.s), both ipsilateral, occurred in the isolated CEA group. In both groups, one of the patients with postoperative stroke had a preoperative symptomatic stenosis.

Conclusion: Outcome with regard to in-hospital stroke is very good in both groups undergoing CEA alone as well as patients undergoing synchronous CEA and CABG using the MECC system. Although synchronous CEA/CABG using the MECC system has slightly increased risk of stroke, it can be considered as combined treatment in particular clinical situations.

Five-years single-center experience of consecutive open repair and endovascular treatment of popliteal artery aneurysm
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Objective: Popliteal artery aneurysms (PAA) represent 70% of all peripheral aneurysm and are associated to potentially dramatic complications in case of rupture. Results: To all 65–80 years old men outpatients visiting our hospital clinics during the study period was given the opportunity to perform a free ultrasound exam for the measurement of the infrarenal abdominal aorta. The result was communicated to the patient’s general practitioner, who was invited to provide follow-up control or to organize the surgical treatment for patients screened positive.

Results: Between 17 January and 27 December 2013, 1390 eligible patients were identified. 744 (64%) ultrasound scans were performed while 646 (46%) did not participate (34% disinterest, 12% unavailability). 7 (1%) of the performed exams were not diagnostic. Of the remaining 737 aortic measurements, 31 (4%) were positive: one patient (0.1%) underwent successful surgical repair without complications for an aortic aneurysm of 5.7 cm, while 30 patients were directed to follow-up programs. The costs of screening per patient was Fr 88.10.

Conclusion: AAA screening can be performed with benefit to the patient and very reasonable organizational and financial effort. Patients’ low interest and low participation to the study requires a detailed analysis of the reasons for their refusal. Methods to improve the acceptability should be developed, before considering an extension to the entire cantonal population.
thrombosis and distal embolisation. Preventive treatment is often recommended and 2 different approaches exist. Open surgery remains the gold standard but endovascular treatment has shown good results in selected cases. The aim of this study is to analyze the single-center results of PAA management.

Objective: To report the single-center results of PAA management.

Methods: This retrospective monocenter cohort study included 106 PAA with 83 in the open surgical group (OS) and 23 in the endovascular (EN) group. All events were recorded in a prospective database. The 2 groups did not differ significantly in terms of comorbidities but in the OS group, more patients were symptomatic (69%) and especially with acute ischemia (25%).

Results: In the OS group, there were significantly more patients with 2 or 3 patent vessels at time of diagnosis (91% vs 62%). Operative time and length of hospital stay were significantly shorter in the EN group. There were no differences in terms of post-operative complications with thrombosis occurring in 4% of cases in both groups. The 4 amputations occurred only in the OS group and all of them followed acute ischemia. Estimates of primary and secondary patency rates at 6, 12, 24 and 36 months were 86%, 79%, 72% and 92%, 89%, 86% respectively in the OS group and 79.5%, 79.5%, 72.5% and 90%, 85%, 85% respectively in the EN group (p = n.s).

Conclusion: Both techniques show similar results in terms of patency rates and complications rates. Advantages of endovascular therapy are shorter operative time of hospital stay. However, pre-operative selection of treatment exists basically on the principle of symptoms and the quality of the run-off.

A new biphasic drug delivery system to prevent the vascular graft failure

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Objective: Open surgical recanalization using venous graft is the first line option in many clinical situation. However the venous wall needs to adapt to the new arterial environment and it can lead to intimal hyperplasia (IH) development, responsible to almost 50% of graft failure the year following the operation. On the contrary of endovascular treatment, the open surgical approach has no drug delivery system to inhibit IH. The aim of our study is to develop a biphasic drug delivery system using atorvastatin (ATV) to inhibit IH development in open vascular surgery.

Methods: An emulsion evaporation method was used to prepare the microsphere. Free or atorvastatin-loaded microparticles (M) and/or free atorvastatin were incorporated in a cross-linked hyaluronic acid (G)(Hydrogel Fortelis Extra®, Anteis). We thus obtained four different combinations (GM as control, GavM, GavM, GavMatv) applied on an in vivo intimal hyperplasia model represented by carotid artery ligation in C57Bl6 strain mice, euthanased 28 days after the intervention. Atorvastatin concentration release from these formulations and drug power diffusion through the human vein wall was tested using a Franz Cell.

Results: The different combination of formulation had three different kinetics of atorvastatin release; GavM-3 days, GavMatv-45 days and GavMatv-45 days and burst at 3 days. The cross-linked hydrogel ensures the permanence of the formulation in vivo over 28 days and the loaded ATV-microparticles, a sustained drug release over the same period.

Conclusion: We observed a non significant inhibition of intimal hyperplasia when atorvastatin is loaded or in gel or in microparticles (GavMatv), however the combination made of both atorvastatin-loaded gel and microparticles (GavMatv) significantly inhibited intimal hyperplasia after four weeks demonstrating to be the most effective formulation.

The Franz Cell set-up showed a peak drug diffusion within 60 hours through the human vein and its histological analysis the tissue viability.

Thoracic

Experimental ex-vivo lung perfusion with sevoflurane: Effect on damaged donor lung grafts

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Objective: Ischaemia-reperfusion injury is a key mechanism of graft damage during lung transplantation, which could be targeted by therapies applied during ex-vivo lung perfusion (EVLP). The inhalational anaesthetic sevoflurane was found to protect to some degree against ischemia-reperfusion injury when used for ventilation. In this experimental study we aimed to determine the therapeutic potential of volatile sevoflurane added to the perfusate during EVLP of damaged lung grafts after circulatory death (DCD).

Methods: Two groups of 6 Sprague–Dawley rats each were used. After cardiac arrest and a warm ischemic time of 1 hour the lungs were flushed with cold Perfadex®, harvested and kept for 2 hours at 4 °C. Normothermic EVLP during 3 hours was performed using a customized circuit primed either with Steen solution® only (control group) or supplemented within the first 30 minutes of EVLP with a gas mixture containing 2% of sevoflurane (treatment group). Differential oxygen partial pressures in the perfusate (DppO2), vascular resistance (PVR), lung compliance (LC), peak airway pressure (PAWP) and lung vascular weight gain (WG) were measured. At the end of EVLP protein and lactate dehydrogenase (LDH) levels were determined in bronchoalveolar lavage (BAL) and cytokine-induced neutrophil chemoattractant factor 1 (CINC-1), tumor necrosis factor alpha (TNF-α), interleukin-6 (IL-6) and protein carbonyl (index of oxidative stress) were determined in lung tissue.

Results: Damaged lungs treated with sevoflurane during EVLP displayed significantly improved LC, reduced weight gain, lower TNF-α, LDH and protein carbonyl levels as compared to controls. PAWP, protein in BAL and IL-6 significantly improved LC, reduced weight gain, lower TNF-α, LDH and protein carbonyl levels as compared to controls.
were diminished in treated lungs, but were not statistically different to controls. 

DissO2, PVR were found comparable in both groups.

**Conclusion**: Intravenous administration of volatile sevoflurane during EVLP reduces inflammatory response and oxidative stress and improves the functional status of damaged rat DCD lungs.

Nucleic acid-based assays increase pathogen detection of pleural empyema

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**Objective**: Empyema is a common disease associated with high morbidity and mortality. Conventional cultures of the pleural fluid/tissue show negative results in up to 70%. Molecular technique by broad-range bacterial PCR (Polymerase Chain Reaction) amplification of part of 16S ribosomal RNA (rRNA) gene followed by sequencing is able to detect all bacterial species in a single assay. Therefore we set up a study to investigate the value of the 16S PCR for rapid pathogen detection and introduction of targeted antibiotic therapy of empyema.

**Methods**: From 01/2013 to 12/2014 fifty patients (34 men, 16 women) with mean age of 60 (SD: ±15) years; who underwent surgery for thoracic empyema, were included in this prospective cohort study. Pleural fluid and pleural biopsies were harvested during surgery. Conventional culture was compared with broad-range 16S PCR, Streptococcus pneumoniae PCR, and Streptococcus pneumoniae antigen test. Categorical variables were compared with the Fisher’s exact test. A statistically significant difference was considered when P < 0.05.

**Results**: Thirty seven video-assisted thoroscopic surgery (VATS) and 13 primary open lung decontaminations were performed. From 37 VATS, 19 were converted to thoracotomy. Results of broad-range PCR were compared to culture. Identical PCR results were found in pleural fluid and corresponding biopsies in 95%. PCR detected twice as many pathogens compared to conventional culture. The ongoing antibiotic therapy was changed in 65% (P < 0.0001) of patients with positive PCR results to specifically target the detected pathogens. Organisms identified by PCR were predominantly Fusobacterium nucleatum (N = 9), Streptococcus pneumoniae (N = 8). S. pneumoniae antigen test was positive in 5/8 patients with positive pneumococcal PCR.

**Conclusion**: These results prove that broad-range PCR increases significantly the pathogen detection and facilitate the implementation of targeted antibiotic therapy.

We believe that early diagnosis of pleural empyema using this technique will reduce the number of patients with advanced stage of this disease who require open surgery by shortening the time to correct antibiotic treatment.

Management of pleural effusions by combining talc poudrage and indwelling pleural catheter – a single center report study

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**Objective**: The majority of symptomatic pleural effusions (MPE) are either managed by VATS talc poudrage or by the insertion of an indwelling pleural catheter (IPC). Both methods are not always successful. In February 2013 a new approach for the management of MPE, VATS talc poudrage with simultaneous insertion of an IPC, was implemented at our department. The goal was to achieve successful pleurodesis, avoid recurrent MPE, and shorten hospitalization time. The aim of this study is to determine whether our treatment has advantages over single talc poudrage alone.

**Methods**: Retrospective descriptive study analyzing data of 105 patients with symptomatic pleural effusion treated from January 2012 till December 2014 at our department. 48 patients underwent single poudrage in combination with the insertion of an IPC (IPC group), 49 patients conventional talc poudrage (Talc group). French Novatech talc and PleurX-Catheter (Fenik) were used. Both groups were comparable in age, sex, and the underlying disease. 8 patients were excluded from our study as their only treatment was the insertion of an IPC in local anesthesia. All patients in the Talc group got 2 chest drains (Ch24/Ch28), and in the IPC group 1 chest drain (Ch28) plus the IPC inserted.

**Results**: The postoperative hospitalization time was significantly shortened in the IPC group (P = 0.0024). The drains could be removed quicker in the IPC group (P = 0.0001). In the Talc group most of the patients were discharged home (77%). As we provided the treatment with the PleurX-Catheter ourselves as a service for other hospitals, 54% of these patients were referred back to the primary institution for further postoperative care. So far there was not a single case of unsuccessful pleurodesis with the combined approach. The patients’ acceptance of fluid drainage at home was high.

**Conclusion**: The results demonstrate that the simultaneous use of talc poudrage and insertion of an IPC has advantages over talc poudrage alone. The time spent at our department after the insertion of IPC could be shortened substantially, and subsequent systemic treatment could be started earlier. The significantly faster removal of the thoracic drain and early referral to the primary institution provides a big advantage to the patients and improves their palliative care.

Lung transplantation in the elderly: Influence of multiple comorbidities and extended criteria donor lungs

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**Objective**: Increased risk for recipients ≥60 years old have been reported although single centers report favorable outcomes for carefully selected older recipients. The purpose of the study was to determine the influence of recipient and donor comorbidities as a risk factor for survival in two predefined age groups.

**Methods**: In recipients <60 (N = 232, Group 1) and ≥60 years (N = 83, Group 2) old, the impact of comorbidities was determined by the Zurich Recipient Score (ZRS), including BMI, systemic arterial hypertension, osteoporosis, cardiac disease, insulin dependent diabetes mellitus, chronic renal dysfunction, diverticulosis and critical situation (such as ECMO, mechanical ventilation). Donor lung quality was assessed by the Zurich Donor Score (ZDS) consisting of 6 extended donor criteria and 5 comorbidities including systemic arterial hypertension, cardiac disease, insulin dependent diabetes mellitus, chronic renal and liver disease.

**Results**: The one- and 5 year survival rates in Group 1 were significantly better than Group 2 (87% and 69% vs. 80% and 34%, respectively, p < 0.001, log rank test). In multivariate analysis, a ZRS consisting of ≥3 comorbidities and ZDS of ≥3 points were found to be significant risk factors for mortality in Group 2 (N = 14 HR 2.79, 95%CI 1.29–6.02 and N = 37 HR 2.30, 95%CI 1.31–4.04, respectively). In Group 1, ZRS of ≥3 was also found to be a risk factor for mortality using the same multivariate model (N = 21, HR 2.50, 95%CI 1.37–4.38). In Group 1, ZDS ≥3 was not found to be a risk factor.

**Conclusion**: The accumulation of three or more comorbidities was a risk factor for mortality in both young and old lung transplant recipients. The negative impact of extended donor lungs seems stronger in older recipients. In order to maximize posttransplant outcome, careful candidate selection and risk calculation weighing comorbidities is crucial.

Relapse pattern after multimodality treatment of malignant pleural mesothelioma

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**Objective**: To analyse the relapse pattern of malignant pleural mesothelioma (MPM) in patients undergoing multimodality treatment. Due to its highly aggressive behaviour overall local recurrence rates is 50–100% depending on treatment modalities and tumour stage.

**Methods**: Analysis of 119 patients (14 females) with recurrent MPM prospectively assessed that have previously undergone macroscopic complete resection (MCR) by either extrapleural pneumonectomy (n = 108) or pleurectomy/decortication (n = 11) after neoadjuvant chemotherapy. 59 patients received adjuvant radiotherapy.

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Results: The median time to relapse was 8.5 months after operation (95% CI: 7.5–9.6). The median overall survival (OS) after relapse was 7.3 months (95% CI: 4.8–9.8). Diagnosis of recurrence was obtained by serial imaging in 61 patients (51%) and by pathology in 51 patients (43%). Local recurrence alone was observed in 57 patients (48%), distant metastases alone in 29 patients (24%) and distant plus local recurrence in 32 patients (27%). Patient with local recurrence alone survived significantly longer compared to patients with distant alone and distant local relapse (p = 0.02).

85 patients (71%) received a further treatment after tumour relapse. Treatment options were chemotherapy (n = 60, 50%), local radiotherapy (n = 22, 19%) or local excision (n = 18, 15%). Patients receiving any treatment survived significantly longer compared to patients not receiving therapy (p < 0.0005). The median OS after local surgical treatment was significantly longer compared to patients receiving chemo- or radiotherapy (19.5 (95% CI: 13.7–25.2) vs. 9.7 (95% CI: 7.5–11.8), p = 0.005); however, this may represent a selection bias.

Conclusion: Even after multimodality treatment and MCR, local recurrence remains a critical issue; however, surgical excision is feasible and has good long-term outcome in selected patients.

Quality of life in octogenarians after thoracic surgery
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Objective: Surgery in octogenarians is performed with acceptable morbidity and mortality. However, little is known about the quality of life (QoL). There are data indicating that elderly patients with lung cancer are less likely to undergo curative treatment simply due to their advanced age. The goal of this study was to retrospectively examine quality of life in the age group over 80. Only well-analysed data enable the surgeon to honestly recommend the best therapeutic option for the patients and give them orientation of their expected quality of life to come.

Methods: A retrospective analysis was performed on 149 consecutive patients with a mean age of 83.4 years (range 80 to 98 years) who underwent thoracic surgery. 79 patients were male (51.6%) and 74 patients female (48.4%). Between 2008 and 2014 88 patients underwent thoracotomy (59.1%), on 61 patients (40.9%) minimally invasive procedures were performed. Preoperative data, operative outcome and long-term survival were analysed. Survival was also compared to the average life expectancy of the standard population. Furthermore, the EORTC questionnaire was used to evaluate the quality of life before and after the intervention.

Results: Mean survival-up time at closing date for abstract submission was 2,6 ± 0.4 years. 30-day-mortality was 5.4% (7.96% for open vs. 1.6% for minimally invasive surgery). Of the 89 surviving patients 61 returned their questionnaire. Comparing the preoperative and postoperative results these patients showed no impairment of the global health status (43.8 ± 5.5 vs. 49.2 ± 3.7). Functioning scores indicated differences between pre and postoperative data (physical functioning 63.3 ± 3.1 vs 47.4 ± 3.9, role functioning 58.8 ± 5.5 vs. 43.0 ± 5.4, emotional functioning 68.8 ± 4.6 vs. 75.8 ± 4.0, cognitive functioning 85.8 ± 2.8 vs. 92.5 ± 1.0 and social functioning 63.3 ± 5.5 vs. 61.5 ± 5.0).

Conclusions: Our results suggest that QoL after thoracic surgery in selected octogenarians is comparable to preoperative QoL. In the comparison of open vs. minimally invasive procedures the second group had a better performance in QoL. Since health in elderly people is the most important factor to maintain a good QoL, denial of surgical treatment only due to advanced age seems to be no longer acceptable.

Thymic tumors – treatment and outcome at a university center
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Objective: Thymic tumors represent a rare but complex neoplastic entity with a wide variety of clinical properties. Over the last few decades, they have generated intense interest and controversy regarding treatment and clinical behavior. Multimodal therapy including complete resection has been reported as a significant favourable factor of improved overall survival both in primary case and in patients with a relapse.

Methods: This is a single center report concerning patients treated for a thymic tumor at the Inselspital, Bern. All patients who received a thymectomy via minimal-invasive approach or by conventional surgery between 2008 and 2014 as well as cases of relapse were included in this report. Multimodal therapy including pre- and postoperative chemotherapy and / or radiotherapy was defined by an interdisciplinary tumor committee. The rate of relapse will be a focal point of the evaluation. A review of the literature including the recommendations of the ESTS is included.

Results: 28 Patients were eligible including three cases (10.7%) with tumor relapse. The relapse occurred 2, 6, and 12 yrs after the primary resection. In all cases multimodal approach including an extended resection was determined. 39.3% of all patients received a RATS in case of smaller thymoma. 17 patients were operated via conventional approach such as sternotomy, hemi-clamshell, and clamshell. Pleuropneumonectomy was necessary in 3 patients. The histological examination showed thymomas, neuroendocrine tumor of the thymus, and squamous cell carcinoma of the thymus. In all cases the completeness of resection was proved.

Conclusion: Considerable improvement in the diagnosis and management of thymic tumors has been reached in recent years. In case of small tumors minimally invasive approaches including video-assisted thoracoscopic surgery (VATS) and robotic-assisted thoracoscopic surgery (RATS) are the method of choice today. For larger tumors often multimodal therapy is recommended including resection by sternotomy / (hemi)clamshell, chemotherapy, and radiotherapy. Our results are comparable to those that have been found in reviewed studies. The three patients with a relapse even after 12 years draw attention to the fact that a longer follow-up period might be needed, as individuals with a relapse also can be treated in a curative intent.