ESGE Newsletter
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European Society of Gastrointestinal Endoscopy

ESGE organized events

EURO-NOTES 2012 NOTES and Advanced Interventional Endoscopy

October 4 – 6, 2012
Prague, Czech Republic

Dear colleagues
EURO-NOTES 2012 in Prague is fast approaching. The meeting concept has been further developed and this year the focus will include advanced interventional endoscopy.
Hands-on training on live animals will for the first time enhance the workshop. Offered to a limited number of registrants on the Saturday, participants may sign in for this activity when registering for the workshop.
We would like to thank all abstract submitters for their interest in our workshop and submitted papers. A record number of abstracts reached us and ten travel grants have been awarded this year.
We look forward to welcoming you in Prague!

Horst Neuhaus
EURO-NOTES 2012 Chairman
ESGE President
www.euro-notes.org

EURO-NOTES 2012 ABSTRACTS

01 Visual control – evaluation of the most suitable visualization angle for NOTES platforms

D. Wilhelm, E.-M. Losher, A. Schneider, T. Baude, A. Meining, H. Feussner

Objective of the study: A perfect visualization of the operative field is essential for efficient and secure manipulation during any intervention. While in laparoscopic surgery a top view with an angle of 30 – 60° is preferred, flexible endoscopes and NOTES platforms currently provide an in-axis visualization (o°-angle). Interestingly, in open surgery the visualization angle is even steeper. The impact of different visualization angles on the operative performance and the mental work load has not yet been investigated, but would be important for the construction of future NOTES platforms
Methods and procedures: Randomized, double blinded study (n = 48 individuals) using a standardized laparoscopic task and a multi-angle laparoscopic scope for evaluation. Assessment of the operative performance was achieved by means of time measurement, video evaluation and electromagnetic tracking of the instruments in use. The mental work load was assessed by different vegetative parameters (pulse variability, width of pupils …) and by using a known questionnaire (NASA TLX). All individuals had to perform the task under 8 different viewing angles.
Results: Time required to complete the task was significantly shorter by visualization under an angle of 30 and 70 ° ($p = 0.06$), although comparison of the path length and handling speed was not significant. Most individuals preferred visualization by the 30 and 70° optical system. Identically, the mental work load was significantly improved for the 30° and 70° viewing angle, as expressed by the
width of pupils ($p < 0.01$) and the eye saccades ($p = 0.03$), as well as by the heart rate variability ($p = 0.04$).
Conclusions based on the results: According to our results in-axis visualization, as currently provided by most NOTES platforms, leads to a worse operative performance and a higher mental work load. A viewing angle about 70° is the most suitable and should therefore be used for construction of future interventional endoscopes. This requires an independent controllable optic, which is separated from the instrument axis.

02 Comparison of endoscopic suturing techniques for closure of the transgastric entrance site for NOTES procedure

Armengol Miro JR, Abu-Suboh Abadia M, Dot Bach J, Masachs Peracaula M, Armengol Bertroli J, Benages Curell A, Salord JC, Kantsevoy SV.

Background: Endoscopic closure of the transgastric wall incision created to enter the peritoneal cavity remains problematic. Several techniques (closure with endoscopic clips, T-bars, stapling devices, etc.) have not achieved quality of closure comparable to surgical suturing.
Aim: To compare clinical and histological results of continuous suture line and interrupted stitches created by novel endoscopic suturing device (Overstitch®, Apollo Endosurgery, Inc, Austin, YX) in a randomized, prospective, controlled animal trial.
Methods: Standard transgastric access to the peritoneal cavity was achieved utilizing gastric wall puncture with subsequent dilation with 20-mm CRE balloon (Boston Scientific, Natick, MA). After brief peritoneoscopy the endoscope was withdrawn into the stomach and all animals were randomly assign to gastric incision closure with either continuous (4 – 6 sequential punctures of each site of the gastric wall incision with subsequent tightening and cinching the suture line) or interrupted line of stitches (one puncture on each site of the incision with subsequent cinching). After completion of the suturing the stomach was insufflated with carbon dioxide and air-leak test was performed to prove airtightness of the closure. All animals were survived for 14 days and then sacrificed for histological examination.
Results: 16 survival animal experiments (8 in each group) were successfully completed. Suturing of the gastric wall incision was easily achieved and airtight in all animals. The mean time to complete continuous line of sutures was 7,43 ± 2,59 minutes, the mean time to complete the closure with interrupted stitches was 10,49 ± 3,8 minutes. There were no post-procedural complications in any animals.
Postmortem examination revealed no signs of peritonitis or other intraperitoneal complications in both groups. Histological examination in all animals demonstrated complete transmural healing with good opposition of gastric wall layers.
Conclusion: Overstitch® endoscopic suturing device is easy to use, reliable and operator-friendly instrument. Closure of the gastric wall incision with continuous suture line was faster, but the clinical and histological results were equally successful in both groups

03 Gastric volume reduction created by the articulating circular endoscopic stapler for the treatment of obesity – preliminary safety results

T. Verlaan, MD, E. M.H. Mathus-Vliegen, MD, PhD, E.A.M.L. Veldhuyzen, J.H. Eshuis, MD, P. Fockens, MD, PhD

Objective: Dietary and medical treatment of obesity often fail. Surgical treatment is successful but carries considerable morbidity. Endoscopic treatment could be an alternative with less morbidity. A minimally invasive technique was developed and studied on an animal model. We now present the preliminary results of the first human trial of a gastric volume reduction created by the Articulating Circular Endoscopic Stapler (ACE) for the treatment of obesity. The aim of this study is to evaluate safety in terms of adverse events.
Methods: Inclusion criteria consisted of a BMI of 40 – 45 kg/m or 30 – 39.9 kg/m plus obesity related co-morbidities, age 18 – 50 and ASA class I or II. Patients with prior oesophagogastric or bariatric surgery were excluded. Procedures were performed under general anaesthesia after intubation. A 20 mm endogastric tube was placed, through which the ACE stapler was advanced. With the stapler a maximum of 10 plications were created in the fundus and antrum of the stomach to realize a gastric volume reduction.
Results: Between April 2012 and May 2012, 5 female patients (median age 37 years, range 28 – 49) with a BMI of 42 kg/m (range 40.2 – 44.9) underwent an endoscopic gastric volume reduction using the ACE stapler. Median procedure time was 156 minutes (range 72 – 233). All patients were admitted for one night postoperatively. No patient was readmitted and no serious adverse events occurred. Adverse events were gastric pain (n = 3, range 2-3 days), constipation (n = 1, 14 days) and diarrhoea (n = 1, 21 days). All adverse events were mild and were treated conservatively.
Conclusions: Preliminary results of this study indicate that a minimally invasive gastric volume reduction created with the Articulating Circular Endoscopic stapler is a safe procedure. More studies are needed to evaluate whether this could be a safe and effective minimally invasive treatment alternative for obesity patients.

04 Feasibility, efficacy and safety of a pure natural orifice transluminal endoscopic gastrojejunostomy using a gastric outlet obstruction survival animal model

J.-M. Gonzalez, E. A. Bonin, G. Vanbiervliet, E. Garnier, S. Berdah, M. Barthet

Introduction: Natural orifice translumenal endoscopic surgery is a less invasive surgical technique for creating a gastrojejunal anastomosis without the need of skin/parietal incisions. Such procedure may be useful for bariatric procedures and for treating gastric outlet obstruction. A pure natural orifice transluminal endoscopic gastrojejunostomy remains experimental and technically challenging despite many efforts in developing the technique. The aim of this study is to determine feasibility, efficacy and safety of a pure endoscopic NOTES gastrojejunal anastomosis procedure (GJA) using a simulated gastric outlet obstruction (pyloric closure) survival swine model.
Methods: This prospective animal study was carried out under University of Aix-Marseille ethical commitee approval. All procedures were performed on 20 to 30-kg domestic pigs, under general intravenous anesthesia and aseptic conditions, including sterilized double working channel endoscope and accessories. This procedure has been previously established according to our preliminary experience of performing a pure GJA on 7 animals (in press) as follows: 1/ gastric incision with a needle-knife, 2/ Access of the peritoneal cavity, 3/ selection and presenting the jejunal loop for anastomosis, 4/ translumenal transfer of the loop into the stomach, 5/exposure of the loop in the stomach using a stoma creation technique using a fully-covered metallic biliary stent, 6/ incision of the loop, 7/ a full thinckness GJ anastomosis with T-tag sutures using a prototype endoscopic suturing device (Brace Bar, Olympus, Japan), 8/removal of the stent. For the present experiment we added a pyloric closure procedure using the Brace Bar endoscopic suturing device. Antibioprophylaxis was administered for a 7 day-period. Animals we assessed daily for clinical outcome and ponderal changes. The pigs were euthanized after 3 weeks. The patency of the gastrojejunostomy (GJ) was confirmed at postmortem examination.
Results: In total, nine pure NOTES gastrojejunal by-pass procedures were performed. All the procedures were successfully achieved. The mean operative time was 108 ± 26 minutes [65-142]. Each GJA was endoscopically sutured using 4 to 7 T-tag sutures (mean of 5.55 ± 1.30). One or 2 T-tags were used for pyloric closure, There was no complications during the procedure. Five of 9 pigs survived for 3 weeks. Their mean weight was 29.5 kg at baseline versus 27.7 kg at 3 weeks follow-up. Diarrhea was observed in 4 pigs. Endoscopic contrast study confirmed that all the gastrojejunostomies were patent. The pylorus was most of the time incompletely closed. On postmortem examination, the GJA was about 50 – 60 mm in maximal diameter without evidence of stricture. Four pigs died from anastomotic dehiscence complicated with septic peritonitis.
Conclusion: GJA with pyloric closure is technically feasible using a pure NOTES approach using standard endoscopic equipment. This procedure is efficient resulting in a patent anastomosis and weight loss in all surviving animals.
Anastomotic dehiscence is a major a concern since it carries a high mortality rate because of ongoing contamination from the obstructed stomach. Further improvements for this model for reducing the risk of anastomotic dehiscence may be creation of a 2-step procedure in separate occasions (GJA anastomosis as the initial procedure followed by anastomotic dilatation and pyloric closure).

05 Multisensor navigation for visualization of the configuration of flexible endoscopes

A. Schneider, D. Wilhelm, M. Polski, A. Fiolka, A. Meining, H. Feussner

Objective: For pure NOTES procedures flexible endoscopes are one precondition. However controlled steering is only possible for the tip of the scope, whereas the rest part of the endoscope places itself uncontrollable in the abdomen. Due to this fact, navigation of instruments is challenging and, moreover, adjacent structures could be injured by unintentional pressure or unintended instrument movements. Even more, the endoscopes tip position can only be assumed out of the images which could be challenging especially in an inverted position.
To overcome these problems, we developed a navigation system for the endoscope tip and the whole flexible shaft which can be used for simple visualization of the configuration or even more in a 3D dataset of the specific patient.
Method: A new navigation catheter, consisting out of seven consecutively placed 5D sensors, was positioned in the working channel of a flexible endoscope and connected to an electromagnetic tracking system.
Sensor values were read with a frequency of 30 Hz. Since simple connection and visualization of the sensor points would be very confusing, we developed an algorithm to calculate a NURBS (non uniform B-Spline)-curve, which allows a smooth visualization.
For rigid registration with the 3D anatomical CT-dataset, a simple registration and scaling algorithm is used.
Results: With the new multisensory catheter tracking sensor, inserted in the working channel of an endoscope, it has become possible to visualize the bending of the tip as well as the whole shaft in correlation with the anatomy.
Accuracy of sensor values as well as the calculated NURBS-curve for representation was proven in a technical setup and found sufficient for use during NOTES procedures.
Conclusion: Up to now, there was no adequate technology for representation of the configuration of a flexible endoscope in three-dimensionally anatomical datasets. There were previous attempts; however, all these techniques were unrelated to the anatomy.
With our system it could be shown, that a direct relationship to the anatomy could be easily combined by configuration visualization.

06 Endoscopic full thickness resection of gastric subepithelial tumors (EndoResect Study)

C. Schlag, D. Wilhelm, S. von Delius, H. Feussner, A. Meining

Objective of the study: Endoscopic resection of gastric subepithelial tumors (SETs) bears a high risk of perforation. New techniques such as use of the OTSC®-clip may enable secure endoscopic closure of perforations but have not systematically been analysed. Hence, we aimed to evaluate the feasibility of endoscopic resection of small gastric SETs using a grasp-and-snare technique followed by OTSC®-closure of the gastric wall if necessary.
Methods and procedures: In this prospective study 20 patients who presented with small gastric SETs (≤ 3 cm) were enrolled. Endoscopic resection was performed using a double channel endoscope, a tissue anchor and a monofilament snare. If perforation occurred complete closure was aimed to be achieved with a tissue twin-grasper and the OTSC®-clip. Procedures were performed under laparoscopic control using a single port 5 mm trocar placed through the umbilicus. All patients were followed up for 3 months after the procedure.
Results: In 6/20 patients a pure endoscopic approach was impossible and switch to laparascopic wedge resection was necessary (large tumor size in 2/6 patients; mainly extraluminal growth in 4/6 patients). Solely endoscopic resection was successfully performed in the remaining 14 patients. Amongst those, laparoscopic control was impossible due to severe adhesions in 2 cases. Perforation occurred in 6/14 patients and gastric closure with the OTSC®-clip was performed successfully in all these cases. No complications occurred and follow-up was unremarkable.
Conclusion: Endoscopic snare-resection of small gastric SETs (≤ 3 cm) seems to be a safe and minimal invasive procedure. Perforation can be adequately managed by placing the OTSC®-clip.

07 Full-thickness endoscopic resection of gastrointestinal cancer: from animal lab to humans

Authors: Armengol Miro JR, Abu-Suboh Abadia M, Dot Bach J, Masachs Peracaula M, Armengol Bertroli J, Benages Curell A, Salord JC, Kantsevoy SV.

Background: Endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) are currently used for resection of early gastrointestinal (GI) tract cancer, limited to superficial layers of the gastric and colonic wall. These techniques are technically difficult, labor intensive and cannot be used when tumor cannot be lifted with submucosal injection and/or involves deeper layers of GI tract wall.
Aim: To study technical feasibility and safety of full-thickness colonic resection in a live porcine model and the first clinical experience in humans.
Methods: We performed endoscopic full-thickness resections of gastric and colonic wall in nine 50-kg domestic pigs. After resection the defects in GI tract wall were sutured with Overstitch® endoscopic suturing device Apollo Endosurgery Inc, Austin, TX). Three animals were sacrificed post procedure. Six animals were survived for 14 days and subsequently sacrificed for postmortem examination. Then endoscopic full-thickness resection of the colonic wall was performed in a patient with actively bleeding colon cancer, who was not a surgical candidate due to severe concomitant medical problems.
Results: Large (3 – 5 cm) full-thickness endoscopic resections of gastric (3 animals) and colonic (4 animals) wall were easily achieved using hook knife, IT-knife and polypectomy snare (all made by Olympus, Tokyo, Japan). Suturing with the Overstitch® endoscopic suturing device was technically easy and achieved airtight closure of the GI tract in all animals. Postmortem examination reveal good full-thickness healing of the GI tract wall at the sites of resection.
After gaining significant experience in endoscopic suturing we performed full-thickness endoscopic resection on a 64-year old man with actively bleeding colon cancer located at hepatic flexure. The patient required anticoagulation and was not able to tolerate even laparoscopic resection due to severe heart problems. The cancer was 2 × 4 cm and could not be lifted with submucosal injection of normal saline. After endoscopic resection, 4 × 6 cm full-thickness defect in colonic wall was completely closed with continuous suture line. The patient had no pain post procedure

and was discharged home in 3 days. Follow-up endoscopy in 3 and 6 months revealed good healing of colonic wall without any residual cancer or strictures.
Conclusion: This is the first reported purely endoscopic, full-thickness resection of GI tract cancer in humans. This procedure can be used even when EMR and ESD are not possible and can potentially become another valuable alternative to laparoscopy and open surgery.

08 Transanal single port access to facilitate distral rectal mobilization: a step towards colorectal NOTES surgery

Albert M. Wolthuis, MD, André D'Hoore, MD, PhD

Objective of the study: Laparoscopic rectal mucosal or intersphincteric sleeve resection is challenging and technically demanding, especially exposure and mobilization of the most distal part of the rectum can be hazardous. The use of a single port access device placed in the muscular anal canal after incision of the sleeve at the appropriate level is proposed to facilitate dissection without sphincter damage. Furthermore, if transanal mobilization of the rectum can be progressed maximally in a cranial way, a complete transanal NOTES rectal resection might become possible. This pilot-study assessed the feasibility of a single port transanal rectal mobilization.
Patients and methods: All patients treated by a laparoscopic-assisted transal single port rectal mobilization were included in the study. Incision of the endopelvic fascia and mobilization of the distal rectum and mesorectum was performed via the single port device under direct control. The created pneumo-retroperitoneum further facilitates laparoscopic dissection of the more proximal part.
Results: Four female patients with a median age of 54 years (range: 51 – 83) had this procedure. Indications were intractable supralevatoric fistula, Crohn rectitis with tubulovillous adenoma and faecal incontinence. In 3 patients a hand-sewn coloanal anastomosis was made and in 1 patient a proctectomy was performed. In one patient, a pure transanal rectal sleeve resection was performed without laparoscopic assistance. There were no postoperative complications and median hospital stay was 7.5 days (range: 3 – 9). Pathology showed tubulovillous adenoma in 2 cases. None of the patients reported any anal dysfunction at a median follow-up of 4 months.
Conclusion: The aforementioned procedure is a promising tool in the armamentarium of the colorectal surgeon. It can enable distal rectal mobilization under direct visualisation. The proposed technique could be a step towards transanal colorectal NOTES surgery.

09 Mechatronic concept of a semiautonomous instrument changing system for flexible NOTES platforms

A. Fiolka, G. Horst, H. Ulbrich, A. Schneider, H. Feussner

Objective: NOTES mechatronic support systems are still needed to overcome the well-known problems of the new technique. New developments will be established only if they are adapted to the clinical workflow. Therefore it is important that tasks of the assistant and of the physicians are equally considered. Changing of flexible instruments is a task that is mostly carried out by the assistant. Because of the flexible design and the length of the manipulators the handling is quite difficult. Instruments can be contaminated by carelessness during the insertion into the working channel and changing is a time consuming task which should be facilitated. We describe a mechanical instrument changing system to standardize, and to accelerate this process and to reduce the workload of the staff.
Methods and procedures: We developed a prototype of an instrument changing system for NOTES platforms which can insert automatically one of four flexible conventional endoscopic instruments directly into the working channel. The prototype consists of two main components. The changing unit manages and changes the instruments. The handgrips are fixed in so-called actuators which operate the instruments. The instrument changer can be controlled from a console or a remote control. The whole concept is modular and can be adapted to new requirements. It was even designed that HF surgery is still possible.
Results: The first prototype was tested in the laboratory. Instruments used are the Olympus HotClaw FD-420LR, Olympus Electrosurgical Knife KD-611L and a Storz flexible Biopsy Forceps. The flexible Gastroscope 13806PKS (Karl Storz, Tuttlingen) was temporarily used as the manipulator. The entire exchange process from instrument choosing to placement at the tip takes 28 sec on average. Instruments were automatically positioned with an accuracy of ± 4,4 mm (n = 20; standard deviation 2.98 mm) directly at the endoscope tip.
Conclusions: The prototype of the instrument changer has been evaluated successfully in in-vitro experiments. Actually a new manipulator is developed and the instrument changer will be an important sub-component of the whole concept. In the future the user can change the instruments by direct command via the system and is not relayed on the help of an assistant.

10 Oral chlorhexidine and microbial contamination during gastroscopy. Implications for transgastric surgery. A randomised trial.

Anders Meller Donatsky, Barbara Juliane Holzknecht, Magnus Arpi, Peter Vilmann, Søren Meisner, Lars Nannestad Jørgensen, Jacob Rosenberg

Background: A concern associated with transgastric natural orifice transluminal endoscopic surgery (TG-NOTES) is the risk of contamination and intraabdominal infection with microbes introduced from the access route. An effective decontamination regimen is needed before the technique can be implemented in routine clinical practice. The aim of this study was to evaluate the effect of oral decontamination with chlorhexidine on microbial contamination of the endoscope during a gastroscopy.
Methods: In a prospective randomised single blinded clinical trial the effect of chlorhexidine mouth rinse was evaluated. As a surrogate for the risk of intraabdominal contamination during TG-NOTES, microbial contamination of the endoscope during gastroscopy was examined. Patients referred to gastroscopy were assessed for eligibility and randomised to either chlorhexidine or no mouth rinse after oral and written consent had been obtained. Culture samples were collected from gastric aspirate and endoscope. Analyses of sample cultures were performed blinded to the respective allocation. The primary outcome measure was colony forming units (CFU/ml) in the endoscope samples. Secondary outcome measures were species specific effect of chlorhexidine on microorganisms with abscess forming capabilities and the effect of proton pump inhibitor (PPI) treatment on CFU measurements.
Results: A total of 160 patients were approached of which 109 were included in the study. Due to exclusions after randomisation, 100 participants were available for final analyses. Chlorhexidine mouth rinse resulted in a significant reduction of CFU/ml in the endoscope samples ($p = 0.001$). There was no species specific effect and microorganisms with abscess forming capabilities were still equally present in both groups. PPI treatment was associated with significantly higher CFU counts in both the gastric aspirate ($p = 0.004$) and endoscope samples ($p = 0.049$).
Conclusion: Chlorhexidine mouth rinse was effective in reducing microbial contamination of the gastroscope, but microorganisms with abscess forming capabilities were still present. Oral chlorhexidine needs to be combined with other measures for an effective decontamination regimen prior to TG-NOTES. PPI treatment significantly increased CFU/ml and should be discontinued before TG-NOTES.

11 Transanal endoscopic operations: A safe and effective alternative to tems

Hoey Koh, Stephen Magill, Mark Vella and Andrew Renwick

Introduction: Rectal surgery is perhaps the easiest conduit for NOTES. Traditional TEMS was the technique of choice for small rectal lesions. More recently the transanal endoscopic operation (TEO) technique has gained a foothold as it is cheaper than TEMS, and surgeons have more refined laparoscopic skills. We report our early experience with TEO's in our unit.
Methods: TEOs carried out between January 2010 and May 2012 were identified. All cases were discussed preoperatively at our colorectal MDT meeting. Case notes were reviewed retrospectively for demographic, clinical and histological data.
Results: 14 cases were performed by 2 colorectal surgeons. There were equal numbers of men and women, with a mean age of 70 (52 – 80). 5 patients were ASA 3 – 4. The lesions were equally located anteriorly or posteriorly, at 3 – 15 cm from the anal margin. Pre-operative enema and postoperative antibiotics were standard protocol. All cases bar one were carried out in the lithotomy position, with a mean operative time of 67 minutes (25 – 110 minutes).
4 cases were adenocarcinoma, 10 were benign adenomas. All adenocarcinomas were diagnosed pre-operatively and were completely excised T1 lesions. One patient had T1 Kikuchi Sm3, and proceeded to an APER, where there was no residual tumour and no lymph nodes involvement. The other 3 patients had routine surgical and endoscopic follow-up.
The patient who had APER had a breach of the vagina during the TEO procedure. This was recognised and repaired peri-operatively.
Two patients had cardiac complications – one fast AF which settled on medical management; the other, who was ASA 4, developed complete heart block requiring pacemaker insertion. One patient died 18 months later from malignant melanoma; there was no procedure-associated mortality.
Surgeons reported frustration with defect closure owing to the confined operative space.
Conclusion: We have shown that TEOs can be used safely and effectively to treat rectal lesions, including certain early T1 adenocarcinomas, thereby avoiding the morbidity associated with conventional open and laparoscopic methods. Patients are still at risk from operative and cardiorespiratory complications, and should be selected appropriately. We welcome developments in the

instrumentation to aid the frustrating elements to this emerging technique.

12 Totally stapled gastrojejunal anastomosis using hybrid NOTES – single 12 mm trocar approach in acute and survival porcine models

Lino Polese, Stefano Merigliano, Benedetto Mungo, Roberto Rizzato, Roberto Luisetto, Lorenzo Norberto

Objective of the study: The aim of this study was to evaluate the feasibility and safety of a totally stapled gastrojejunal anastomosis performed with hybrid NOTES – single 12-mm trans-abdominal trocar approach in a porcine model.
Methods and procedures: The procedure was carried out on 10 domestic pigs (7 acute and 3 survival models) of 45 kg using a NOTES hybrid technique with a gastroscope and a 12-mm Hasson trocar, positioned in the left hypocondrium. At the end of the procedure a mechanical circular 21 mm gastrojejunal anastomosis was performed by inserting the stapler through a small gastrotomy, after enlarging the trocar incision. In 8 pigs it was performed a lateral-lateral gastro-jejunal by-pass, in 2 pigs a Roux-en-Y gastro-jejunal by-pass. Survival models were followed up for 2 weeks and then a gastroscopy and a necropsy were performed to look for complications.
Results: In all 10 cases the procedure was completed through a single 3 cm abdominal incision, without intraoperative complications. The mean operation time was 2 hours, and endoscopic investigation showed that the anastomoses were intact, patent and airtight. In survival models no complications were found during follow-up and anastomoses were regular and well-functioning at control. Pigs fed spontaneously in the first postoperative day, and at the end of the follow-up had grown a mean of 2.5 kilograms. Analgesics have been suspended in the second postoperative day.
Conclusions based on the results: Totally stapled gastrojejunal anastomosis using a hybrid NOTES – single 12 mm trocar approach is a simple and safe procedure in the porcine model. Further studies are warranted to evaluate the functional and metabolic results of this procedure.

13 Comparative study of NOTES alone vs. NOTES guided by a new image registration system for navigation in the mediastinum: A study in a porcine model

Henry Córdova, Raúl San José Estépar, Antonio Rodríguez-D'Jesús, Graciela Martínez-Pallí, Pedro Arguis, Cristina Rodríguez de Miguel, Ricard Navarro-Ripoll, Juan M. Perdomo, Miriam Cuatrecasas, Josep Llach, Kirby G. Vosburgh, Gloria Fernández-Esparrach

Background and study aims: Natural Orifice Transluminal Endoscopic Surgery (NOTES) mediastinoscopy through the esophagus has proven to be feasible in the animal model. However, injury of the adjacent pleura and pneumothorax has been reported as a frequent complication when using a blind access. The aim of the current study was to assess the utility and safety of a CT-based Image Registered (IR) navigation system to identify mediastinal structures.
Methods and Procedures: 30-minute mediastinoscopies were performed in 30 pigs: 15 procedures used IR guidance (IR-MED) and 15 procedures used a blind access (MED). In both groups, the mediastinum was accessed through a 10 cm-submucosal tunnel in the esophageal wall. Timed exploration was performed with identification of 8 organs (carina, right pulmonary artery, right atrium, cava vein, porcine bronchium, brachiocephalic vein, right vagus nerve and lung). Necropsy was immediately performed after the procedure.
Results: 30 animals weighting 31.5 ± 3.5 kg were included in this study. Mediastinoscopy was not possible in two animals in MED group but in all in IR-MED. The mean number of identified organs was slightly higher in IR-MED (6.13 ± 1.3) than in MED (4.7 ± 2.3; p = 0.066). Moreover, right atrium and cava vein were identified in more cases in IR-MED than in MED (13 vs. 3 and 15 vs. 11, p = 0.000 and 0.03, respectively). We had 3 (23 %) complications in IR-MED vs. 4 (27 %) in MED (p = ns) being pneumothorax the most frequent (2 and 3, respectively).
Conclusion: The present study demonstrates that IR system appears feasible in NOTES mediastinoscopy and suggests that IR guidance might be useful for selected procedures.

14 Endolumenal full-thickness colon-wall resection using an over-the-scope-clip: three techniques compared in a porcine survival study

Rieder Erwin, Mesteri Ildiko, Bolton J. Emily, Mathews F. Connor, Timmel B. Gregory, Whiteford H. Mark, Swanström L. Lee

Objective: Reliable endoscopic full-thickness resection (EFTR) of the GI-tract would be a desirable adjunct to GI-cancer care. We have recently described an appealing technique for EFTR, using T-tag sutures for accurate tissue retraction and the over-the-scope-clip for pre-resection tissue closure. The aim of this animal survival study was to compare this technique in an either hybrid or purely endolumenal fashion, with a modified method using solely endoscopic suction for retraction.
Methods and Procedures: All survival experiments were performed on female Yorkshire pigs. In Group-A laparoscopic overview was used to facilitate endolumenal colon-wall resection performed with a standard colonoscope. T-tags were endolumenally applied circumferentially to a hypothesized colon-lesion and were used to gently and accurately retract the intestinal wall into the attached over-the-scope-clip system. For pre-resection tissue closure the nitinol-clip was applied as soon as complete intestinal wall retraction had been verified. The inverted colon-wall was then snare-resected and specimens (n = 2) were easily withdrawn from the colon. In Group-B the same technique was performed purely endolumenally without laparoscopic overview (n = 5). In Group-C solely suction, instead of T-tag sutures, was used for tissue retraction (n = 6). All animals were survived for 14 days followed by necropsy and histological analysis.
Results: EFTR in the colon was achieved in all attempted interventions (13/13). Overall mean intervention time was 33 ± 21 min. The full-thickness colon specimens had a mean diameter of 23 mm ± 6 mm.
In Group-A no signs of leakage or infection were found. At the resection sites normal healing without stenosis was observed macroscopically and histologically. The clips were already passed with the stool. In Group-B the first two EFTR (2/5) also resulted in appropriate healing with the clips already passed. However, the other three resections led to intestinal fistulas (3/5). No related fistula was found in Group-C, with some clips still in place (4/6). However, pure endoscopic suction without T-tags impaired accurate resection with appropriate safety margins barely possible.
Conclusion: Endolumenal full-thickness resection in the colon, using T-tags for tissue retraction and an over-the-scope-clip for pre-resection closure seems appealing but only if laparoscopic overview is used. At this stage pure endolumenal EFTR cannot be recommended.

15 A new instrument for endoscopic submucosal dissection: The "EndoDissector"

Alexander Meining, Daniel Roppenecker, Armin Schneider, Tim Lüth

Background: Albeit, effective for treatment of early neoplasm, endoscopic submucosal dissection (ESD) can be technically demanding and time consuming. Furthermore, use of multiple instruments if often mandatory for performing various steps associated with the procedure. Hence, we aimed to design, create and evaluate a new instrument for ESD, the "Endo-Dissector".
Methods: Gastric ESDs of areas from 15 to 30 mm including circumferential incision and coagulation of bleeding vessels were performed using a single device. Incision was done with the prototype instrument in a closed position using cutting current. Submucosal dissection was performed using an approach comprised by four steps: 1) open jaws of instrument, 2) grasp fibers, 3) elevate tip to avoid contact with muscle layer, 4) dissect fibers using cutting current. Bleeding was terminated by grasping vessels and applying coagulation current.
Results: The procedure was successfully performed in a total of 6 pigs. The new instrument was useful performing all single steps as needed (incision, dissection, coagulation of bleeding vessels). Time needed for the complete intervention was 35 to 70 minutes.
Conclusions: The new instrument has potential advantages in comparison with standard instruments used for ESD. All steps can be performed with a single instrument and the technique of lifting submucosal fibers during dissection potentially decreases risk of perforation.

16 Ultimate less invasive laparoscopic surgery by using needle devices and NOSE for rectal cancer

Masaaki Ito, Atsushi Koyama, Norio Saito

Objective of the study: The aim of this study is to develop a less invasive surgical technique by using needle devices and trans-rectal specimen extraction for patients with rectal tumors and to evaluate clinical results after the surgery.
Methods and procedures: In this study, we used needle graspers of 2 or 3 mm in size in performing laparoscopic surgery for rectal tumors. General laparoscopic anterior resection was performed by using these devices. Then rectal mucosa was washed out with clamping at the distal side of the primary tumor. Rectal wall was directory transected by electric cautery or the ultrasonic Harmonic Scalpel under laparoscope, with keeping 2 cm of distal margin at least. After an operator moving to anal side, we expand the anus by special retractor **circumferentially** and distal stump was sutured and closed from the anus. By pulling the suture, the specimen was removed per the rectal cut-end and anvil head was placed at the oral colon of the anastomotic site and push it back to the abdominal cavity. Rectal cut-end was closed in purse-string sutures from the anus. Reconstruction was performed by single stapling technique (SST) under laparoscopy. Five patients with rectal cancer and rectal carcinoid underwent this operation. We evaluate perioperative clinical outcomes after the operations.
Results: We had not experienced operative deaths in this study. R0 curative resections were done for all the patients. Median operation time was 270 min and amount of bleeding was 100 ml. There was one postoperative leakage in the

first patient without diverting stoma and recovered conservatively without emergency operation. Greatest incision in this operation was less than 10 mm and the other incisions were 2 or 3 mm in size. Patients were satisfied with less pain and less abdominal incisionsafter this operation.
Conclusions based on the results: Laparoscopic surgery with needle use and trans-rectal specimen extraction is feasible and offer less invasiveness to patients with rectal tumors.

17 Comparison of hemodynamic and inflammatory changes between transoral and transthoracic thoracoscopic surgery

Yun-Hen Liu, Yen Chu, Chien-Ying Liu, Yi-Cheng Wu, Ming-Ju Hsieh, Tzu-Ping Chen, Ying-Kai Chao, Ching-Yang Wu, Hsu-Chia Yuan, Po-Jen Ko, Hui-Ping Liu

Background: Natural orifice transluminal endoscopy has been developed for abdominal surgical procedures. The aim of this study was to compare the surgical outcome between a novel transoral approach and a standard transthoracic approach for the thoracic cavity in a canine model.
Methods: Twenty-eight dogs were assigned to transoral (n = 14) or standard thoracoscopy (n = 14). Each group underwent thoracic exploration, pre-determined surgical lung biopsy, and pericardial window creation. Blood draws were obtained before surgery and at postoperative days 1, 3, 7, and 14. Operative time, complications, laboratory parameters, hemodynamic parameters, and inflammatory parameters were compared between the two procedures. The animals were monitored for two weeks and necropsy was performed for surgical outcome evaluation.
Results: The thoracic procedures were successfully performed in all of the dogs, with the exception of one animal in the transoral group. There were no serious acute or delayed complications related to surgery. There was no difference between the two surgical groups for each of the hemodynamic parameters that were evaluated.
Regarding the immunological impact of the surgeries, transoral thoracoscopy was associated with significant elevations in IL-6 and CRP levels on postoperative days 1 and 3, respectively, when compared with the standard thoracoscopy. All dogs recovered well, without signs of mediastinitis or thoracic infection. Necropsy revealed absence of infection, no injury to vital organs, and confirmed the success of the novel procedure.
Conclusions: This study suggests that both techniques were comparable with respect to procedure success rate, hemodynamic impact, and inflammatory changes. Furthermore, there was a decreased incidence of postoperative discomfort in the transoral group.

18 NOTES-Cholecystectomy may be a viable alternative to conventional laparoscopic cholecystectomy: A systematic review and meta-analysis of the published comparative studies

Sajid MS, Ladwa N, Leaver C, Singh KK, Sayegh M

Objective: The objective of this article was to systematically analyse the published studies comparing the cholecystectomy by national orifice transluminal endoscopic surgery (NOTES-cholecystectomy) versus conventional four port laparoscopic cholecystectomy (CLC).
Methods: The meta-analysis was conducted according to the Quality of Reporting of Meta-analysis (QUORUM) standards. Pubmed, Medline and Cochrane library databases were searched to retrieve all types of published studies comparing the clinical and technical effectiveness of NOTES-cholecystectomy against CLC. The data from included studies was extracted and it was systematically analysed using RevMan®. The summated outcomes were expressed as the odds ratios (OR) for dichotomous variables and standardised mean differences (SMD) for continuous variables.
Results: Eight published studies (one randomised trials, 3 non-randomised trials and 4 comparison cohorts) encompassing 527 patients were retrieved from the standard electronic databases. There were 234 patients in NOTES-cholecystectomy group and 293 in CLC group. There was significant heterogeneity (Tau2 = 1.37; chi = 103.75, df = 7, p < 0.00001; I = 93 %) among included studies. Therefore, in the random effects model, operative time (SMD, 1.62; 95 % CI, 0.74, 2.51; z = 3.60; p < 0.0003) for NOTES-cholecystectomy was shorter compared to CLC. In addition, the 24-hour postoperative pain score was lower (SMD, − 0.98; 95 % CI, − 1.61, − 0.35; z = 3.06; p < 0.002) and length of hospital stay was shorter (SMD, − 0.37; 95 % CI, − 0.56, − 0.18; z = 3.77; p < 0.0002) following NOTES-cholecystectomy. The risk of developing postoperative complications (OR, 0.55; 95 % CI, 0.23, 1.29; z = 1.37; p = 0.17) and time to return to normal activities (SMD, − 2.94; 95 % CI, − 6.96, − 1.09; z = 1.43; p = 0.15) were statistically comparable between two techniques.
Conclusion: NOTES-cholecystectomy is a safe and technically feasible approach to treat gallstones with proven advantages of shorter operative time, shorter length of hospital stay and lesser postoperative pain. However, stronger evidence in the form of a major, multicentre randomised trial is required before considering the wider application of this approach for cholecystectomy.

19 Endoscopic transumbilical and transvaginal surgery using various types of flexible endoscopes. Is there a future for this technology?

Shishin K.V., Starkov Yu.G., Solodinina E.N., Nedoluzhko I.Yu

Background: Up to now there are no specialized flexible endoscopes to perform transluminal endoscopic surgery.
Aim: To evaluate the capacity of various types of flexible endoscopes in order to reveal their benefits and disadvantages.
Methods: Since May 2007 up today 25 patients underwent cholecystectomies (23) and liver cysts fenestrations (2) using flexible endoscopes. Transvaginal (7) and transumbilical approach (18) were used. All prosedured were peformed by the same surgical team, there were no conversions, no intra/postoperative complications. In 7/25 cases we used the hybrid approah with the single access 2/5 mm port introduced at the right subcostal region to peform gallbladder's tractions and keep up the intra-abdominal pressure. Endoscopic tools were used, passed through the operating channel of endoscope. To perform the technique we used single-channel endoscope Olympus GIF-Q160(3), high definition single-channel endoscope Olympus GIF-Q180H(3), double-channel therapeutic endoscope Olympus GIF-2T160 (7), frontal optics ultrasound-endoscope with curved transducer and channel equipped by operated elevator Pentax EG-3830UT(2) and Fujinon EG-530UT(6), along with Olympus R-scope(4).
The single-channel diagnostic endoscopes were the least convenient and caused the problems with stabilization of the device in abdominal cavity due to their significant flexibility. Moreover, thin biopsy-channel did not provide fine aspiration of the contents.
The double-channel therapeutic endoscopes were more stable. Usage of two tools allowed to perform the limited manipulations in gallbladder neck area; however it did not enable the basic movement-triangulation and thus limited its application.
The ultrasoud-endoscopes allowed carrying out the intraoperative ultrasonography of bile ducts. The management of device gave greater opportunities for manipulations by means of operated elevator.
Usage of R-Scope with two channels allowing the management of tools in two perpendicular planes was accompanied by best results. The effective technique using two tools provided for triangulation and tension of tissues, thereby achieving better visualization and a precision work reducing operative time.
Conclusion: Endoscopic transumbilical and transvaginal surgery using flexible endoscopes is a feasible, safe and effective technique, offering all advantages of minimally invasive surgery with excellent cosmetic results. The use of flexible endoscopes has limited capabilities compared to conventional laparoscopy and SILS. The development of this technology is closely dependent on the technical evolution.

20 Potential of a HDR image processing sensor for optimized visualisation in NOTES interventions

Marita Falkinger, Armin Schneider, Dirk Wilhelm, Judith Jakob, Wolfgang Endreß, Hubertus Feußner

Objective of the Study: Since current NOTES endoscopes have a very narrow and poorly illuminated field of view, it is inevitable to optimize the visualization of the operation field and build a basis for further developments in NOTES-surgery. Typical effects are the overexposure of near objects and the underexposure of distant structures, as well as bright areas in the centre and poorly illuminated areas in the periphery. Consistent illumination and sharp clear structures would help for orientation and to ensure safe operation.
Methods and Procedures: In a collaborative research project with viimagic and C.R.S. iiMotion (Villingen-Schwenningen) a new High-Dynamic-Range (HDR) Sensor is developed and adapted to medical problems and irritating effects occurring in minimally-invasive surgery. For this purpose, a first evaluation including different approaches for virtual smoke elimination was implemented by consulting 16 experienced endoscopists. Moreover, the sensor is able to take three or more pictures of different exposure time simultaneously and fuses them to one optimized image in real-time. Due to the increased dynamic range compared to Standard-Dynamic-Range (SDR) cameras, more picture and colour information can be detected and utilized.
Results: HDR image processing provides high potential for medical application. The analysis of the evaluation provides the basis for further optimization of the surgeon's field of vision by the HDR camera system and dedicated software tools. The integrated image processing software improves interfering effects, such as reflections or smoke plumes of HF-devices. The HDR sensor is able to correct over- and underexposure and delivers an optimized image on the screen in real-time.
Conclusions: HDR imaging is a promising tool for improved visualization in medicine, but this technique is in an initial stage for medical application. There are some aspects, which still have to be optimized. One important challenge is colour rendering. In NOTES the natural colouring of human structures is an important feedback for the physi-

cian to guarantee safety of the procedure. High-Dynamic-Range camera systems in medicine establish a helpful and promising technique also for NOTES interventions.

21 Feasibility and safety of endoscopic transumbilical thoracic surgical lung biopsy: A survival study in a canine model

Wei-Hsun Chen, Yen Chu, Chi-Ju Yeh, Chien-Ying Liu, Hsu-Chia Yuan, Po-Jen Ko, Yun-Hen Liu

Background: Post-thoracotomy discomfort is an unavoidable complication following thoracoscopic surgery. Transumbilical laparoscopy allows the patient to undergo various surgical procedures associated with abdominal diseases and prevents post-thoracotomy discomfort by avoiding the creation of an incision through the chest wall. The aim of this study was to evaluate the feasibility and safety of transumbilical thoracic exploration and surgical lung biopsy in a canine survival model.
Methods: The procedure was performed in 12 dogs weighting 7.1 – 9.1 kg. The thoracic cavity was accessed using a metal tube inserted via umbilical and diaphragmatic incisions. Following transumbilical thoracoscopy, the predetermined lung lobe was resected with an electrocautery loop. Clinical examinations, including determination of respiratory rate and rectal temperature, were carried out daily. Laboratory parameters (white blood cell [WBC] count) and inflammatory parameters, including serum interleukin-6 (IL-6) and C-reactive protein (CRP) levels, were measured before surgery and at postoperative days 1, 3, 7, and 14. Necropsies were performed 2 weeks after surgery.
Results: Corrected surgical lung biopsies were performed successfully for the predetermined lung lobe in all animals, with a median time of 43.5 min (range, 32 – 65 min). Two peri-operative complications were observed; 1 dog suffered from minor postoperative air leakage, and 1 dog suffered from hemodynamic collapse due to inadequate ventilation. These animals recovered well without signs of peri-operative infection. Necropsies at 2 weeks after surgery showed no evidence of mediastinitis or peritonitis.
Conclusions: Exposure of the thoracic cavity and surgical lung biopsy via a transumbilical incision is feasible and practical in this canine model of survival, and this procedure may have potential advantages over currently used transthoracic thoracoscopy techniques.

22 Hybrid NOTES laparoscopic anterior resection in women and men

Sebastian Lamm, Andreas Zerz

Objective of the study: The NOTES hype of the last few years did not lead to any adoptions in daily routine with the exception of the hybrid NOTES cholecystectomy which has become a standard procedure in several institutions. In our opinion the rigid hybrid NOTES technique is the perfect tool to convert laparoscopically assisted operations into totally laparoscopic procedures, avoiding the need of a minilaparotomy.
Methods and procedures: Although, in standard laparoscopy, we can usually perform the operation with a few five millimetres incisions and one ten millimetre trocar (for insertion of the Endostapler), there remains the need for a minilaparotomy for specimen removal. This lead to the idea of removing specimen through natural orifices avoiding additional harm to the abdominal wall. As the transvaginal route is an old and well known surgical pathway since decades, it was obvious to develop the technique of transvaginal retrieval of colorectal specimens. When this technique was introduced, the proximal stapling of the specimen and the insertion of the anvil in the proximal lumen was performed extracorporally in the vagina. We advanced this technique and meanwhile we perform an intracorporal purse-string suture after insertion of the anvil in order to avoid any compromises concerning the length of the specimen. The transrectal pathway is a good alternative for retrieval of the specimen in men or in women with contraindications for a transvaginal route.
Results: In our experience after more than hundred transvaginal and transrectal laparoscopic anterior resections it is a safe and feasible method for daily routine.
Conclusions based on the results: In our opinion these techniques are the consequent evolution of the standard laparoscopic surgery in colorectal surgery. Combining standard laparoscopic operative techniques with specimen retrieval through natural orifices, eliminates the need for a minilaparotomy, allowing a totally laparoscopic operation with only small incisions. This significantly minimizes the risk of scar hernias, reduces postoperative pain and leads to quicker recovery of the patients. The transvaginal laparoscopic (rigid hybrid NOTES) anterior resection has become a routine procedure in our clinic. In near future, the transrectal laparoscopic resection will become our standard procedure in men. We demonstrate our technique of intracorporal purse-string suture combined with transvaginal removal and report a first series of transrectal laparoscopic anterior resection with operative video sequences.

23 A single surgeon's experience with a modified NOTES cholecystectomy: How to keep it safe and comfortable

Tom G. Kirchner MD, Bjoern Siemssen MD

Objective: The transvaginal approach prolongs the average operation time of a laparoscopic cholecystectomy. Even a high experienced endoscopic surgeon probably has to undergo a learning process. We use a minor modification by the placement of one additional 5-mm instrument (mostly in the left upper abdomen) in order to increase the practical comfort and safety. In this single surgeon retrospective analysis of all performed laparoscopic cholecystectomies (n = 579) from January 2009 till December 2011 we compare the transvaginal contingent (TVC, n = 138) with the female fraction of the conventional laparoscopic contingent (CLC, n = 301).
Methods: Generally the transvaginal approach is offered to all our female patients. The only exception would be a gynaecological contraindication (e.g. advanced endometriosis). In the reviewed period 138 patients opted for a transvaginal procedure. All patients are listed in our standard clinical database, so all needed specifications are available.
We start like generally common with a 5-mm invisible incision deep in the umbilicus, than we apply the additional 5-mm instrument and perform the colpotomy and the transvaginal placement of a 10-mm optic and a 5-mm dissector under visual control.
Results: 5 of 138 TVC-cases were converted into a conventional laparoscopic approach (because of severe postoperative adhesions in the small pelvis or an affixed uterus myomatosus). There was one postoperative vaginal bleeding that requires a reintervention and one vaginal mycosis that was treated with local antimycotica.
Mean age was 50 years (CLC = 54 y.). Mean BMI 25,3 (CLC = 27,6).
The average operation time was 37,5 minutes (CLC = 31,9).
The required operation time for the TVC adds up to 45,8 min in 2009 and 34,4 min in 2011.
Conclusions: The risk of further complications by using an additional 5-mm incision is negligible, but you can achieve an optimal surgical comfort and an unproblematic triangulation during a NOTES cholecystectomy. The cosmetic outcome is still excellent. You can observe a moderate learning curve and the required operation time is only marginally prolonged in comparison to the CLC.

24 Covered self-expandable metal stents (sems) as a new treatment option for perforated duodenal ulcer

Jorge Alberto Arroyo -Vazquez, Per-Ola Park, Maria Bergström

Introduction: Surgical closure is the gold standard for treating perforated duodenal ulcers. Covered self-expandable metal stents are currently used for treating anastomotic leakages. In analogy with this treatment we started to use covered SEMS to treat perforated duodenal ulcers.
Aims & methods: From 2009 to 2012 eight patients (age 62 to 87, six female, two male) with a perforated duodenal ulcer were treated with a covered duodenal SEMS at our surgical department. A covered Hanaro stent (through the scope) from M.I tech Korea was used. It was placed through the endoscope under fluoroscopic and endoscopic guidance. All patients presented with acute epigastric pain and a CT-scan showed intra-abdominal gas. The two first patients were primarily treated with open surgical closure, but due to continuous leakage endoscopic stenting was performed. The six following patients were treated with SEMS as primary treatment due to co-morbidities. Of these patients, one had a complicated ulcer disease with bleeding and had been treated with endovascular coiling previous to the perforation. Another patient who also had been treated with coiling developed a pyloric stenosis and perforated during dilatation. Abdominal drainage was placed percutaneously in four patients. The two patients who were primarily operated received a drainage-tube at the operation.
Results: The patients were treated with SEMS 1 to 36 days after presenting with epigastric pain. Six patients were checked with a CT-scan 1 – 6 days after stenting showing no leakages. One patient with dementia showed good recovery and was not checked for leakage. One patient, 87 years old, died 1 day after stenting. She was in a poor condition due to delayed diagnosis and treatment. In total seven patients recovered without further complications or treatments. All stents were removed endoscopically after a mean of 30 days. These patients are still alive after 6 – 52 months.
Conclusion: Covered metal stents can safely be used as a treatment of perforated duodenal ulcers. In the future, stent treatment might become a primary option together with percutaneous drainage as an alternative to surgery.

25 An analysis of endoscopy-assisted and laparoscopic intragastric surgery in an experimental model of gastric submucosal pseudotumor

Sánchez-Margallo FM, Pérez FJ, Sánchez MA

Objective: This study aimed to evaluate the feasibility and usefulness of the combination of flexible endoscopy and laparoscopy during minimal-

ly invasive intragastric treatment of experimental submucosal pseudotumors located at the level of Z-line.
Methods and procedures: Six healthy female pigs urderwent a transparietal injection of sterile alginate at the level of Z-line area creating a model of gastric submucosal pseudotumor The operative procedures included intragastric surgery with endoscopic vision (n = 3) and intragastric surgery with gastrotomy and laparoscopic vision (n = 3), using a two minilaparoscopic portals or single-port technique, respectively. The pseudotumors were resected and the gastric mucosal layer was closed using intracorporeal sutures. The gastrotomy and the minilaparotomy were closed in a multilayered fashion.
Results: The pseudotumors ranged in size from 3 to 6 cm in diameter. The access of the intragastric cavity was successfully performed in all animals without complications. The transgastric approaches were performed without any complication in all animals. More technical difficulties were encountered in the transgastric approach with endoscopic vision. The duration of the operations ranged from 70 to 130 mins. No complications were encountered on the postoperative follow-up. After one-month exploratory laparotomy not showed alterations in abdominal cavity.
Conclusions: This experiment showed the usefulness of porcine model for research in minimally invasive intragastric surgery. The application of transgastric endoscopic-assisted and laparoscopic surgery to submucosal pseudotumor of the stomach are technically feasible, safe and reproducible and may be an useful alternative to open surgery and endoscopic techniques. Additional studies will be necessary to establish the role of transgastric surgery in the treatment of gastric cancer.

26 New ultrasound-guided culdotomy of vaginal ovarian cystectomy for pregnant women incarcerated ovarian dermoid cysts in recto-uterine pouch: case reports

Satoshi Dohi, Masaaki Tanaka, Rena Yamazaki, Tetsuo Sagawa, Masaki Inoue

Objective of the study: For pregnant women with ovarian cysts, it's important that pregnant uterus is gently treated in laparoscopic cystectomy. Especially the cases incarcerated in recto-uterine pouch are difficult to do laparoscopic ovarian cystectomy. Such cases are suitable for vaginal ovarian cystectomy, but it has severe complication, rectal injury. As a reliable method of transvaginal access, we introduce a new culdotomy procedure and repoted two pregnant cases.
Methods and procedures: New culdotomy procedure uses a technique for the creation of space in the cul-de-sac, transvaginal ultrasound, and a newly developed umbrella Hakko needle. The umbrella Hakko needle consists of a 19-gauge, 30-cm long, metal needle with an overcoat.
Results: In both cases, culdotomy was performed successfully. There were no severe operative complications, rectal injury. Also, there were no blood transfusion, no severe hemoglobin drop, and no postoperative complications.Pregnancy course of both case were no problem, normal vaginal delivery.
Conclusions based on the results: Ultrasound-guided culdotomy of vaginal ovarian cystectomy for pregnant women incarcerated ovarian dermoid cysts in retro-uterine pouch is useful, minimally invasive surgery. It has potential applicability in transvaginal NOTES for pregnant women.

27 Diagnostic flexible laparoscopy: A single incision procedure

Lino Polese, MD and Stefano Merigliano, MD

Objective of the study: Diagnostic laparoscopy is a minimally invasive method which enables the direct inspection of intra-abdominal organs. Simple additional procedures, such as histological or cytological sampling, fluid aspiration and intraperitoneal lavage can be carried out by positioning additional trocars.
The aim of this technique is to reduce the number of percutaneous trocars required to complete the procedure, by using a flexible endoscope for this purpose.
Methods and procedure: After positioning a percutaneous 12 mm trocar and inducing CO2 pneumoperitoneum, a flexible endoscope was introduced through the trocar to inspect intra-abdominal organs. Simple procedures were performed utilizing the working channel of the endoscope.
Results: The procedure was performed in six patients for diagnosis of chronic abdominal pain or for tumor staging. No complications were reported after a median follow-up of 5 months. It was possible to inspect the intra-abdominal organs, including the surface of the liver, the gallbladder, the stomach, the intestine, the pelvic organs and the free intraperitoneal fluid. It was possible to perform also simple procedures through the working channel, without positioning additional trocars: histological and cytological sampling, removal of simple adhesions, cyst puncture and intraperitoneal lavage.
Conclusions based on the results: Using a flexible endoscope through a single percutaneous trocar makes it possible to perform a diagnostic laparoscopy during which simple therapeutic and diagnostic procedures can be carried out with the same sterility and organ integrity as that provided by a standard laparoscopy.

28 Transanal ileoproctostomy in a human cadaver

Lino Polese, Emanuele Lezoche, Andrea Porzionato, Giovanni Lezoche, Raffaele De Caro, Stefano Merigliano, Lorenzo Norberto

Objective of the study: The technical feasibility of ileorectal by-pass (ileoproctostomy), performed entirely through a transanal access, was previously evaluated and demonstrated in a porcine model. The aim of this study was to verify the technical feasibility of the same operation in a human cadaver.
Methods and procedures: The procedure was carried out in a human male cadaver. A Transanal Endoscopic Microsurgery (TEM) device and endoscopic instruments were utilized.
Results: The study demonstrates that ileorectal bypass through a transanal access is technically feasible in humans. The principal steps of the procedure are:
– TEM device placement;
– rectal perforation above the peritoneal reflection;
– peritoneoscopy using a standard gastroscope;
– grasping the small bowel with retrieval forceps and pulling it through the rectal hole;
– suturing the ileum and the rectum together through the TEM device
– opening the ileal loop followed by endoscopic exploration
Conclusions based on the results: Ileorectal bypass through a transanal access is technically feasible in humans and although still at an experimental stage, it could become a surgical option in the treatment of some types of colonic strictures.

29 Endoscopic minimal invasive methods for drainage of pancreatic cysts and abscesses: 3-year results from a single centre

Omar Al-Mukhtar, Bo Erlandsson, Maria Bergström, Per-Ola Park

Objective of the study: As an alternative to open surgery laparoscopic, endoscopic and interventional radiology has been developed to treat complications of acute pancreatitis. These methods carry less morbidity and mortality than open surgical treatment.
Methods and procedures: During a 3 year period 22 of 478 patients hospitalized with the diagnosis acute pancreatitis at the Department of Surgery, South Älvsborg Hospital, Borås, Sweden developed abscesses or symptomatic cysts.
NOTES-technique: With EUS the abscess/cyst was identified and punctured. Over a guidewire the puncture hole was dilated with a 20 mm CRE-balloon. A therapeutic large channel gastroscope was introduced into the cyst/abscess over the wire for cleaning and necrosectomy. Four 10 F pigtail stents were left in place between the cyst and gastric lumen to secure drainage.
Percutaneous endoscopic technique: The abscess was punctured with the help of external US and a guidewire was introduced. The chanel was dilated with a 20 mm CRE-balloon and a therapeutic large channel gastroscope was introduced over the wire into the cyst/abscess for cleaning and necrosectomy. A 24 F drainage was left in place for drainage and further rinsing.
Results: Out of the 22 patients 10 with abscesses and 7 with cysts were treated with NOTES-technique and 2 were treated with percutaneous endoscopic technique. Two patients were laparotomized due to spontaneous perforation of the abscess into the transverse colon. One of these patients were later drained with NOTES-techniqe duo to a secondary pseudocyst. One patient was excluded duo to pancreatic cancer. Abscesses needed in median 1,5 (1 – 7) interventions while percutaneous drainage needed a median of 3 interventions (2 – 4). The patients were followed by CT-scans. All abscesses/cysts drained with minimally invasive techniques healed without need of surgery.
Complications: One patient died later due to heart failure, one draine migrated into the cyst and was not possible to remove.
Conclusions: Pancreatic abscesses and cysts can safley be drained with endoscopic techniques (NOTES or percutaneous) with low morbidity and mortality.

30 Covered stent placement is a treatment option for anastomotic leakage after gastric bypass surgery

Jorge Alberto Arroyo-Vàzquez, Sari Karhu, Maria Bergström, Per-Ola Park

Introduction: One of the most feared complications after Laparoscopic Gastric Bypass (LGBP) surgery is leakage of the gastro-entero anastomosis, often leading to re-operation with high morbidity. Endoscopic treatment with covered self-expandable metal stents (SEMS) has been proposed as a treatment for these leakages.
Aims & methods: From January 2011 to May 2012, five patients (ages 37 – 58) operated with LGBP at our department presented leakage in the gastro entero anastomosis. Four of the leakages were diagnosed on post-op 2 – 3 days. One patient presented with leakage eight days after surgery. All patients were endoscopically treated with a stent within 12 hours after confirmed leakage. (Wallflex, partially covered, 23/28 × 125 mm). In

four of the patients a diagnostic laparoscopy was performed for drainage. During the procedure a gastroscopy was performed and the stent was placed under laparoscopic control. In one patient leakage was diagnosed during the LGBP and the procedure was converted to open surgery. To secure the resutured anastomosis a stent was placed endoscopically. An abdominal drainage was also placed. In all patients leakage was tested with methylene blue 0 – 1 day after stenting. The first patient was allowed oral intake after 4 days. The following 4 patients were allowed immediate oral intake after leakage test.

Results: No patient showed signs of leakage after stenting. During stenting patient number 3 had a pneumothorax, probably caused by the gastroscopy. He was treated with an additional stent and a chest tube. Three patients needed intensive care (2, 3, 30 days). The stents were changed in two patients after 22 and 26 days, these stents were finally removed after 14 respectively 16 days. The other three stents were removed after 15, 19 and 76 days. Hospital stay was 13 days (median). Three patients without further complications had a hospital stay of 9, 11 and 13 days. Two patients with additional complications, pulmonary embolism and pneumothorax, had a hospital stay of 30 and 42 days. Stent related complications were one stent migration (endoscopically removed) and one minor bleeding.

Conclusion: Stent treatment of anastomotic leakage after LGBP is safe and efficient and allows early oral intake.

31 Trans-gastric pancreatic necrosectomy via fully covered esophageal stent placed by a novel rendezvous technique: A never before described technique

Niket Sonpal MD, Patrick Saitta MD, Gregory B. Haber MD

Patients with acute pancreatitis can develop necrosis and the removal of dead tissue is critical. Typically this debridement is done surgically but it can also be accomplished by EUS-guided endoscopic trans-gastric-necrosectomy (EUS-ETGN). A 53-year-old male developed acute pancreatitis secondary to alcohol consumption. A repeat CT scan at 6 weeks revealed persistent pancreatic necrosis and he continued to have bacteremia. The patient was referred for endoscopic debridement. A linear-echo-endoscope revealed a large hypoechoic collection with mixed echogenicity. The collection was accessed using a 19-gauge needle. A 0.035 guidewire was advanced into the cavity under fluoroscopic guidance and the wire coiled inside what appeared to be a mature cavity. Contrast was injected into the cavity further confirming correct placement of the wire in the cavity of necrosis. The fistula tract was dilated from 6 mm to 12 mm using a through-the-scope balloon and a large release of purulent material confirmed placement. However due to the acute angulation of the gastro-peritoneal fistula, endoscopic access to the necrotic area was not possible. At this time two 10 fr × 5 cm double pig-tail stents were placed. Then during a second procedure a novel access approach was employed. A guidewire was introduced into the fistula tract and advanced into the necrotic cavity. A mini-snare was then advanced through the external drain into the cavity of necrosis. Then using a tandem cannulation catheter the wire was advanced into the snare. This rendezvous technique was then successfully used to carry the wire out through the external drain, and with traction on the wire, we were successfully able to deploy an 18 mm × 6 cm fully covered stent through the cystgastrostomy tract under direct endoscopic and fluoroscopic guidance. This facilitated access to the cavity allowing for subsequent debridement of necrosis. After complete debridement of the cavity, the covered stent was removed and again two pigtail stents were left in its place. EUS-ETGN of infected necrosis in acute pancreatitis appears to be safe treatment option. This novel technique describes how access to the retroperitoneum can be accomplished in the face of difficulty angulation and orientation.

32 Initial experience of glove port technique in single incision laparoscopic cholecystectomy using conventional laparoscopic instruments

Abdelaziz Hassan AM, Mahmoud M, Helmy AH

Introduction: Single-incision laparoscopic surgery is an attractive approach for cholecystectomy. However, its widespread application has many limitations. A significant obstacle of application in developing countries is the expensive and non-affordable specialized single port systems and roticulating instruments.

Objective: To evaluate our initial experience of single incision laparoscopic cholecystectomy (SILC) performed by a single surgeon using the glove port technique and the conventional laparoscopic instruments.

Methodology: 45 patients with symptomatic gall bladder stone disease underwent an elective SILC during the period from October 2011 to March 2012 at Theodor Bilharz Research Institute. Trans-Umbilical single incision glove port access was used. Patient's demographic data, perioperative outcomes, and early postoperative complications were collected and analyzed.

Results: The mean operative time was 47.75 min and the mean estimated blood loss was 14.5 ml. Intraoperative bile leakage due to gall bladder perforation occurred in 4 cases (8.89 %). Troublesome cystic artery bleeding occurred in 2 cases (4.44 %). An intra-operative trans cholecystic cholangiogram was performed in 2 cases and a drain was inserted in 3 cases (6.66 %). No conversion of the technique occurred except in one case (2.22 %) at which additional 5 ml port was used. 41 patients (91.11 %) discharged in the first post-operative day and 4 patients in the 2nd day. Post-operative wound seroma was observed in 2 cases and subumbilical wound hematoma in one case. Three months post-operative wound length was an average of 1.59 cm while patient satisfaction of the surgery was an average of 9.41.

Conclusion: On preselected cases; glove port laparoscopic cholecystectomy (GPLC) using the conventional laparoscopic instruments is feasible and safe with excellent aesthetic results and high grade of patient satisfaction. We consider GPLC a cost effective and convenient alternative to single port laparoscopic cholecystectomy and its scale of application could be widened once enough experience is attained.

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