S001 IMPACT OF MINIMALLY INVASIVE SURGERY ON PERIOPERATIVE OUTCOMES AMONG INFANTS UNDERGOING REPAIR OF CONGENITAL ANOMALIES Jordan C Apfeld, MD; Yuri V Sebastião, PhD; Katherine J Deans, MD, MHSc; Peter C Minneci, MD, MHSc; Center for Surgical Outcomes Research, Nationwide Children's Center

Background: To compare perioperative outcomes among infants undergoing repair of congenital anomalies using minimally invasive (MIS) versus open surgical approaches.

Study Design: Using data from the ACS NSQIP Pediatric (2013-2018), an analysis of procedures for repairs of congenital anomalies was performed. MIS or open repairs for the following 9 congenital anomalies were included: congenital lung lesion (LL), mediastinal mass (MM), congenital malrotation (CM), anorectal malformation (ARM), Hirschsprung disease (HD), congenital diaphragmatic hernia (CDH), tracheoesophageal fistula (TEF), hepatobiliary anomalies (HB), and intestinal atresia (IA). Inverse probability of treatment weights (IPTW) derived from propensity scores were used to estimate the risk-adjusted association between surgical approach and outcomes. Outcomes compared included operative time, length of stay, and postsurgical complications.

Results: A total of 13,402 patients undergoing repairs of congenital anomalies were included (10,723 open; 2,679 minimally invasive). After IPTW, the MIS and open groups were similar in all preoperative characteristics. MIS was associated with longer operative time (Difference: 14 minutes; 95%CI: 10min, 19min) and anesthesia time (16 minutes; 10min, 21min), but with less days on postoperative ventilation (-0.7 days; -1.0d, -0.4d), and shorter length-of-stay (-1.3 days; -2.3d, -0.4d). MIS repairs had decreased risk of having any surgical complications (Risk Difference: -7.5%; -9.3, -5.7), including decreased hematologic complications (-6.5%; -8.2, -4.8) and decreased wound-related complications (-2.6%; -3.6, -1.6). There were no significant differences in the risk of unplanned reoperation by MIS vs open (0.7%; -0.9, 2.4), although MIS was associated with increased risk of unplanned readmissions (1.4%; 1.0, 2.7).

Conclusion: Minimally invasive repair of congenital anomalies is associated with improved perioperative outcomes as compared to an open approach. Additional studies are necessary to compare longer term functional and disease-specific outcomes.

S002 COMPLICATED CASES OF CHOLEDOCHAL CYST WITH PREVIOUS INTERVENTION/SURGERY: IS LAPAROSCOPIC CHOLEDOCHAL CYST EXCISION AND BILIARY RECONSTRUCTION FEASBILE? Sunita Ojha; Santokba Durlabhji Memorial Hospital and Research Institute

INTRODUCTION: Many complications can occur in Choledochal cyst (CDC) before surgery like Preoperative pancreatitis, Rupture/Perforation. Many patients undergo some intervention like ERCP, Laparotomy for perforation of CDC, Laparoscopic cholecystectomy etc. Aim of our study was to evaluate and assess the feasibility and outcome of all such cases of complicated CDC which were admitted to our hospital and underwent laparoscopic surgery for CDC.

MATERIALS AND METHODS: All cases of Choledochal cyst over last five years (2014 to 2019) which had previous interventions like ERCP, percutaneous drainage or previous surgery were included in the study. These cases were evaluated, preoperative investigation, laparoscopic surgery, intraoperative findings, and post-operative outcome were analysed.

RESULTS: Of all the case of CDC from 2014 to 2019 managed at our institution, six cases had previous intervention. Age ranged from 1.5 years to 8 years. Five cases presented to us with previous interventions done at other hospitals. One case had undergone previous laparoscopic cholecystectomy and ERCP stenting, one had laparotomy for biliary peritonitis and ERCP, one had undergone percutaneous drainage of large cyst, one had undergone ERCP, and one had laparoscopic cholecystectomy. One case presented to us as ruptured CDC with massive biliary ascitis and underwent peritoneal drainage. All these cases were operated laparoscopically for CDC excision and hepatico-duodenostomy. Average duration of surgery was 200 minutes. Drain placed in subhepatic region postoperatively was removed within 3-5 days. Bile leak was observed in none. Cases were discharged in 5-7 days postop. One case was readmitted in immediate postop period for nonbilious vomiting which settled with conservative management in two days. In follow up of four months to 3 years patients are doing well with no episodes of cholangitis.

CONCLUSION: Complicated cases of CDC due to previous interventions are expected to be technically tedious to operate laparoscopically. It is challenging to operate with multiple adhesions and distorted anatomy. Special attention should be given to identify the hepatic artery to avoid further complications. Keeping the distorted anatomy in mind with patience and expertise it is feasible to operate on complicated CDC laparoscopically and deliver good outcome.

V001 ROBOTIC EXCISION OF CHOLEDOCHAL CYST WITH HEPATICODUODENOSTOMY Aaron R Scott, MD; Steve Megison, MD; Samir R Pandya, MD; UT Southwestern Medical Center

Clinical History: This is an obese 14-year-old female diagnosed with choledocholithiasis. She underwent ERCP with stone extraction and stent placement and was suspected to have a choledochal cyst. She was lost to follow up for two years. A subsequent MRCP confirmed the diagnosis. She underwent robotic resection of the choledochal cyst.

Operative Technique: The robotic system was docked over the right shoulder. Three (8mm) instrument arms were used in addition to the 12mm optical arm. An additional 5mm assist port was also placed. The cyst was excised and the hepaticoduodenostomy reconstruction was completed.

Hospital Course: She was discharged on day 3. She returned to the ED on day 8 with reflux symptoms which resolved with a proton pump inhibitor and Carafate. At three months she is no longer taking any anti-reflux medications. The surgical pathology was consistent with a choledochal cyst without evidence of malignant transformation.

V002 BALLOON SPHINCTEROPLASTY IN LAPAROSCOPIC COMMON BILE DUCT EXPLORATION: TIPS, TRICKS AND TROUBLESHOOTING

Maggie E Bosley, MD; Kristen A Zeller, MD, FACS; Lucas P Neff, MD, FACS; Wake Forest Baptist Medical Center

Mastery of any surgical technique requires instruction and repetition. When beginning to perform laparoscopic common bile duct explorations, inexperience with the techniques can generate frustrations. Our video demonstrates the balloon sphincteroplasty technique in a stepwise fashion along with some “tips and tricks” to help circumvent anticipated difficulties. Understanding the described set up and simple maneuvers can mitigate friction and drive adoption of both laparoscopic common bile duct exploration and balloon sphincteroplasty.

S003 NORMOKINETIC BILIARY DYSKINESIA: PAIN WITH CCK ON HIDA SCAN PREDICTIVE OF SYMPTOM RESOLUTION Maggie E Bosley, MD[1]; Jillian Jacobson, MD[2]; Michaela W Gaffley, MD[1]; Lucas P Neff, MD[1]; James S Davis, MD[3]; [1]Wake Forest School of Medicine; [2]University of Texas Southwestern; [3]Texas Children's Health

Introduction: Biliary dyskinesia is typically defined as a gallbladder ejection fraction (EF) less than 35% on hepatobiliary iminodiacetic acid scan with cholecystokinin stimulation (CCK-HIDA testing). Cholecystectomy for a hypofunctioning gallbladder in the absence of cholelithiasis has been associated with resolution of biliary colic symptoms. Alternatively, there are a subset of patients in which CCK-HIDA testing reveals a gallbladder EF within normal limits, yet patients continue to experience symptoms. It has been proposed that pain with CCK injection is more predictive of symptom resolution than gallbladder EF itself in traditionally defined biliary dyskinesia. We reviewed our experience with pediatric patients who endorsed pain with CCK injection on HIDA scan, yet had a normal gallbladder EF in the absence of stones.

Methods: With IRB approval, we retrospectively reviewed the records of all pediatric patients with normal HIDA EFs (35-80%) and pain with CCK injection at a tertiary care center over a four year period. Age, sex, BMI, CCK-HIDA results, and post-operative pathology were noted. Resolution of symptoms was determined by subjective patient self-reporting at postoperative visit at 3 weeks.

Results: Seventeen patients met inclusion criteria. Average age 15.2 (range, 12-17 years), median BMI 24.9 (± 4.9). Fifteen patients were female and 2 were male. Average CCK-HIDA ejection fraction was 56.3% (± 11.4) and 100% of patients had pain with CCK injection. 65% of the patients had evidence of chronic cholecystitis and/or cholesterolosis on pathology. Postoperatively, 80% of the patients available for follow up (n=15) reported complete or near complete resolution of symptoms. One patient experienced no pain relief after surgical intervention. Two of the patients endorsed resolution of presenting right upper quadrant pain but continued to have chronic abdominal pain postoperatively.

Discussion: Normokinetic biliary dyskinesia is defined by a normal gallbladder EF (35-80%) without concomitant cholelithasis but with associated pain upon CCK injection on HIDA scan. This clinical entity is not well described in literature but appears to be associated with chronic inflammation and cured by surgical intervention. Laparoscopic cholecystectomy results in resolution of symptoms for a majority of these patients and should be considered in those who experience pain with CCK injection despite normal imaging studies.

S004 CHARACTERISTICS OF PEDIATRIC LATE POSTOPERATIVE COMPLICATIONS AFTER RADICAL OPERATION OF CONGENITAL BILIARY DILATATION (CBD) AND THE STRATEGY FOR BILE DUCTOPLASTY OF HILAR BILIARY DUCT STENOSIS BY LAPAROSCOPIC EXCISION OF CBD

Hiroo Uchida, MD; Takahisa Tainaka, MD; Chiyoe Shirota, MD; Wataru Sumida, MD; Kazuki Yokota, MD; Satoshi Makita, MD; Aitaro Takimoto, MD; Akihiro Yasui, MD; Hizuru Amano; Msamune Okamoto, MD; Yoichi Nakagawa, MD; Akinari Hinoki, MD; Nagoya University Graduate School of Medicine

Purpose: Intrahepatic lithiasis due to biliary duct stenosis are generally believed as the main late postoperative complications after excision of congenital biliary dilatation (CBD). In this study, we characterize pediatric late postoperative complications after radical operation of CBD. Next, our strategy is summarized for resolution of hilar and intrahepatic biliary duct (HIBD) stenosis by laparoscopy.

Methods: Firstly, we retrospectively reviewed the medical records of patients who were treated for late postoperative complications of CBD excision by laparotomy or laparoscopy between 1999 and 2019 at our institution. Secondly, we evaluate how to perform bile ductoplaty for resolution of HIBD stenosis by laparoscopy. HIBD stenosis was defined by a narrowing of the lumen of the bile duct compared with the more peripheral bile duct as detected by preoperative ERCP, or MRCP. During surgery, HIBD stenosis were also detected as membranous structure of HIBD or septum of HIBD.

Results: For 20 years, 27 patients (5 Male, 22 Female) were treated for late postoperative complications. The median age at primary radical surgery was 3.5 (0-14) years old. The median age at treatment of complications was 16 (0-39) years old. The median interval between the primary operation and treatment for complications was 11 (0-36) years. Eighteen patients occurred intrahepatic stones due to HIBD stenosis, and 3 patients had anastomotic stenosis. Four patients were suffering from ileus, and 2 patients got pancreatitis due to intrapancreatic remnant of bile duct. One patient had with refractory cholangitis due to unknown etiology.

The laparoscopic bile ductoplasty for HIBD stenosis from 2013 on was performed at 69% (66/79). In main cases, lateral incision of common hepatic duct was performed for enlarging the anastomotic site. Resection of membranous structure or septum was performed 60% (48/79). Two patients showed anastomotic stenosis after postoperative 1 and 6 years. There are no intrahepatic stones due to HIBD stenosis and no intrapancreatic remnant of bile duct over 1cm in size caused by operative procedures.

Conclusion: This study clarified the main postoperative complications of CBD were caused by HIBD stenosis. Our intensive bile ductoplasty by laparoscopy result in good short-term outcome; however, we must attentively observe the long-term outcome for more than five years.

S005 DIAGNOSTIC LAPAROSCOPY IN INFANTILE CHOLESTATIC JAUNDICE Salma Mani; Samia Belhassen; Nouha Boukhrissa; Meriem Ben Fredj; Sami Sfar; Sabrine Ben Youssef; Sana Mosbahi; Amine Ksiaa; Lassaad Sahnoun; Mongi Mekki; Mohsen Belguith; Department of Pediatric Surgery Monastir

Introduction: Cholestatic liver disease is a significant cause of morbidity and mortality in children. Traditional tests such as ultrasonography and percutaneous liver biopsy are often not sufficiently discriminating. When jaundice persists for more than 14 days postnatally, the early diagnosis of surgical jaundice is important for the prognosis in extrahepatic biliary atresia after draining procedure. Traditional tests such as ultrasonography and percutaneous liver biopsy are often not sufficiently discriminating The aim of this study was to determine the feasibility of laparoscopy and its accuracy and safety in the diagnosis of biliary atresia and thus preventing unnecessary laparotomy in infants whose cholestasis is caused by diseases other than biliary atresia.

Methods: This study was conducted in pediatric surgery department of Fattouma Bourguiba Monastir, from 2000 to 2020. The study included 30 infants with prolonged conjugated hyperbilirubinemia. Their ages ranged from 25 days to 6 months, mean 26 days. They were referred from pediatric medical department and neonatal intensive care unit to exclude biliary atresia. All patients were thoroughly investigated by detailed biochemical and abdominal US. Diagnostic laparoscopy was performed for all cases of this study and cholecystocholangiography was done once the gall bladder was visualised. Liver biopsies were taken in all cases at the end of the procedure.

Results: Nine patients had completely absent gall bladder, so the laparoscopic procedure was terminated and laparotomy was done (Kasai operation). Four patients had small size gall bladder; they underwent cholangiography that showed patent common bile duct with atresia of the common hepatic duct, so laparotomy and Kasai operation was performed. Seventeen children had well-developed gall bladder, cholangiography revealed patent biliary tree, so laparoscopic liver biopsies were taken for histopathology. No perioperative complications or mortality were observed in the patients of this study.

Conclusion: When the diagnosis pediatric cholestasis remains elusive after traditional investigations, cholecystocholangiography is an accurate and simple method for differentiating biliary atresia from hepatocellular causes.

Laparoscopy with laparoscopic-guided cholangiogram may be a valuable method in accurate and earlier diagnosis in an infant with prolonged jaundice.

S006 LAPAROSCOPIC MANAGEMENT OF HYDATID CYSTS IN CHILDREN : COULD IT BECOME THE CURRENT APPROACH ? Yosra Ben Ahmed, MD; Meriem Oumaya; Intissar Chibani, MD; Meriem Marzouki; Tarek Boukesra; Awatef Charieg, MD; Faouzi Nouira, PhD; Said Jlidi; Children Hospital of Tunis

Introduction: Hydatid disease is a common benign condition in our country. Laparoscopic treatment has steadily increased among surgeons from both endemic and non endemic areas. Although early reported laparoscopic treatments of liver hydatid disease were confined to simple drainage, more advanced laparoscopic methods are now possible

The purpose of our study is to evaluate the characteristics and outcomes of patients with hydatid cyst (HC) who were laparoscopically operated.

Methods: We retrospectively analyzed the clinical data of 4 children who underwent laparoscopic surgery for hydatid cysts with different localization at pediatric surgery department B of Children Hospital of Tunis, between august 2017 and December 2019. All operations were performed using one 10 mm optic trocar and two or three working trocars placed in the hypochondriac regions and the epigastrium, according to cyst localization. After exploration, gauze pads impregnated with hypertonic saline were placed around the cyst. The cyst contents were evacuated using a Veress needle, and the cyst was refilled with hypertonic saline that remained for 5 min followed by aspiration. The cyst wall was punctured and daughter vesicles in the cyst were aspirated completely. The excised pericyst wall, germinal membrane, and gasses were removed through the 10-mm trocar using an endobag.

Results: 4 patients underwent laparoscopic surgery for hydatid cysts. There were 2 male and 2 female with a mean age of 7.2 years (range, 4-10). The cyst was discovered incidentally in 50 % of children. Abdominal ultrasonography (US) confirmed an hydatid cyst of the liver in 75 % of patients. Computed tomography (CT) was necessary to better characterize the mass. It was associated in one case with hydatid cyst of the spleen and with a pulmonary hydatid cyst in the other case. An isolated hydatid cyst of the spleen was identified . The hydatid cysts were solitary in all patients. Most of the cysts on USG were Gharbi type I (75% Of patients).

Operation types of laparoscopic surgery were as cystectomy and then preservation of the pericyst in 2 patients (Hydatid cysts of the liver and the kidney) or partial resection of the pericyst (partial pericystectomy) in 2 patients . No Cysto-biliary communication was found. Intraperitoneal drains were indicated in all patients and was removed after 48 hours.

No Conversion to open surgery was necessary. Median hospital stay was ranged from 72h to 96h.

The average follow-up duration was 8 months. There was no mortality.

Conclusion: Laparoscopic management of hydatid cysts can be performed safely and successfully. Compared to open surgery, laparoscopic treatment can play an important role in improving the post-operative recovery and reducing the morbidity .

V003 MULTI-QUADRANT ROBOTIC SURGERY THROUGH A SINGLE HIDDEN Maria C Mora, MD; Karen A Diefenbach, MD; Katherine A McCracken, MD; Marc P Michalsky, MD, MBA; Nationwide Children's Hospital

The utilization of contemporary robotic technology, with enhanced degrees of freedom, has enhanced surgeons' ability to efficiently operate in multiple quadrants of the abdomen. This quality has proven beneficial in colorectal and gynecologic oncology procedures. Using the daVinci Xi System we were able to complete a cholecystectomy as well as an ovarian cystectomy via a single site approach. The patient is a 14-year-old female who initially presented with gallstone pancreatitis. Diagnostic imaging revealed a left ovarian dermoid (3.6x3.9cm in greatest dimension). Due to testing positive for COVID-19, a combined robotically-assisted cholecystectomy with left ovarian cystectomy was scheduled to be performed electively following resolution of her viral pulmonary symptoms. The patient tolerated the procedure well and was discharged to home on the day of surgery. She had an uneventful recovery. The single incision allowed for easy triangulation when changing from pelvic to upper abdominal dissection and allowed for a quick recovery.

S007 TRANSANAL USE OF FLUORESCENT URETERAL STENTS FOR PELVIC RESECTION Katherine C Ott, MD; Timothy B Lautz, MD; Julia E Grabowski, MD; Seth D Goldstein, MD; Ann and Robert H. Lurie Children's Hospital, Division of Pediatric Surgery

Near infrared technology is increasingly available in the modern pediatric operating room. In addition to venous injection of indocyanine green for vascular and biliary applications, recent advances allow instrumentation to be visualized, which have opened up a host of new potential applications. The Spy system by Stryker Endoscopy (San Jose, CA) includes 6 Fr IRIS ureteral stents that have become popular with adult colorectal surgeons and urologists, but no dedicated pediatric infrared hardware is currently available. We report an innovative application of these stents by removing the 0.75-mm fibers from the flexible sheath and performing transanal deployment to illuminate the rectum in two neonatal colorectal operations.

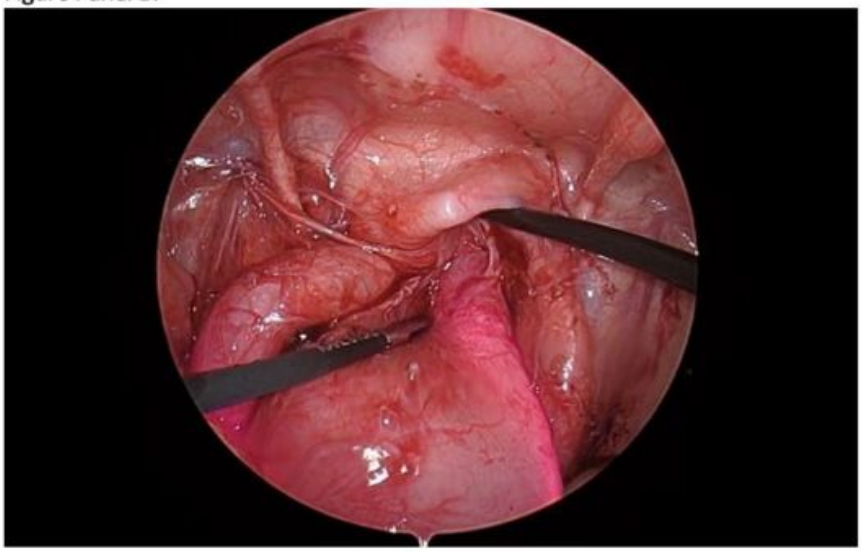
The first patient was a 4-month-old female undergoing re-resection of a sacrococcygeal teratoma due to incomplete resection at birth via abdominal approach for an Altman Type IV lesion. In prone jackknife position, the re-operative tissue planes inferior to the coccyx were difficult to dissect. To better delineate the rectum, insertion of an infrared ureteral stent was attempted; however, the stent was too stiff to easily traverse the distal rectum. Thus, the inner fibers were removed from two stents, taped together, and easily advanced per anus well into the rectum. Using the open field camera (Figure Panel A), additional tissue outside of rectal serosa was identified and resected, facilitating a more complete dissection.

The second patient was an infant male with an anorectal malformation comprising imperforate anus with a prostatic rectourethral fistula. As a full-term newborn he underwent diverting colostomy; subsequently at 6 weeks of life he underwent definitive repair. Cystoscopy was performed, confirming the preoperative distal colostogram suggestion of a fistula from the prostatic urethra to the rectum. The working channel of the scope and the fistula itself were too small to accommodate the full ureteral stent. Therefore, the infrared fibers were removed and passed through the fistula easily under visualization. Subsequently, the fistula was clearly identified at laparoscopy (Figure Panel B), informing appropriate dissection margins. The infant was turned prone for posterior sagittal anorectoplasty and the open field camera additionally located the fistula, expediting safe ligation without injury to the prostate or urethra.

Fluorescence guided surgery is an innovative new technique that can aid pediatric surgical care. The possibilities for this technology, are ever-growing as adjunctive tools for identifying and protecting structures of interest. The development of NIR instruments, such as lighted ureteral stents, represents an exciting advance that does not rely on indocyanine green. These novel uses of the ureteral stent components may trigger additional commercial development, and will need to be assessed on a larger scale to determine ideal applications and limitations. This report serves as an initial description of their use in this manner and provides an exciting new application of the technology.

Figure Panel A.

Figure Panel B.



S008 IMAGE-GUIDED PEDIATRIC SURGERY USING INDOCYANINE GREEN (ICG) FLUORESCENCE IN LAPAROSCOPIC AND ROBOTIC SURGERY Ciro Esposito; Alessandro Settimi; Fulvia Del Conte; Mariapina Cerulo; Vincenzo Coppola; Alessandra Farina; Giuseppe Autorino; Rachele Borgogni; Maria Escolino; Federico II University of Naples, Naples, Italy

Purpose: This study aimed to report our experience with indocyanine green (ICG)-guided near-infrared fluorescence (NIRF) in pediatric laparoscopy and robotics and evaluate its usefulness and technique of application in different pediatric pathologies.

Methods: ICG technology was adopted in 76 laparoscopic and/or robotic procedures accomplished over a 24-month period (January 2018-January 2020): 40 (37 laparoscopic, 3 robotic) left varicocelectomies with intra-operative lymphography; 13 (10 laparoscopic, 3 robotic) renal procedures: 7 partial nephrectomies, 3 nephrectomies and 3 renal cyst deroofings; 12 laparoscopic cholecystectomies; 5 robotic tumor excisions; 3 laparoscopic abdominal lymphoma excisions; 3 thoracoscopic procedures: 2 lobectomies and 1 lymph node biopsy for suspected lymphoma.

Results: The ICG solution was administered intravenously in all indications except for varicocele and lymphoma in which it was respectively injected into the testis body or the target organ. Regarding the timing of the administration, the ICG solution was administered intra-operatively in all indications except for cholecystectomy in which the ICG injection was performed 15-18 hours before surgery. No conversions to open or laparoscopy occurred. No adverse and allergic reactions to ICG or other postoperative complications were reported.

Conclusions: Based upon our 2-year experience, we believe that ICG-guided NIRF is a very useful tool in pediatric MIS to perform a true imaged-guided surgery, allowing an easier identification of anatomy and an easier surgical performance in difficult cases. The most common applications in pediatric surgery include varicocele repair, difficult cholecystectomy, partial nephrectomy, lymphoma and tumors excision but further indications will be soon discovered. ICG-enhanced fluorescence was technically easy to apply and safe for the patient reporting no adverse reactions to the product. The main limitation is represented by the specific equipment needed to apply ICG-guided NIRF in laparoscopic procedures, that is not available in all centers whereas the ICG system Firefly® is already integrated into the robotic platform.

S009 INTRAOPERATIVE USES OF NEAR-INFRARED FLUORESCENCE SPECTROSCOPY IN PEDIATRIC SURGERY: A SYSTEMATIC REVIEW

Heba Alghoul, Dr[1]; Farah Al Farajat, Dr[2]; Osaid Alser, Dr[3]; Andrea Rogers Snyr, Ms[4]; Carroll Harmon, Dr[5]; Nathan Novotny, Dr[6]; [1]Faculty of Medicine, Islamic University of Gaza, Palestine; [2]Faculty of Medicine, Jordan University of Science and Technology, Jordan; [3]Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA; [4]Beaumont Children's, Royal Oak, MI, USA; [5]Division of Pediatric Surgery, Department of Surgery, Jacobs School of Medicine and Biomedical Sciences, University in Buffalo, NY, USA; [6]Monroe Carell, Jr. Children's Hospital at Vanderbilt, Nashville, TN, USA

Background: The applications of near infrared spectroscopy (NIRS) fluorescent imaging in surgery are growing. However, the best intraoperative uses of NIRS in pediatric surgery have yet to be elucidated. This study aimed to systematically review the literature to summarize the intraoperative uses of NIRS in pediatric surgery as well as its advantages and limitations.

Methods: A search strategy was developed by an expert librarian based on the Population, Exposure, Comparison, Outcomes and Study framework. A PRISMA-compliant literature search was conducted in PubMed, Embase, Scopus, and Web of science from inception to February 2020. Title and abstract and then full-text screening against eligibility criteria was performed independently by three reviewers, and consensus was achieved by the senior author. The Oxford Centre for Evidence Based Medicine tool was used to evaluate the level of evidence of included studies.

Results: Reviewers identified a total of 7,685 unique articles, of which 54 were included in the analysis. Most articles included were either case-series studies (n=35, 65%) or case reports (n=11, 20.4%). Most of the studies (n=46, 85.2%) were level 4 on the Oxford Centre for Evidence Based Medicine scale. The most common uses of NIRS (particularly with indocyanine green) were to visualize the biliary tree and to identify primary and metastatic malignant tissues. Other applications include perfusion angiography in transplants and urologic surgery, identification of leak and necrosis following bowel anastomosis, endocrine surgery, tracheoesophageal repair, and lymphatic surgery. Some evidence has shown several advantages of the introduction of NIRS in pediatric surgery including reduction of operative time and intra/post-operative complications across different intra-operative uses. Moreover, NIRS imaging can help in detection of malignant tissues that can be missed by conventional imaging and minimizing the need to dim the operating room lights during surgery therefore facilitating dissection. However, NIRS has important limitations such as difficulty in identification of the biliary tree in obese patients and those with severely inflamed gallbladder, detection of small and deeply localized malignant tissues, as well as the cost associated with the purchase of NIRS equipment.

Conclusions: NIRS imaging is a promising modality that can be used intraoperatively to augment different pediatric surgical procedures - most commonly those involving the hepatobiliary system, cancer resection, and perfusion. NIRS has some important advantages and limitations compared to conventional surgery, however, more robust studies are required to evaluate the outcomes and cost-effectiveness of NIRS in pediatric surgery.

S010 ARTIFICIAL INTELLIGENCE DRIVEN AUTOMATED DETECTION OF PYLORIC STENOSIS IN ULTRASOUND IMAGING Alejandra M Casar Berazaluce, MD[1]; Ravi Yadav, MS[2]; Smruti Deoghare, MS[2]; Alexander T Gibbons, MD, MS[3]; Surya Prasath, PhD[2]; Beth A Rymeski, DO[2]; Todd A Ponsky, MD[2]; [1]Cincinnati Children's Hospital Medical Center, University of Texas Health Science Center at San Antonio; [2]Cincinnati Children's Hospital Medical Center; [3]Akron Children's Hospital

Background: Pediatric subspecialty expertise is a limited resource in healthcare, with access to pediatric radiologists and surgeons limited to <50% of the world's population. Artificial intelligence methods are being increasingly utilized to augment physicians' capabilities including computer-aided diagnosis. We sought to evaluate the feasibility of creating automated detection tools for pediatric surgical conditions through a pyloric stenosis ultrasound proof-of-concept model.

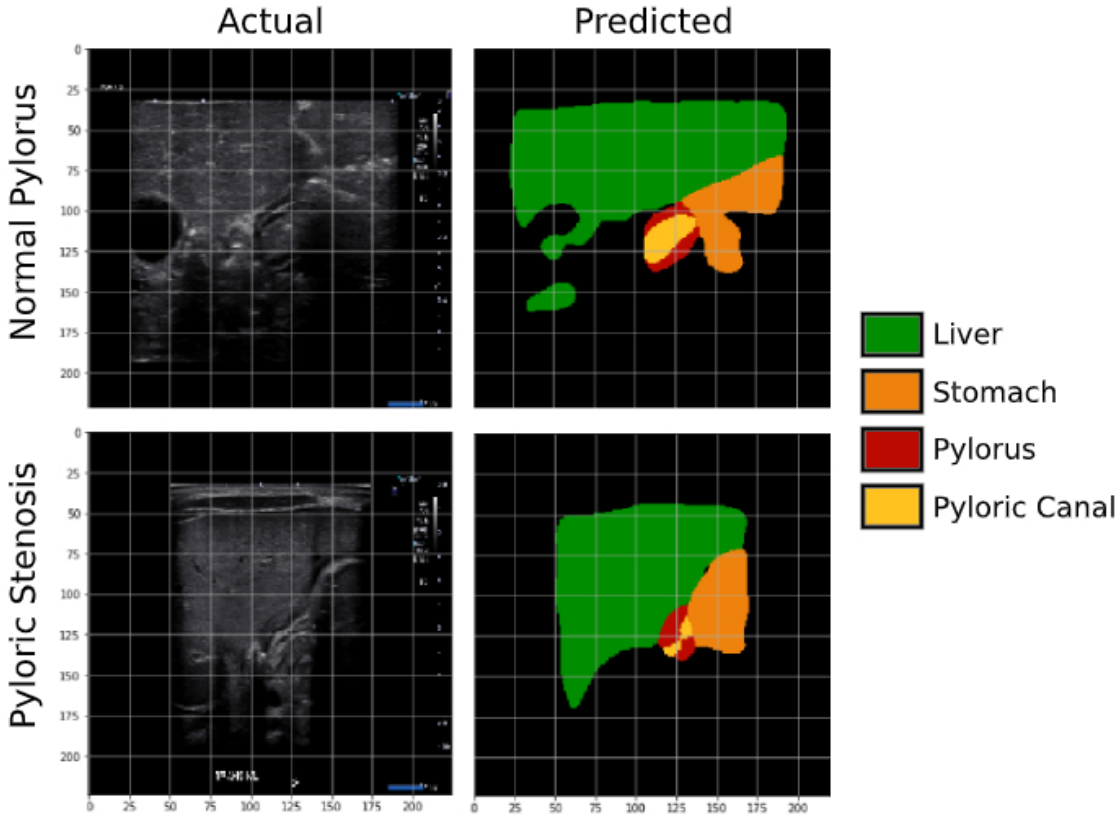
Methods: Still images from abdominal ultrasounds interpreted by expert radiologists at a quaternary children's hospital were retrospectively acquired, de-identified, and annotated. A total of 120 images were included in the first stage of development of this model. We benchmarked state-of-the-art deep learning convolutional neural networks (VGG16, U-Net) for semantic segmentation and binary classification of pyloric stenosis.

Results: Our first segmentation model achieved 85% pixel-to-pixel accuracy, a satisfactory result that continues to improve as further iterations of the model are run. This detailed computer-generated read clearly facilitates the visual identification of the pathology in question, as shown in Figure 1A. The simple version of our classification model without segmentation, displayed in Figure 1B, had 90% accuracy. This represents an excellent result given that complex model customization can proceed from a highly accurate starting point. As these basic models can segment and classify the images with high accuracy independently, a blended customized model – currently underway with expansion to a sample size of >700 and an additional expert annotator – is projected to achieve >99% accuracy.

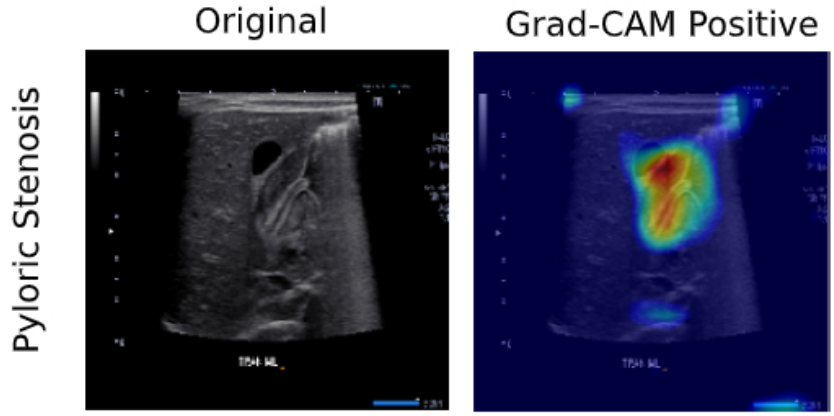
Conclusion: Computer-assisted image-diagnosis of pediatric surgical conditions is feasible. Our independent models displayed high accuracy in segmentation and classification of two-dimensional ultrasound imaging for pyloric stenosis, producing automated labels that allow for clear visual identification of relevant structures and an automated wet read. Further fine tuning of the hyperparameters for the models and data processing enhancements are currently underway and expected to be complete by the end of the year.

Figure 1:

A. Segmentation



B. Classification



S011 LAPAROSCOPY-ASSISTED ENDORECTAL PULL-THROUGH FOR PEDIATRIC HIRSHPRUNG'S DISEASE – 16-YEAR EXPERIENCE WITH 724 PATIENTS

Igor Poddoubnyi, MD, PhD[1]; Michael Kozlov[2]; Mahmud Ismailov[1]; Anatole Kotlovsky[3]; Kirill Tolstov[4]; Vladimir Trounov[4]; Anton Malashenko[4]; [1]Department of Pediatric Surgery, A.I. Yevdokimov Moscow State University of Medicine and Dentistry, Moscow; [2]Department of Pediatric surgery, Morozov Central Children's Hospital, Moscow; [3]Depatment of Pediatric Surgery, Z.I. Krouglaya Central Children's Hospital, Oryol; [4]Department of Pediatric Surgery, Federal Scientific and Clinical Center of Children and Adolescents FMBA of Russian Federation, Moscow

Background and Objective: The laparoscopic approach to pediatric Hirshprung's disease (HD) continues to be advanced. The objective is to present our single institution extensive experience in treatment of HD in children using a modified laparoscopy-assisted endorectal pull-through (LAEPT) technique.

Material and methods: The data of 724 patients aged between 2 weeks and 17 years having undergone LAEPT for the established Hirshprung's disease during 2003-2019 was retrospectively reviewed.

The operative technique in our modification entailed laparoscopic ultralow rectal mobilisation and transanal endorectal dissection both performed synchronically (by two surgeons) whilst leaving a very short muscular cuff.

Results: LAEPT as a primary procedure was performed in 524 patients - group 1 and as redo surgery - in 200 patients (after previous surgery done elsewhere) - group 2.

Extensive agangliosis, including subtotal and total, was present in 21.2% patients, of group 1 and 35.5% - group 2.

All procedures were completed with zero conversion rate. The operative time ranged from 25 to 70 minutes in group 1 and 45 - 240 minutes in group 2. Intraoperative complications were encountered in 1.5% in group 2 and none – in group 1. The overall rate of postoperative complications which required further procedures was 2.3% in both groups and lower in group 1 (1.9%) than in group 2 (3.5%).

Functional long-term outcomes followed up in 300 patients were assessed as satisfactory considering continence and constipation in 86.4% of 250 patients in group 1 and 70% of 50 patients in group 2.

Conclusion: LAEPT in our modification is safe and efficacious for treatment of HD of all anatomical types in children of any age. In line with ERNICA guidelines 2020, to achieve superior outcomes we recommend our LAEPT technique be used in pediatric surgery centres specialised in colorectal disorders.

S012 POSTOPERATIVE HIRSCHSPRUNG ASSOCIATED ENTEROCOLITIS. REVIEW OF 153 PULL-THROUGH PATIENTS TREATED OVER 30 YEARS. Masahiro Takeda[1]; Go Miyano[1]; Nana N Tanaka[1]; Yusuke Shigeta[2]; Geoffrey J Lane[1]; Takashi Doi[2]; Tsubasa Takahashi[3]; Masahiko Urao[1]; Tadaharu Okazaki[1]; Takanori Ochi[1]; Hiroyuki Koga[1]; Atsuyuki Yamataka[1]; [1]Department of Pediatric General & Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan; [2]Division of Pediatric Surgery, Department of Surgery, Kansai Medical University, Osaka, Japan; [3]Department of Pediatric Surgery, Nippon Medical School Musashi Kosugi Hospital, Tokyo, Japan

Introduction: Hirschsprung associated enterocolitis (HAEC) is a serious complication of Hirschsprung's disease (HD). Many reports fail to analyze correlations between grading of severity, duration of treatment, duration of elevated C-reactive protein (CRP) and left-shift leukocytosis and different types of HD specifically. We present our experience of postoperative HAEC in 153 consecutive rectal/rectosigmoid type HD (RHD) patients over 30 years (1980-2019) treated using a pull-through (PT) procedure we developed.

Methods: Our PT procedure is distinguished by total excision of the posterior aganglionic rectal muscle cuff. Laparoscopy-assisted PT (LPT) was introduced in 1997 and used to treat 96 of our series. Data was obtained by reviewing all medical records retrospectively.

Results: The overall incidence of HAEC preoperatively was 27 episodes in 153 patients (17.6%); there were 13 episodes postoperatively in 10/153 patients (6.5%). There was no correlation between preoperative HAEC and postoperative HAEC (p=0.08). HAEC episodes were classified using the grading scale presented in Pediatr Surg Int:33:517-521, 2017 as follows; grade I: possible HAEC requiring outpatient management with oral antibiotics or rehydration as required (n=4); grade II: definitive HAEC requiring inpatient management with parenteral antibiotics or intravenous fluids (n=8); and grade III: severe HAEC presenting with shock (n=1).

In this cohort, the median age at PT was 6.4 months. Postoperative HAEC episodes occurred at a mean of 7.3 months (range: 1.8 months-1.3 years). Presenting symptoms included explosive diarrhea (76.9%: 10 episodes), fever (76.9%: 10 episodes), abdominal distension (69.2%: 9 episodes), and bloody stools (7.7%: 1 episode with grade III HAEC). While symptomatic, serum biochemistry data were abnormal with left-shift leukocytosis or elevated CRP.

There were 18 patients with post-PT complications (11.8%); of 5 with symptoms of anal obstruction, 3 developed postoperative HAEC (protrusion of colon from the anus (n=1; grade I HAEC), coloanal anastomosis stenosis requiring bougienage (n=1; grade II HAEC), and transitional segment colon PT (n=1; grade III HAEC). The difference between 3/5 patients with obstructive symptoms developing HAEC (60.0%) and incidence of postoperative HAEC in patients without obstructive symptoms being 7/148 (4.7%) was statistically significant (p=0.002). Two cases with recurrent HAEC had no post-PT complications.

For treatment, mean duration of intravenous antibiotic administration was 8.8 days (range: 6.0-14.0) in grade I HAEC (n=2 episodes) and grade II HAEC (n=6 episodes); mean duration of rectal irrigations was 7.1 days (range: 1.0-14.0) in grade I HAEC (n=2 episodes), grade II HAEC (n=6 episodes), and grade III HAEC (n=1 episode); and mean duration of nothing by mouth (NBM) was 4.9 days (range: 2.0-9.0) in all grade II and grade III episodes. Mean overall hospitalization was 14.3 days (range: 7.0-40.0). Grades of HAEC, duration of symptoms, duration of intravenous antibiotic administration, duration of rectal irrigations, and duration of NBM were not correlated (Figure 1).

Conclusions: To the best of our knowledge, there are no reports focusing specifically on postoperative HAEC in RHD patients. We attribute our low incidence of HAEC to total resection of the posterior aganglionic rectal muscle cuff. The reported grading system for HAEC requires further assessment for accuracy and consistency.

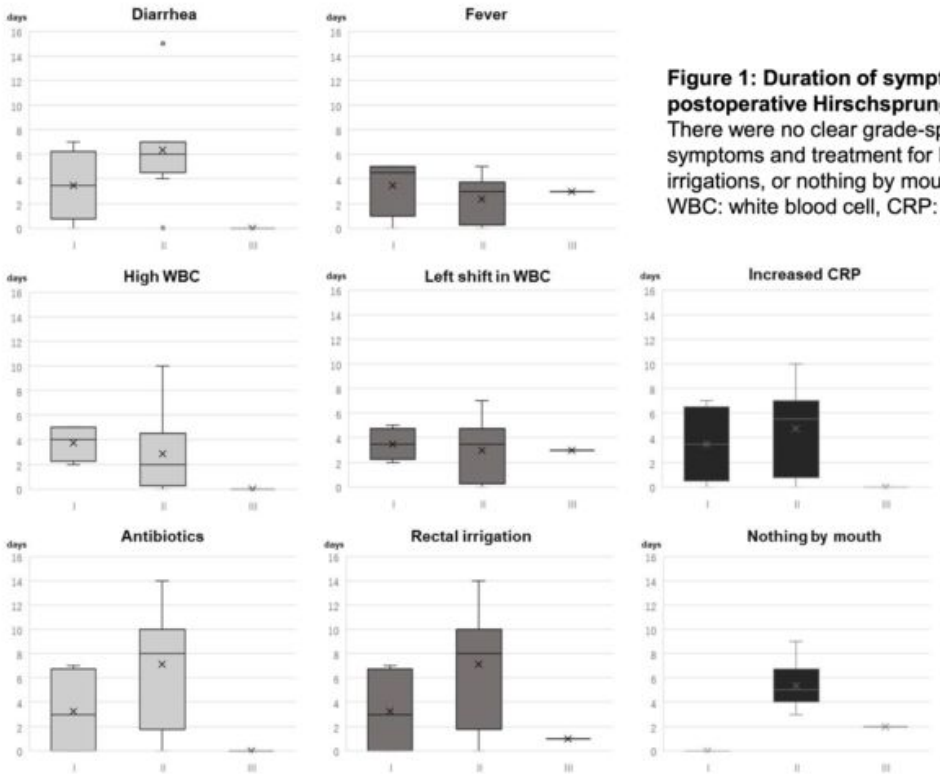


Figure 1: Duration of symptoms and treatment versus grade of postoperative Hirschsprung associated enterocolitis (HAEC)
There were no clear grade-specific correlations between duration of symptoms and treatment for HAEC (including intravenous antibiotics, rectal irrigations, or nothing by mouth).
WBC: white blood cell, CRP: C-reactive protein

V004 ROBOTIC SOAVE CUFF EXCISION IN A PATIENT WITH OBSTRUCTIVE SYMPTOMS AFTER TRANSANAL ENDORECTAL PULL-THROUGH (TEP) Emre Divarci, Associate Professor; Hilmican Ulman, MD; Ahmet Celik, Professor; Orkan Ergun, Professor; Geylani Ozok, Professor; Ege University Faculty of Medicine Department of Pediatric Surgery

A long aganglionic Soave cuff could cause obstructive symptoms in some of the patients after transanal endorectal pull-through (TEP). Secondary operations in this region could be challenging due to difficult exposure of the deep pelvis and adjacent hard adhesions.

A 16-year-old girl was admitted with obstructive symptoms caused by a long residual seromuscular cuff demonstrated on imaging studies. Firstly, a laparoscopic cuff “incision” was performed but symptoms recurred in the early postoperative period. Therefore, a tertiary procedure was conducted by robotic surgery to “excise” the Soave cuff. Robotic surgery gave the advantages of an excellent 3-D exposure and ergonomic freedom with 540-degrees flexibility during surgery. Residual Soave cuff was excised from the anterior portion of 270-degrees safely without injuring surrounding tissues. Obstructive symptoms were resolved after surgery.

Robotic surgery is seen as a safe and efficient surgical option in patients who require the excision of obstructive seromuscular cuff after TEP.

S014 LAPAROSCOPIC-ASSISTED ANORECTOPLASTY FOR INTERMEDIATE TYPE RECTOVESTIBULAR FISTULA: A COMPARISON STUDY WITH MODIFIED ANTERIOR SAGITTAL ANORECTOPLASTY Yan Zhou; Long Li; Hang Xu; Anxiao Ming; Mei Diao; Capital Institute of Pediatrics

Purpose: To study the safety, efficacy, and aesthetics of laparoscopic-assisted anorectoplasty (LAARP) in comparison with modified anterior sagittal anorectoplasty (MASARP) in the management of intermediate anorectal malformations (ARMs) in girls.

Methods: Twenty-two ARMs patients with IRVF who successfully underwent LAARP between October 2017 and August 2020 were reviewed. The outcomes were compared with those of 33 patients who underwent MASARP between March 2015 and September 2019. The short-term outcome as regard wound infection, anal stenosis, rectal prolapse, vaginal injury as well as cosmetic appearance was evaluated. Results were compared using the Student t-test, nonparametric statistics, or chi-square test.

Results: The two groups were comparable in terms of demographics. No significant difference was observed between LAARP and MASARP groups in terms of transfusion rates and postoperative hospital stays. The median operative time of the LAARP group was significantly longer than that of MASARP group (113.5 vs. 85 min; $p < 0.001$). The median length of the resected rectal in the LAARP group was also longer than that in the MASARP group (5 vs. 3 cm; $p < 0.001$). In comparison with the LAARP group, complications in MASARP group were more frequent (4.5% vs. 33.3%, $p = 0.028$), including wound infections (0% vs. 12.1%), mild mucosal prolapse (0% vs. 9.1%), rectal prolapse (4.5% vs. 12.1%), recurrent fistula (0% vs. 6.1%), and rectal retraction (0% vs. 3.0%). Cosmetic satisfaction was higher in the LAARP group; however, the difference was not statistically significant.

Conclusion: LAARP technique is a safe and effective way to overcome the characteristic of a high and deep rectal pouch in IRVF patients. LAARP offers an alternative method of correction for the IRVF with good visualization of the SMC and may diminish the risks of wound infection and vaginal injury.

Keywords: Anorectal malformation; Vestibular fistula; laparoscopic-assisted anorectoplasty; Anterior sagittal anorectoplasty

V005 COMPLETE LAPAROSCOPIC REPAIR OF LONG CHANNEL CLOACAL MALFORMATION Wendy Jo Svetanoff, MD, MPH; Nicholas E Bruns, MD; Ashli A Lawson, MD; Julie A Strickland, MD, MPH; John Gatti, MD; Rebecca M Rentea, MD, MS; Children's Mercy Hospital - Kansas City

We present a 13-month female who underwent complete laparoscopic repair of her long channel cloacal malformation. A 3D cloacogram identified a common channel length of 4cm, a high rectal insertion, no contrast or patent vaginal communication with the common channel, and a sacral ratio equal to 0.70.

The rectum was dissected until the fistula was identified entering the urogenital sinus, and the distal end was closed with an Endoloop. The vagina was laparoscopically separated from the urogenital sinus. A vaginal septum was excised. The lateral peritoneal attachments were mobilized for a tension-free vaginoplasty. A laparoscopic-assisted anorectoplasty was performed, pulling through the distal rectum into a well-defined sphincter complex. A vaginoplasty and urethroplasty was performed, incorporating a posterior omega-shaped flap for reconstruction. Indocyanine green fluorescence Angiography (ICG-FA) was utilized to confirm tissue perfusion to the rectum, vagina, and urethra.

The child was discharged on post-operative day four and is doing well.

S015 A COMPARISON OF SEXUAL FUNCTION IN MALE PATIENTS WITH ANORECTAL MALFORMATIONS BETWEEN THE CONVENTIONAL APPROACH AND THE LAPAROSCOPIC APPROACH Tetsuya Ishimaru, MD, PhD; Hiroshi Kawashima, MD; Kentaro Hayashi, MD; Hironobu Oiki, MD; Kanako Omata, MD; Yohei Sanmoto, MD; Maho Inoue, MD, PhD; Saitama Children's Medical Center

Aim: The primary goal of anorectoplasty in patients with anorectal malformation (ARM) is to achieve fecal continence, and more attention tends to be paid to the management of bowel movement during follow-up. Several studies have reported that the incidence of sexual disorders, such as erectile dysfunction and ejaculatory anomalies are high in male patients with ARM, but little is known about these problems that may manifest long after anorectoplasty in adolescence or adulthood. In particular, studies on the impact of laparoscopically assisted anorectoplasty (LAARP) on sexual function are scarce. The aim of this study was to compare the incidence of erectile dysfunction and ejaculatory anomalies between male ARM patients treated with the conventional approach and those with LAARP.

Methods: Male patients who had undergone repair of high- or intermediate-type ARM at our center and aged ≥ 15 years as of November 2020 were enrolled. Patients with intellectual disability and chromosomal disorders were excluded. Our hospital was founded in 1983, and standard sacroperineal anorectoplasty was routinely performed. LAARP was introduced as the standard procedure in 2000. Medical records of the outpatient clinic were retrospectively reviewed, and questionnaires were sent in November 2020. Data of patients with erectile dysfunction, ejaculatory anomalies, sacral deformity, and spinal cord pathologies were collected.

Results: Among the 22 patients who underwent sacroperineal anorectoplasty (Group S), we received answers from 6 cases, 7 patients were lost to follow-up, and 9 patients did not respond. Eight of the 17 LAARP patients responded, but 1 patient was lost to follow-up and 8 patients did not respond. The median age at the time of replying was 23.5 [18–29] years in Group S and 19 [15–20] years in Group L. The incidence of sacral deformity and spinal cord pathology was 0/6 (0%) and 2/6 (33%) in Group S, and 2/8 (25%) and 1/8 (13%), respectively. None of the patients had erectile dysfunction, but 2 cases in Group S (33%) and 3 cases out of 8 patients in Group L (38%) had ejaculatory anomalies.

Conclusions: Although the results of this study are preliminary and the number of patients was small, the incidence of sexual dysfunction in male ARM patients might be higher than that in the normal population. Furtherer studies with a large number of cases are required to clarify whether LAARP is more beneficial to prevent these problems compared to the conventional procedure. Patients might abscond from their follow-up visit as they grow up; therefore, providing parents and the patients with proper information on this issue is important.

Comparison of sexual function

	Sacroperineal anorectoplasty (n=6)	**Laparoscopically assisted anorectoplasty (n=8)**
Patient age [years]	23.5 [18–29]	19 [15–20]
Spinal cord pathology (%)	0/6 (0)	2/8 (25)
Sacral deformity (%)	2/6 (33)	1/8 (13)
Erectile dysfunction (%)	0/6 (0)	0/8 (0)
Ejaculatory anomaly (%)	2/6 (33)	3/8 (38)

S017 A NOVEL COMBINED ENTERSCOPY AND LAPAROSCOPY APPROACH TO PREVENT URETHRAL COMPLICATIONS IN MANAGEMENT OF RECTOURETHRAL FISTULA Mei Diao, Professor; Long Li; Rui-Jie Zhou; An-Xiao Ming; Department of Pediatric Surgery, Capital Institute of Pediatrics

Purpose: For the last 20 years, laparoscopy management of anorectal malformations (ARM) has been challenged due to the development of postoperative urethral diverticulum or injury caused by the imprecise transection of rectourethral fistulae, particularly rectobulbar fistulae situated deep in the pelvis. We have developed a combined approach of enteroscopy and laparoscopy for intraluminal incision of a rectourethral fistula.

Methods: We retrospectively reviewed 47 ARM patients who underwent surgical corrections using the combined approach between January 2019 and June 2020. A gastroscope (Fujinon EG-600WR gastroscope, outer diameter 9.3 mm, Japan) was inserted into the distal rectum through the distal colostomy stoma to visualize the rectourethral fistula intraluminally. We used a gastroscope as an enteroscope because it was the finest endoscope with an instrument channel (2.8 mm in diameter) that allows for Micro-knife insertion (knife sheath: 2.3 mm in diameter). After insufflation, the rectourethral fistula looked like the underside of an opened umbrella, as the rectal mucosa columns converge to the urethral opening. The junction between the fistular mucosa and the urethral epithelium could be clearly identified. The fistular mucosa was transected at the junction site, using a Micro-knife (MicroKnifeTM XL triple lumen needle knife, 5.5 F, 1.8 mm in diameter, 5 mm in length, 20 watt, Boston Scientific, US). The electro-incision was carried out along the mucosal layer. After transection, the urethral mucosa was retracted. The rectal mucosa was then completely excised under the guidance of a laparoscope, to prevent diverticulum formation. The muscular cuff was left behind to prevent injury of the urethra. Laparoscopic-assisted anorectoplasty was carried out. Early post-operative and subsequent follow-up results were evaluated.

Results: The median follow-up period was 12 months. The average age at surgery was 3.18 ± 0.64 months. The mean operative time of a single incision laparoscopic-assisted anorectoplasty was 1.19 ± 0.29 hours. The time for intraluminal incision of the fistula was shortened from 14 minutes to 2 minutes. No patients underwent a conversion. The average postoperative hospital stay, time to full feeds and placement of an anal tube were 10 days, 1 day, and 5 days respectively. No urethral diverticulum, urinary injury, wound infection, rectal retraction, anal stenosis or rectal prolapse was encountered in the cohort.

Conclusions: The combined enteroscopy and laparoscopy approach offers precise management of rectourethral fistulae. It could effectively obviate urethral complications, eliminating the obstacles of laparoscopy application in the management of ARMs.

S018 FACTORS TO DISTAL BOWEL DILATATION IN MALE CHILDREN WITH CONGENITAL ANORECTAL MALFORMATION Hang Xu; Long Li; Yan Zhou; Anxiao Ming; Mei Diao; Capital Institute of Pediatrics

Purpose: The aim of our study is to explore the factors that might be related to the distal bowel dilation of male children with ARMs.

Methods and materials: 84 male patients with intermediate ARMs or high ARMs from July 2018 to July 2020 were respectively reviewed in this study. Of them, 36 patients with a dilated distal bowel diagnosed by a SS1/RR1 higher than 0.64 (16 intermediate ARMs with rectobulbar fistula and 16 high ARMs with rectoprostatic fistula or rectovesical fistula) were accessible for this study. On the augmented-pressure distal colostogram imaging studies, minimum diagram of the fistula, fistula length, maximum diagram of the dilated bowel were chosen to be the evaluation standards. A lateral transverse diameter of the second sacral vertebra was used to present the dilation degree. Data of all the APDC studies of the patients were prospectively measured and independently analysed by three readers (three experienced staff members of paediatric radiology, A, B and C)

Result: The average age of patients to undergo APDC was 4.28±1.63 months. The results showed that the maximum distal bowel dilatation diameter/transverse diameter of the second sacral vertebra in the high group was (3.34±1.10) higher than that in the middle group (2.62±0.40). The independent sample *t* test results indicated that there was a statistical difference distal bowel dilatation degree between the patients with intermediate ARMs and high ARMs ($p<0.05$). Eventually, a Pearson correlation analysis was used to evaluate the relationship between distal bowel dilatation and the minimum fistula diagram, and there was a moderate negative correlation between the two variables ($r=-0.446$, $p=0.010$). Therefore, distal bowel dilatation was associated with the minimum fistula diagram.

Conclusion: Position of the distal rectum pouch and minimum fistula diagram seems to be factors to distal bowel dilation. Severe distal bowel dilation usually occurred in patients with a higher distal rectum pouch or a narrower fistula. This might give a hint for performer in preoperative preparation and surgical protocol of anorectoplasty.

Keywords: Anorectal malformations; Distal bowel dilation; Fistula

S019 ROL OF MIS IN CLOACAL RECONSTRUCTION. RESULTS OF A SINGLE CENTER Maria Marcela Marcela Bailez; Natalia Ordonez, MD; Victor Dibenedetto; Lucila Alvarez, MD; Javier Ruiz; Garrahan Childrens Hospital Buenos Aires

We present a prospective analysis of 32 consecutive patients with cloaca treated with MIS combined with different approaches to achieve reconstruction

M&M: We divided them in 5 groups according to the combined approach in addition to the lap rectal pull through (LRPT) required for simultaneous genitourinary reconstruction. Those successfully reconstructed with a LRPT and a perineal approach(Group 1). The UGS treatment was achieved using either a partial mobilization or a laparoscopic vaginal pullthrough according to the length of the channel and proximal urethra .Group 2 includes those who underwent a combined posterior sagittal approach (PSARP) .When a laparotomy was required they were considered Group 3. Patients with a simultaneous vaginal replacement were grouped as special cases (Group 4) and MIS redocloacas were included in Group 5.

Results: Uterovaginal duplication was observed in 50 to 85 % of patients .

Group 1: LPT + Partial Urogenital Sinus Mobilization (UGM)or Lap Vaginal Pullthrough was achieved in 41% (14p). The mean age was 115,63 months (9 -204) and the mean length of the cloaca channel was 4.44 cm (4-9 cm). Sacral RATIO average was 0.3 (0,1-0.6) and 3 had partial sacral agenesis. Mean operative time was 379,54 minutes (250-490). Two patients presented mild dehiscence without sequela and as a long-term complication 1 had a rectal prolapse and 2 mild vaginal stenosis.

G2: LPT+ PSARP Four patients (11%) underwent an additional PSARP. The mean age was 115,63 months (9 -204) and the mean length of the channel 3.8 cm (1-4 cm). Sacral RATIO average was 0.4. Mean operative time 419 minutes (360-510). Two had long-term complications, 1 recto-vaginal fistula that was fixed laparoscopically and 1 a vaginal stenosis.

G3: LRP + Pffannestiel

In 17% (6p) a Pffannestiel laparotomy was requiredfor: :resection of a dilated rectosigmoid, need of a vaginal switch technique and ureteral reimplant. The mean age was 33.45 months (22-55) and length of cloacal channel was 5.8 cm (5.5-7). Sacral RATIO average was 0.5 (0.5-0.8). Mean operative time was 421 minutes (400-670). One patient was reoperated to treat a vaginal stenosis.

G4: Cloacas + Vaginal Agenesis

Three patients underwent a simultaneous vaginal replacement .We left the distal rectum as vagina in 1 and used ileum in 2. Their mean age was 88 months (16-58) and the average length of the cloacal channel was 4.5cm (4-5). Sacral RATIO was 0.8 (0.81-0.83). Mean operative time was 421 minutes (340-600). One patient presented a mild dehiscence.

G5: Redo Cloacas

Five patients (14%) were referred for a reoperation. All had an obstructed asymmetric functional Mullerian structure. Three (60%) had an umbilical Mitroffanoff. The mean age was 88 months (26-140). The average of the length of cloacal channel was 5.8 (3.5-7). Mean operative time was 421 minutes (340-600).

Conclusion: Near half of the cloacas treated underwent a successful whole reconstruction with combined MIS and perineal approach with a reasonable operative time (Group1). Laparoscopy had been specially useful in redocases to define the anomaly and drain or resect a mullerian structure or complete a redo pullthrough under laparoscopic vision avoiding going through the bowel augmented bladder with a laparotomy.

V006 LAPAROSCOPIC HEMIHISTERECTOMY IN A DIDELPHIC UTERUS WITH UNILATERAL CERVICAL ATRESIA Soledad Heredia, PhD; German F Falke, PhD; Daniel R Russo, PhD; Sofia Marchionatti, PhD; Leandro B Berberian, PhD; Constanza Abdenur, PhD; Anahi Salomon, PhD; Gustavo Rebagliatti, PhD; Austral Hospital

Herlyn-Werner-Wunderlich syndrome is a rare and underdiagnosed congenital anomaly of the urogenital tract involving Müllerian ducts and Wolffian structures.

It includes: uterus didelphys, obstructed hemivagina and ipsilateral renal agenesis. However, only few variants of OHVIRA are known

Female, 11y, atends to the emergency room experiencing cyclical abdominal pain since menarche appeared (five months ago with regular menstrual cycles)

Ultrasound showed a Uterus didelphys, and a distended endometrial cavity filled with complex fluid with low level internal echoes, diagnosis of hematometra was made. Left kidney was absent.

MRI pelvis demonstrated uterus didelphys, left cervical atresia resulting in distended left endometrial cavity.

The patient underwent laparoscopic left hemihysterectomy. One 5mm camara port and two working ports 5mm were used. There were no intra o postoperative complications

She had uneventful postoperative stay with resolution of symptoms and resumption of normal menstruation and was discharged on postoperative day 1 without complications, with hormonal therapy

V007 WRAPPING THE MACE: LAPAROSCOPIC CECAL FUNDOPLICATION FOR ANTEGRADE ACCESS REFLUX Wendy Jo Svetanoff, MD, MPH; Rebecca M Rentea, MD, MS; Children's Mercy Hospital - Kansas City

We present the case of a 14 year old male with anorectal malformation - rectourethral fistula, who presented with incontinence of his Malone antegrade continence enema (MACE). He was tolerating his flush regimen but noted incontinence (reflux through the MACE) of both saline and stool in between flushes. Thus, a laparoscopic cecal fundoplication was recommended. A 5mm incision was placed in the left upper quadrant to gain abdominal access since the MACE was located in the umbilicus. The cecum and terminal ileum were mobilized until the cecum could be wrapped around the base of the appendix without tension. The 360-degree wrap was created incorporating cecum, appendiceal wall, and cecum on the opposite side of the appendix. A 10-French coude catheter was inserted past the wrap to ensure patency. At one year follow-up, the patient denies any further MACE leakage and remains free of accidents or streaking.

S021 LAPAROSCOPIC APPROACH TO INFLAMMATORY BOWEL DISEASE IN CHILDREN - 15-YEAR EXPERIENCE Igor Poddoubnyi[1]; Michael Kozlov[2]; Mahmud Ismailov[1]; Anatole Kotlovsky[3]; Elmira Alieva[4]; Vladimir Trounov[4]; Kirill Tolstov[4]; Valentin Sitkov[1]; Anton Malashenko[4]; [1]Department of Pediatric Surgery, A.I. Yevdokimov Moscow State University of Medicine and Dentistry, Moscow; [2]Department of Pediatric surgery, Morozov Central Children's Hospital, Moscow; [3]Depatment of Pediatric Surgery, Z.I. Krouglaya Central Children's Hospital, Oryol; [4]Department of Pediatric Surgery, Federal Scientific and Clinical Center of Children and Adolescents FMBA of Russian Federation, Moscow

Background and Objective: The laparoscopic approach to pediatric Inflammatory bowel disease (IBD) remains somewhat underused. The objective was to appraise our single institution broad experience in laparoscopic surgery for IBD in children.

Material and methods: The data of 115 patients with IBD aged between 4 and 17 years was retrospectively reviewed following laparoscopic procedures undertaken during 2005 t? 2019.

Results: In total there were 62 patients with Crohn's disease (CD) and 53 – with ulcerative colitis (UC).

In the CD series, the following one-stage intestinal resections were carried-out: ileo-caecal with endo-stapled side-to-side ileo-colic anastomosis in 42 cases, jejunal with intracorporal endo-stapled side-to-side anastomosis -11, colonic with endo-stapled side-to-side anastomosis – 2, ultralow anterior with trans-anal sutured colorectal anastomosis - 4, subtotal colectomy – with straight ileorectal anastomosis – 3. In the UC series, there was proctocolectomy with straight ileo-anal anastomosis performed as a one-stage procedure in 7 cases and as a two- or three- stage procedure – 46 cases, including 17 emergencies.

All procedures were successfully completed with the resultant zero conversion rate.

There was no perioperative mortality. The overall postoperative morbidity was 16.5%: 16.1% and 16.9% of cases in the CD and UC series respectively. The most serious complications requiring further surgical procedures in the CD series were ileo-colic anastomotic leak in one case and stricture of colorectal anastomosis in one case. The most common complication in the UC series was stricture of ileo-anal anastomosis in four cases - treated conservatively with dilatations. Remarkably, after proctocolectomy small bowel obstruction occurred in only one case and functional outcomes considering faecal continence were assessed as satisfactory or acceptable in all these patients.

Conclusion: In our experience, the laparoscopic approach to IBD in children is safe and efficacious ultimately providing for the best possible patient outcomes with reasonably minimal complications. Along with MIS benefits it therefore is our choice rather than analogous open surgery.

S022 INTRAOPERATIVE ENDOSCOPIC ASSISTANCE AS AN ADJUNCT TO MINIMALLY INVASIVE SURGERY IN PEDIATRICS Carlos García-Hernández, MD; Lourdes Carvajal-Figueroa, MD; Christian Archibaldo-García, MD; Ariadna Alvelais, MD; Sergio Landa-Juarez, MD; Hospital Infantil Privado

Introduction: The advantages of minimally invasive surgery in children are well known, never the less the disadvantages described are: loss of binocular vision, different spatial perception, impossibility of direct palpation in reoperations or complex surgeries of the upper digestive tract, adequate identification of structures and digestive leaks. These drawbacks can be associated with a greater number of complications, making surgery less safe and leading to longer surgical time.

The objective of this study is to demonstrate that simultaneous endoscopic approach in laparoscopic procedures facilitates a safe and correct performance of procedures in upper digestive pathology of children.

Methods: Retrospective and descriptive study in a single hospital center. We revised 20-year-old records of patients who underwent endoscopic assistance during minimally invasive surgery for resolution of digestive pathology in children. Age, weight, sex, diagnosis, type of operation, intraoperative findings, surgical time, procedure performed, modification of the original procedure, complications and postoperative evolution were analyzed.

Results: From 2000 to 2020, 83 patients, ages 1 month to 20 years, with diagnosis of peptic stenosis 9, achalasia 23, embryonic remains 4, re-fundoplications 42, esophageal duplication 2, mesenteric clamp 2 and giant gastric hemangioma 1 were treated.

Forty fundoplications were performed, 11 Collis-Nissen, 23 Heller´s myotomy, 4 esophageal resections with anastomosis, 2 duplication resections, 2 gastrojejunal anastomoses and 1 gastric resection for a giant hemangioma.

With intraoperative endoscopy, 2 esophageal and 5 gastric perforations were detected and repaired at that time and short esophagus in 10 children, the patency of the anastomoses was confirmed in 6 and in the case of the Collis-Nissen procedure, the endoscope served as a splint to construct the neo-esophagus and rule out the presence of fistulas.

In re-operations, despite the scarring process, in all cases it favored the identification of the esophagus. There were no complications associated with the upper gastrointestinal endoscopy procedure.

Discussion: Minimally invasive surgery in Pediatrics is now applied with greater frequency and in a greater number of conditions, with excellent results, however it presents some spatial and tactile limitations that in some procedures can condition complications, in this study we find that when this is practiced simultaneously with a digestive endoscopy in surgeries of the upper digestive tract it facilitates the identification of the organs as well as the dissection of these tissues. Likewise, it allows identifying the extension of different diseases as well as verifying the integrity of the tissues and the anastomoses, which adds security to the minimally invasive procedure.

Conclusion: Digestive endoscopy is an excellent adjunct to minimally invasive surgery of the upper gastrointestinal tract in Pediatrics, which facilitates the procedure and makes it safer

V008 PER-ORAL PYLOROMYOTOMY James Wall, MD; Auriel August, MD; Maheen Hassan, MD; Stanford

A 12-year-old male with a history of autism spectrum disorder and oral aversion presented with intolerance of gastric feeds with abdominal pain and bloating. His work-up revealed delayed gastric emptying and a hypertensive pylorus. He was initialy managed with Erythromycin but could not tolerate the medication due to side effects. He underwent both pyloric dilation and pyloric botox which both offered temporary relief of symptoms. Given center expertise in Per-Oral Endoscopic Myotomy, we offered an endoscopic Per-Oral Pyloromyotomy (POP). The POP procedure was performed in 134 minutes. Post operatively the patient was kept NPO for the first 24 hours. On post-op day 1, he underwent an upper GI study which confirmed a sealed tunnel and increased pazsage of contrast into the duodenum compared to pre-operative imaging. At 6-month follow-up he was tolerating full bolus gastric feeds without symptoms. POP is feasible in the pediatic population and needs further study.

S023 IMPLEMENTATION OF ENHANCED RECOVERY PROTOCOLS REDUCES OPIOID USE IN PEDIATRIC LAPAROSCOPIC HELLER MYOTOMY Olivia A Keane, MD; Goeto Dantes, MD; Kurt F Heiss, MD; Emory University

PURPOSE: Enhanced recovery protocols (ERPs) have shown to be effective means of standardizing and improving the quality of surgical care in adults and pediatric colorectal surgery patients. Our purpose was to retrospectively compare outcomes before and after implementation of ERPs in children undergoing Heller myotomy for achalasia.

METHODS: A pediatric-specific ERP was used for children undergoing laparoscopic Heller myotomy starting in July 2017 at two pediatric surgery centers within the Children's Healthcare of Atlanta system. A retrospective review of 8 patients undergoing Heller myotomy between the periods of July 2014 through July 2017 was performed as a control. This cohort was compared to 15 patients managed post-ERP implementation between July 2017 and July 2020. All patients aged 0-18 years old were included in the data collection. Patients who met criteria all had a diagnosis of achalasia and were similar in age, ranging from 3 to 19 years old. Outcomes of interest investigated included number of ERP interventions received, opioid use, narcotics at discharge, date of regular diet, length of stay (LOS), and readmissions.

RESULTS: Time to regular diet and LOS were comparable between the pre- and post-ERP cohorts. There was however a significant decrease in opioid use both while in the hospital and at time of discharge. Mean morphine equivalent use was 4.50 mg in the pre-ERP cohort and 1.94 mg in the post-ERP cohort. Furthermore, 8 out of 15 (53%) patients in the post-ERP cohort received no narcotics during the admission compared with only 1 out of 5 (20%) patients in the pre-ERP cohort. Only 1 out of 15 (6.67%) patients in the post-ERP cohort was discharged with a prescription for narcotic medication, while 6 out of 8 (75%) in the pre-ERP cohort were discharged with a narcotic prescription.

CONCLUSION: The use of pediatric-specific ERP in children undergoing laparoscopic Heller myotomy surgery is safe and effective and leads to a significant reduction in opioid use during admission and in the number of narcotics prescribed at time of discharge.

S024 PEDIATRIC GASTROSTOMY TUBE PLACEMENT: LESS COMPLICATIONS WITH LAPAROSCOPIC APPROACH Rebecca A Saberi, MD[1]; Gareth P Gilna, MD[1]; Antoine J Ribieras, MD[1]; Alessia C Cioci, MD[1]; Eva M Urrechaga, MD[1]; Joshua P Parreco, MD[2]; Eduardo A Perez, MD[1]; Juan E Sola, MD[1]; Chad M Thorson, MD, MSPH[1]; [1]University of Miami, DeWitt Daughtry Family Department of Surgery, Division of Pediatric Surgery; [2]Lawnwood Regional Medical Center, Department of Trauma and Critical Care Surgery

Purpose: Gastrostomy tube (GT) placement in the pediatric population may be performed via open, laparoscopic (lap), and percutaneous endoscopic (PEG) approaches. There are no nationwide studies comparing outcomes by approach.

Methods: The Nationwide Readmissions Database from 2010-2014 was used to identify patients ≤18 years (excluding newborns) who underwent GT placement. Demographics, hospital characteristics, and outcomes were compared by GT approach using standard statistical analysis. Results were weighted for national estimates.

Results: There were 3278 patients (41% female, age 3 ± 5 years) identified who underwent GT placement. The most common approach was open (40%), followed by PEG (32%), and lap (28%). The majority of patients were <1 year (67%), had a diagnosis of gastroesophageal reflux disease (53%), and a history of prematurity (52%). Lap was the preferred approach in patients <1 year (91% vs. 66% open vs. 46% PEG, p<0.001), while PEG was utilized more often in patients with a Charlson Comorbidity Index ≥1 (26% vs. 22% open vs. 21% lap, p=0.044). GT-related complications were highest with an open approach (Table 1).

Readmission within 30-days and 1-year were 18% and 43%, respectively. GT approach did not affect 1-year readmission rates (44% lap vs. 44% open vs. 43% PEG, p=0.773), but 30-day readmission was slightly more common following the lap approach (20% vs. 19% open vs. 16% PEG, p=0.036). Readmission for GT-related complications were again highest following an open approach (Table 1). When excluding patients who also had a fundoplication at the time of GT placement, the rates of open, PEG, and lap were 51%, 45%, and 4%, respectively. In this subset, the rate of GT-related complications at readmission were similar between GT approach (2.3% open vs. 2.3% lap vs. 2.2% PEG, p=0.993), but the incidence of conversion to gastrojejunostomy or jejunostomy was higher following an open approach (3.8% vs. 2.3% PEG vs. 0% lap, p=0.039).

Conclusion: Laparoscopic gastrostomy tube placement is currently performed less often than open or endoscopic approaches in pediatric patients. However, the laparoscopic approach is associated with fewer GT complications in both the short and long term.

Table 1. Comparison of open, laparoscopic, and percutaneous endoscopic approaches to gastrostomy tube placement.

	OPEN n=1315 (40%)	**PEG** n=1041 (32%)	**LAP** n=923 (28%)	**p-value**
Index Admission				
GT Infection	6.2%	0.2%	1.3%	<0.001
GT Mechanical Complication	3.3%	1.2%	0%	<0.001
GT Any Complication	10.2%	2.7%	3.8%	<0.001
1-Year Readmission				
GT Infection	0.5%	0%	0.2%	0.046
GT Mechanical Complication	1.5%	2.0%	0%	<0.001
GT Any Complication	2.1%	2.0%	0.4%	<0.001
Conversion to GJ or J	5.0%	2.3%	2.3%	0.294

OPEN (open gastrostomy tube); LAP (laparoscopic gastrostomy tube); PEG (percutaneous endoscopic gastrostomy tube); GT (gastrostomy tube); GJ (gastrojejunostomy); J (jejunostomy)

S025 MODIFIED LAPAROSCOPIC GASTROSTOMY TUBE PLACEMENT IN CHILDREN: DOES SUBCUTANEOUS SUTURE TYPE MATTER?

Alicia G Sykes, MD; James M Prieto, MD; Hariharan Thangarajah, MD, MPH; Karen M Kling, MD; Benjamin A Keller, MD; Romeo C Ignacio, MD; David A Lazar, MD; Division of Pediatric Surgery, Department of Surgery, University of California San Diego

Background: Laparoscopic gastrostomy tube (GT) placement carries the risk of early tube dislodgement, and is often modified with subcutaneously-tunneled transabdominal tacking sutures that can aid in tube replacement if necessary (Figure). However, this modified approach results in buried sutures that may increase the risk of surgical site infection (SSI). The purpose of this study was to evaluate SSI rates for various types of transabdominal tacking sutures used in modified laparoscopic GT placement.

Methods: A single-institution, retrospective review was performed of all patients undergoing laparoscopic GT placement using the modified technique between September 2016 and March 2020. Patients were stratified into groups based on the suture type used. The primary outcome was SSI within 30 days of surgery. Secondary outcomes included other post-operative complications. Demographic and perioperative data were analyzed using a chi-square test with Bonferroni correction.

Results: During the study interval, 114 modified laparoscopic GT placements were performed at a median age of 9.5 months (interquartile range 3 months – 3 years). There were no differences in perioperative antibiotic use between groups. Eleven patients (10%) developed an SSI and all were treated with antibiotics alone. No SSIs were observed with the use of poliglecaprone suture (i.e. Monocryl, n=46). By comparison, higher rates of SSI were observed with the use of polyglactin (i.e. Vicryl, n=17) and polydioxanone (i.e. PDS, n=51) suture (18% polyglactin vs 16% polydioxanone vs 0% poliglecaprone, $p<0.05$). No differences were observed in rates of early postoperative dislodgement, leakage, or granulation tissue (Table).

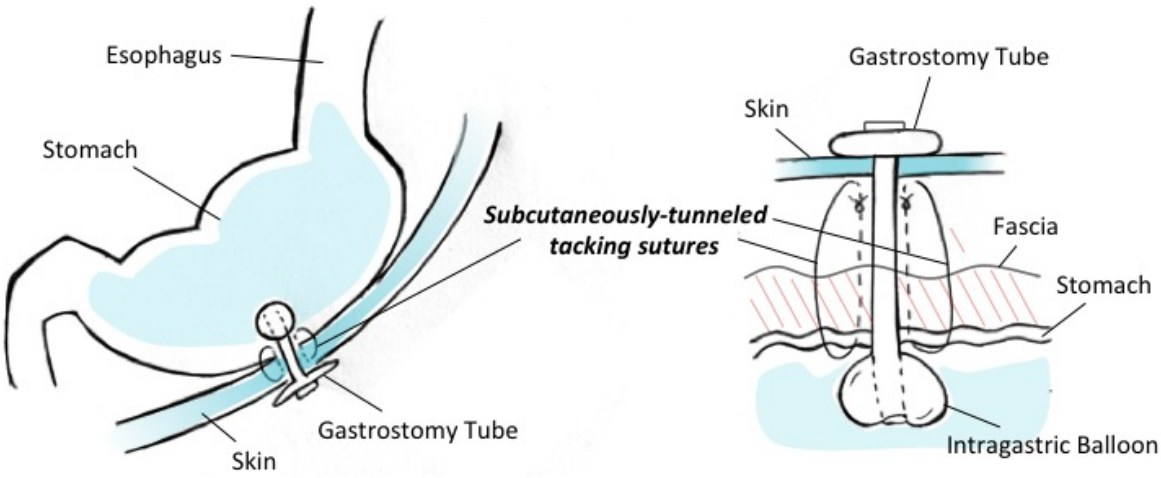
Conclusions: Braided or long-lasting monofilament transabdominal tacking sutures may increase the risk of SSI following modified laparoscopic gastrostomy tube placement. In this cohort, the use of poliglecaprone suture (i.e. Monocryl) was associated with zero SSIs and similar rates of postoperative dislodgement, leakage, and granulation tissue.

Table: Postoperative complications by suture type

	Poliglecaprone ("Monocryl", n=46)	Polydioxanone ("PDS", n=51)	Polygalactin ("Vicryl", n=17)
Surgical site infection	0%	16%*	18%*
Dislodgement	9%	18%	12%
Leakage	4%	14%	12%
Granulation Tissue	33%	31%	47%

*$p<0.05$ compared to poliglecaprone by chi-square test with Bonferroni correction

Figure: Illustration depicting placement of subcutaneously-tunneled tacking sutures



S026 SIZE MATTERS: EARLY GASTROSTOMY BUTTON DISLODGEMENT IN CHILDREN Paul M Jeziorczak, MD, MPH[1]; Riley S Frenette, BA[2]; Joan E Lee, BS, BA[3]; Sarah C Coe, BSE[3]; Charles J Aparahamian, MD[1]; [1]Children's Hospital of Illinois; [2]A.T. Still University- Kirksville College of Osteopathic Medicine; [3]University of Illinois College of Medicine Peoria

Background: Gastrostomy button (g-tube) complications are typically minor and site related with major complications related to dislodgement prior to tract establishment. Previous studies have evaluated both technical and educational opportunities for dislodgement. However, with the recent adoption of 12fr gastrostomy buttons; size of tube has not been evaluated. There is limited research on the efficacy and dislodgement rates of 12 and 14 Fr g-tubes within the previously mentioned early dislodgement window (<42 days post-surgery).

Methods: A retrospective study at a children's hospital from June 1, 2013 – May 25, 2020 was performed. All patient encounters occurred in the Pediatric Surgery Clinic or in the emergency department. A total of 888 patient encounters were identified, with a final dataset of 835 being used for analysis. The 53 excluded encounters were removed due to sizes other than 14fr or 12fr. A subset of 21 patients was evaluated based on early dislodgement status. Chi-squared and two-tailed T-test analyses were used to test for significance between groups ($p<0.05$)*.

Results: The early dislodgment rate is low at 2.5% (21/835). There was a significant impact of g-tube size on dislodgement rates. When evaluated by g-tube size, 12fr g-tubes are nearly 4 times more likely to dislodge before 6 weeks than 14 fr g-tubes (3.56% v. 0.91%). Additionally, the average age of 12 Fr patients that dislodged early (2.17 years) was significantly lower than that of the population for 14 Fr patients (8.33 years).

Table 1. Early G-tube button dislodgements

G-tube size	**12 fr**	**14 fr**
Total encounters (dislodged)	506 (18)	329 (3)
Dislodgement rate	3.56%*	0.91%*
Average age ±SEM (years)	2.17 ±1.00*	8.33 ±1.67*
Replacement requring surgical intervention	11.1%	0%

Conclusions: There is a significant difference in early dislodgment rate and age at early dislodgement for children with a 12 Fr gastrostomy button compared to a 14 Fr. This data suggests a trade-off of the smaller balloon in 12 Fr gastrostomy buttons and potential for more limited use in our smallest children. Targeted education (hospital staff and families), along with elective change sooner than 6 weeks are potential opportunities in the care of these children.

S027 WEIGHT LOSS AFTER SLEEVE GASTRECTOMY IN CHILDREN 14 YEARS AND YOUNGER Numa P Perez, MD[1]; Cornelia L Griggs, MD[2]; Jennifer R DeFazio, MD[3]; Jeffrey L Zitsman[3]; [1]Massachusetts General Hospital; [2]MassGeneral Hospital for Children; [3]New York-Presbyterian Morgan Stanley Children's Hospital

Background: Obesity is a national health epidemic increasingly affecting adolescents and young children. While bariatric surgery is an established therapeutic option in adults and adolescents, its short and long-term outcomes in younger children, specifically those under 15, is underreported.

Methods: 46 children age of 14 and younger with morbid obesity who underwent laparoscopic sleeve gastrectomy (SG) were evaluated over a 9-year period (2011-2020). Patient characteristics, comorbidities, operative outcomes, and long-term follow-up were evaluated by univariate analyses.

Results: Median age at entry into the program was 13.5 years and at SG was 14.1 [IQR 13.3 – 14.7]. Eleven patients younger than 13 underwent SG. Most patients were female (67.4%), 50% White, 37.0% Hispanic, and 13.0% Black. Average total duration of follow up was 1.2 years. There were no operative mortalities. Two patients required early re-exploration for post-operative complications. One patient was readmitted within 30 days for dehydration and thiamine deficiency. All patients experienced a net loss in weight and body mass index (BMI). Although BMI fluctuated at intervals of follow up, mean % excess BMI loss was 16.2% at 6 months (N=46), and 25.5% at 24 months (N=10), which corresponded to a Z-score decrease of 0.4 and 0.8 respectively (Table 1). Idiopathic intracranial hypertension, depression, and obstructive sleep apnea were among comorbidities that improved as early as 6 months.

Conclusions: Bariatric surgery is a safe and effective method of achieving weight loss in the pre-pubertal period. Although it is not without complications in this population, resolution of comorbidities occurred without mortality or significant morbidity.

Table 1: Cohort Weight Loss

Weight Loss	Time from surgery 6 months N = 46	12 months N = 18	18 months N = 12	24 months N = 10
Z-score decrease (mean ± SD)	0.4 ± 0.3	0.8 ± 0.7	0.9 ± 0.7	0.8 ± 0.6
BMI decrease (Kg/m^2)	7.1 ± 3.4	11.1 ± 4.8	11.6 ± 4.6	10.7 ± 3.7
% Excess BMI loss*	38.4 ± 24.6	64.7 ± 34.5	71.2 ± 35.3	69.3 ± 33.4
% Total Body Weight loss	16.2 ± 7.0	25.6 ± 11.2	25.1 ± 12.0	22.8 ± 9.1

* Excess BMI defined as current BMI minus 85th percentile per CDC charts for age and sex

S028 ROBOTIC-ASSISTED VERTICAL SLEEVE GASTRECTOMY IN ADOLESCENTS: DO BMI LIMITS APPLY? Maria C Mora, MD; Karen A Diefenbach, MD; Marc P Michalsky, MD, MBA; Nationwide Children's Hospital

Background: Robotic-assisted vertical sleeve gastrectomy (VSG) has been shown to have comparable outcomes compared to laparoscopic VSG. Recent data suggests that metabolic and bariatric surgery (robotic and laparoscopic) in patients with BMI≥50kg/m2 have a higher risk of adverse events compared to those with BMI<50kg/m2. The aim of this study was to compare the outcomes of robotic-assisted VSG in adolescents with a BMI above and below 50kg/m2.

Methods: A retrospective analysis of all adolescents undergoing robotic-assisted VSG between January 2014-October 2020 at a single pediatric tertiary healthcare institution was performed. Subjects were categorized based on BMI; Group 1 (BMI<50kg/m2) or Group 2 (BMI≥50kg/m2). Data collection included patient demographics, pre-operative BMI, comorbidities, hospital length of stay (LOS), total operative time, access time (total time for port-placement), 30-day complications, and 30-day readmissions. Analysis was performed using chi-square, Fisher's Exact, and student t-test.

Results: Total of 100 subjects (Group 1 N=66 and Group 2 N=46) were included. No differences in age or ethnicity were detected (Table1); however, they did differ in gender with a higher female predominance (p=0.026). Mean operative times (Group 1 = 122.7min vs. Group 2 = 121.2min) and access times (Group 1 = 19.2min vs. Group 2 = 19.7min) were similar between both groups. Thirty-day readmissions and complication rates were similar between groups (p=0.124); however, there was a higher prevalence of hospital readmission in Group 1.

Conclusion: While recent data demonstrate an increased likelihood of adverse events occurring among patients with BMI≥50kg/m2 undergoing robotic surgery, we observed no differences in intraoperative or early post-operative outcomes as well as overall operative time based on BMI in this robotic-assisted pediatric cohort. Larger prospective studies are needed to confirm these findings.

Table 1

	Group 1 BMI<50 N = 66	Group 2 BMI≥50 N = 46	p-value
BMI, kg (Mean, SD)	44.67,±3.5	55.96,±6.2	0.019
Age (Mean, SD)	16.98,±1.9	17.43,±1.7	0.524
Gender (n, %)			0.026
Male	5, 7.6%	11, 24%	
Female	61, 92.4%	35, 76%	
Ethnicity (n, %)			0.780
Biracial	7, 10.6%	7, 15.2%	
Black	17,25.8%	14, 30.4%	
Hispanic	2, 3.0%	1, 2.2%	
White	40, 60.6%	24, 52.2%	
Operative Time (min) (mean, SD)	122.7,±18.2	121.2,±18.3	0.3
Access Time (min) (mean, SD)	19.2,±5.3	19.7,±8.4	0.149
LOS days (mean, SD)	1.8,±1.0	1.85,±1.3	0.400
Complications (n, %)			0.124
Hospital Readmission	6, 9.0%	3, 6.5%	
Post-Operative Vomiting	5, 7.5%	0	
Stricture	1, 1.5%	2, 4.3%	
Leak	0	1, 2.2%	

S029 THE EFFECT OF BOTULINUM TOXIN IN EXPERIMENTAL HYPERTROPHIC PYLORIC STENOSIS Mehmet Sarikaya; Ilhan Ciftci; Nejat Unlukal; Tamer Sekmenli; Metin Gunduz; Selcuk University

Infantile Hypertrophic Pyloric Stenosis(IHPS) is the most common cause of gastric outlet obstruction in the first month of life. Botulinum toxin(BT) is a neurotoxin produced by clostridium botulinum, that causes paralysis in striated muscles. We aimed to evaluate the effectiveness of BT in the experimental pyloric stenosis model.

The study protocol was approved by the Selcuk University Medical Faculty Ethics Committee (2017/20) and founded by the Selcuk University Research Projects Fund Committee (project number:17102039). We performed an experimental study using 32 Wistar-Albino newborn rats. Rats were divided randomly into four groups with six rats in both control (C), and Nw-nitro-L-arginine methyl ester hydrochloride (L-NAME) group, and ten rats in each sham (S), and Botulinum Toxin (BT) group. 100 mg/kg/g L-NAME was applied to all groups intraperitoneally for 14 days from birth except control group. 0.2 ml saline and 20 U/kg botulinum toxin was injected by surgery to S and BT groups respectively at 21 days from birth. After 35 days all rats were sacrificed and biopsies were performed from pyloric muscle for histopathological examination. The results were evaluated with the ‘one-way ANOVA’ test

Total and circular muscle thickness of the groups were compared. The total muscle thickness of the L-NAME group was significantly higher than the control group ($p=0.031$). Comparing the circular muscle thickness of BTG with CG and LNG, muscle thickness was significantly smaller ($p<0.001$, $p<0.001$). The total muscle thickness of BTG was significantly different between LNG ($p<0.001$).

Hypertrophy of pylor in an experimental model was reduced by BT injection in present study. We think that Botox injection via endoscopic or interventional radiological methods, may be an alternative method for surgery.

S030 FUNDOPLICATION WITHOUT ESOPHAGOCRURAL SUTURES: LONG-TERM FOLLOW-UP FROM A RANDOMIZED TRIAL Kayla B Briggs, MD; Wendy Jo Svetanoff, MD, MPH; James A Fraser, MD; Charles L Snyder, MD; Pablo Aguayo, MD; David Juang, MD; Rebecca M Rentea, MD, MS; Richard J Hendrickson, MD; Jason D Fraser, MD; Tolulope A Oyetunji, MD; George W Holcomb III, MD; Shawn D St Peter, MD; Children's Mercy

Introduction: We previously conducted a randomized trial evaluating the need for esophagocrural (EC) sutures during fundoplication when no esophageal dissection is performed. We found no increased incidence of wrap transmigration or other complications in the group without EC sutures 1.5 years post-operatively. In this study, we aimed to evaluate long-term symptom control and complication profiles in these patients.

Methods: 120 children were included in the study from February 2010 to February 2014. The primary outcome was transmigration of the fundoplication through the esophageal hiatus. In this study, we conducted retrospective chart review and a telephone follow-up survey at a minimum of six years post-operatively.

Results: Of the 120 patients included in the original study, 100 (83%) were alive at late follow-up, and 70 (58%) parents/guardians responded to the telephone survey. Thirty-seven (53%) children were male, and 53 (76%) were Caucasian. Of these children, 39 (55%) received four EC sutures, while 31 (44%) did not. Follow-up was conducted at a median of 8.7 years [IQR 8.2,9.7] post-fundoplication; the median age of patients at follow-up was 9.5 years [IQR 8.8,10.9].

There were no documented late wrap transmigrations discovered by chart review or caregiver report in either group. When comparing baseline characteristics, there was no difference in gender, ethnicity, rate of G-tube placement at the time of original surgery, or pre-operatively diagnosed neurologic deficit between those who did and did not receive EC sutures (Table 1). The rate of residual reflux symptoms at late-follow up did not differ between groups. The rate of post-operative hospitalization(s) for pneumonia, failure to thrive (FTT), and/or apparent life-threatening events (ALTE)/brief resolved unexplained events (BRUE) were also similar between groups. Only two children were documented as having loosening or dehiscence of their wrap on follow-up upper GI study; only one was symptomatic and required re-operation 140 days post-operatively.

Conclusion: Long-term follow-up in children who underwent fundoplication without esophagocrural sutures demonstrates no difference in symptom management or subsequent hospitalizations at a minimum of six-year follow-up.

Table 1. Baseline characteristics and long-term telephone follow-up results comparing children who did and did not receive EC sutures.

	EC sutures (n=39)	**No EC sutures (n=31)**	***p*-value**
Male (%)	46.2	61.3	0.2
Caucasian (%)	82.1	67.7	0.2
G-tube placement during fundoplication (%)	64.1	70	0.6
Neurologic impairment at time of operation (%)	41.0	54.8	0.3
Current reflux symptoms (%)	35.9	35.5	0.9
Current antacid use	92.9	90.9	0.9
Current retching (%)	25.6	38.7	0.3
Need for gastrojejunostomy tube post-operatively (%)	23.1	6.5	0.1
Post-fundoplication hospitalization(s) (%)	33.3	51.6	0.1
Pneumonia	17.9	35.5	0.1
FTT	17.9	12.9	0.7
ALTE/BRUE	7.7	12.9	0.7

S031 NATIONWIDE OUTCOMES AND READMISSION AFTER PEDIATRIC FUNDOPLICATION Gareth P Gilna, MD[1]; Rebecca A Saberi, MD[1]; Antoine J Ribieras, MD[1]; Joshua P Parreco, MD, FACS[2]; Eduardo A Perez, MD, FACS[1]; Juan E Sola, MD, FACS[1]; Chad M Thorson, MD, MSPH, FACS[1]; [1]DeWitt Daughtry Family Department of Surgery University of Miami/Jackson Health System; [2]Lawnwood Regional Medical Center

Purpose: Fundoplications are a common operation in the pediatric population. This study aims to explore outcomes comparing laparoscopic versus open operative techniques.

Methods: From 2010-2014 the Nationwide Readmissions Database was used to identify patients 0-18 years who underwent a fundoplication. Demographics, hospital factors, and complications were compared by surgical technique (laparoscopic vs. open). Fundoplication complications were divided into major (gastrojejunostomy or jejunostomy tube, bowel obstruction, gastrostomy closure/re-siting, VP shunt revision) and minor (dysphagia, gastric functional disorder, gas bloat, vomiting). Results were weighted for national estimates.

Results: There were 4411 patients (47% female) who underwent fundoplication via laparoscopic (69%) vs. open (31%) technique. Gastrostomy tubes were placed in 75% of patients also undergoing fundoplication. Newborn made up 64% of the cohort, with 47% of newborns having cardiac anomalies and 96% being premature. Open fundoplications were more likely to be performed in newborns (72% vs. 61%) and those in the lowest income quartile compared to laparoscopic (41% vs. 31% p<0.001), both p<0.001.

The readmission rate was 20% within 30 days (14% admitted to a different hospital) and 38% within the year (15% admitted to a different hospital). Only 14% of readmissions were elective. The most common conditions associated with readmission were infection (18%), respiratory complications (15%), and feeding problems (7%). Fundoplication complications were found in 10% of patients, with 7% minor and 3% major complications. Patients undergoing concomitant gastrostomy tube placement during their index admission were excluded to avoid confounding factors from gastrostomy placement. Laparoscopy had lower 30-day readmission rates, lower readmission operations, and lower major and minor Nissen complications (Table 1).

Conclusion: The majority of fundoplications are being performed in newborns and are being done laparoscopically, which demonstrates lower complications and post-operative readmission compared to open fundoplications.

Table 1. Outcomes of laparoscopic versus open fundoplication, excluding same admission gastrostomy tube placement

	Laparoscopic Nissen n=631 (69%)	**Open Nissen** n=465 (31%)	**p-value**
Readmission 30 Days	14%	21%	0.003
Readmission Within Year	38%	33%	N.S.
Readmission to Different Hospital within Year	2.7%	6.7%	0.001
Unplanned Readmission[a]	77%	90%	<0.001
Unplanned Operation[b]	13%	37%	<0.001
Major Nissen Complication[c]	2.2%	4.5%	<0.001
Minor Nissen Complication[d]	3.2%	8.4%	<0.001

a. Percentage calculated with denominator of readmissions (n=392)
b. Percentage calculated with denominator unplanned readmissions (n=321)
c. Gastrojejunostomy or jejunostomy tube, bowel obstruction, gastric fistula closure/re-siting, VP shunt replacement
d. Dysphagia, gastric functional disorder, gas bloat, vomiting

V009 LAPAROSCOPIC PARTIAL PANCREATECTOMY USING A 5MM STAPLER IN A PRENATALLY DIAGNOSED GASTRIC DUPLICATION CYST Soledad Heredia, PhD; Daniel R Russo, PhD; German F Falke, PhD; Sofia Marchionatti, Phd; Leandro M Berberian, pHd; Constanza Abdenur, PhD; Anahi Salomon, PhD; Adolfo Etchegaray, PhD; Austral Hospital

A retroperitoneal cystic was diagnosed at 25 weeks of gestation on a Prenatal ultrasound. MRI confirmed a gastric duplication.

Even though patient remained asymptomatic, an elective laparoscopic approach was programmed.

One 5mm and two working ports 3mm were used. The cystic mass was located in the pancreas body and was completely surrounded by pancreatic tissue. No connection or adhesions were found between the tumor and the stomach.

A complete laparoscopic resection of the cyst and the distal portion of the pancreas (distal pancreatectomy) was performed using a 5mm endo-stapler (JustRightTM).

The sample was retrieved through the umbilical site. The operative time was 40 minutes.

The patient was discharged on postoperative day 2, without complications.

Histopathology findings revealed a pancreatic gastric duplication with mucous content.

Late follow up has been uneventful without recurrence of the cystic mass.

V010 LAPAROSCOPIC TREATMENT OF JEJUNOILEAL ATRESIA - NEW CHALLENGES IN NEONATAL MINIMALLY INVASIVE SURGERY Yury Kozlov, PhD[1]; Simon Poloyan[2]; Konstantin Kovalkov[3]; Vadim Kapuller, MD[4]; [1]Pediatric Hospital Irkutsk; [2]Krasnoyarsk Center of Maternity and Childhood; [3]Kemerovo Regional Children's Hospital; [4]Assuta University Medical Center, Israel

It was believed that laparoscopic intracorporeal anastomosis could not be used to treatment of small bowel atresia. We present the first experience of fully laparoscopic approach in 8 newborns with jejunoileal atresia. The milestones of these procedures are: placement of anchor sutures for stabilization of the intestinal segments, adaptation of the placement of laparoports to the level of atresia, anastomosis design like fish-mouth or membranectomy and 3/4 anastomosis. Type I atresia was seen in 2 patients, type IIIa atresia - in 5 patients, atresia secondary to intrauterine intussusception in 1 patient. All laparoscopic operations were performed without conversion to open procedures. The operative time ranged from 60 to 75 minutes. The start of enteral nutrition was 3-5 days after the operation. The transition to full nutrition occurred 7-10 days after the operation. Laparoscopic approach for treatment of jejunoileal atresia became not only possible, but also demonstrated its effectiveness and safety.

S033 LAPAROSCOPIC-ASSISTED APPROACH FOR INTESTINAL DUPLICATIONS IN INFANTS: 15 YEARS OF EXPERIENCE IN A SINGLE CENTER. Neil Di Salvo; Giovanni Parente; Tommaso Gargano; Michela Maffi; Mario Lima; Pediatric Surgery Unit, Sant'Orsola University-Hospital, Bologna

INTRODUCTION: Alimentary tract duplications are congenital malformations that may be found anywhere from mouth to anus. The most common duplication is cystic and located on the mesenteric aspect of the small or large intestine. Most duplications in the abdomen can be approached using laparoscopic techniques or a laparoscopic-assisted approach. We present the experience matured at our Center in the last 15 years with the video-assisted trans-umbilical approach.

MATERIALS/METHODS: We retrospectively collected demographic, operative and post-operative data of patients presenting intestinal duplications, from 2004 to 2019. The technique consists in aspirating the cyst under direct visualization with a large gauge needle either transabdominally or at the umbilical incision. By aspirating the cyst the decrease in size makes it possible to bring out the duplication through the umbilicus.

RESULTS: At our Center 33 patients were treated for intestinal duplication (M/F 1.5): 30 in the small intestine, 3 in the large intestine, of which 2 rectal (excluded from our analysis). 31 were approached with a video-assisted technique: 16 were resected as one specimen (bowel resection and primary anastomosis); in the remaining 15 cases we performed enucleation of the duplicated bowel. We registered 5 conversions to laparotomy and 1 complications (laparocele). Median age was 16,6 months and median operative time was 105 min. [55 min-155 min].

CONCLUSIONS: The laparoscopic-assisted transumbilical approach for intestinal duplication represents a valid minimally invasive technique, in terms of safety, efficacity and rapidity.These data should encourage the use of this technique as first approach for intestinal duplication.

S034 EFFECTS OF INTRAPERITONEAL BUPIVACAINE INJECTION IN LAPAROSCOPIC APPENDECTOMY IN CHILDREN ON POSTOPERATIVE PAIN: A CONTROLLED RANDOMIZED DOUBLE BLINDED STUDY Ergun Ergun[1]; Anar Qurbanov[1]; Gulnur Gollu[1]; Ufuk Ates[1]; Sumeyye Sozduyar[1]; Meltem Bingol-Kologlu[1]; Aydin Yagmurlu[1]; Murat Cakmak[1]; Ozlem Selvi Can[2]; [1]Ankara University Faculty of Medicine, Department of Pediatric Surgery; [2]Ankara University Faculty of Medicine, Department of Anesthesiology and Renimation

Purpose: The aim of this study is to determine the effects of intraperitoneal local anesthetic administiration in children who underwent laparoscopic appendectomy.

Methods: Patients who underwent laparoscopic appendectomy due to acute appendicitis were enrolled in the study. The children were divided into 2 group. Intraperitoneal bupivacaine injection to appendectomy site and subdiaphragmatic area was performed after resection of appendix and aspirastion of intraperitoneal reactive fluid in Group 1 while Group 2 did not receive this therapy. The children were questioned by a nurse at postoperative first, sixth, 12 th and 24 th hours. Pain scores (abdominal), abdominal wall incisional pain, shoulder pain and first need for analgesics were recorded.

Results: One hundred and twenty children were enrolled to the study. There was no significant difference in pain scores values and incisional pain values between the two groups ($p>0.05$). Shoulder pain values at 12 th and 24 th hours were significantly lower in group 1 ($p<0.05$). There was a statistically significant reduce in analgesic need in group 1 ($p=0.007$).

Conclusion: Intraperitoneal bupivacaine instillation to surgery site and subdiaphragmatic area seems to reduce the shoulder pain postoperative and also reduce postoperative analgesic need. More meaningful results can be obtained with an increase in the number of patients.

S035 MINIMALLY INVASIVE SURGERY IN SURGICAL TREATMENT OF ABDOMINAL LYMPHATIC MALFORMATIONS IN CHILDREN Daria Diehtiarova, MD; Iryna Benzar, MD, PhD, Professor; Oleg Godik, MD, PhD; Pediatric Surgery Department, Bogomolets National Medical University, Kyiv, Ukraine

Background: despite abdominal lymphatic malformations (LMs) in children are relatively rare, the question of optimal surgical treatment is actual.

Purpose: The aim is to share our experience in using minimally invasive surgery (MIS) for abdominal LMs treatment.

Patients and methods: Among pediatric patients, who underwent treatment in National Specialized Children's Hospital "Okhmatdyt" since January 2011 till July 2019 we identified 225 patients diagnosed lymphatic malformations. In 43 (19,1%) of them LMs were located in the abdominal cavity or retroperitoneally. 5 of them were treated via open surgery, other 5 underwent combined treatment or dynamic observation. We focused on 33 (76,7%) out this group, which were treated by means of MIS. Median patients' age was 4 years old (range 1 month ÷ 17 years old), with male predominance 23 to 10. Sonography, MRI or CT were routinely used as diagnostic options. The median follow-up period was 44.6 ± 5,62 months (6÷110 months).

Results: Among 33 patients, treated by means of MIS, in 10 patients (30,3%) LMs were accidentally found and asymptomatic, 9 (27,3%) presented with abdominal mass, 12 (36,4%) presented pain and fever, simulating acute abdomen, and 2 (6%) presented intestinal obstruction. 5mm or 10mm umbilical port and up to three 3-5mm working ports. Only one working port was required for sclerosant agent injection under laparoscopic guidance. In 9 (27,3%) cases LMs originated retroperitoneally, 10 (30,3%) affected the mesentery, in 6 (18,2%) - intestinal wall was involved into the process with or without mesentery, in 7 (21,2%) patients LMs were omental. In 1 (3%) case LM was originating from supravesical fossa with its mass in abdominal cavity. Cysts were not aspirated before incision to provide better dissection. 10 (30,3%) laparoscopic excisions and 13 (39,4%) transumbilical lap-assisted procedures, either for extracorporeal bowel resection with following anastomosis, or for omental LM traction to provide better dissection; 5 (15,1%) cases required conversion into laparotomy. In 5 (15,1%) patients in with LMs spread retroperitoneally, were not mobile, fixed and connected to cisterna chyli, sclerosing agents injection was performed under laparoscopic guidance. That prevented cisterna chyli injuries and lymphatic leaks and resulted into 90% decrease of abdominal mass. Conversions took place when it was unsafe for anatomical distinction of LM. There were no intraoperative or postoperative complications. No recurrencies were observed during mentioned follow-up period.

Conclusion: It is optimal to use MIS for surgical treatment of abdominal LMs. Sclerotherapy under laparoscopic guidance showed good effect and guaranteed safety for sclerosing agents injection into the malformation cavity. For well-trained surgeon MIS is feasible for LMs treatment of any intraabdominal location.

S036 PERITONEAL TUBERCULOSIS: ARE LAPAROSCOPIC FINDINGS ALWAYS TYPICALLY? Marwa Messaoud; Myriam Ben Fredj; Salma Mani; Sabrine Ben Youssef; Sabrine Ben Ammar; Sami Sfar; Sana Mosbahi; Samia Belhassen; Rachida Laamiri; Amine Ksia; Lassaad Sahnoun; Mongi Mekki; Mohsen Belghith; Department of Pediatric Surgery Monastir Tunisia

Introduction: The peritoneum is one of the locations outside the most common pulmonary tuberculosis. Peritoneal tuberculosis (PTB) poses a public health problem in endemic regions of the world. Late diagnosis is often due to non-specific symptoms. Typical laparoscopic findings of PTB are multiple yellow-white tubercles scattered all over the visceral and parietal peritoneum, omental thickening with ascites, and fibrous bands extending from parietal peritoneum to visceral peritoneum, but it's not always the case.

Material and Methods: It is a retrospective study of 23 cases explored for suspicion with PTB at the Department of Pediatric Surgery of Fattouma Bourguiba Hospital between January 2001 and June 2020.

Results: We collected 23patients. There were 11 boys and 12 girls, with a mean age of 9,5 years [1 to 15 years]. Two patients had had epidemic contact with tuberculosis. The Mains clinical manifestations were abdominal pain with vomiting (47%), prolonged fever (13%), night sweats (13%). Abdominal distension and free ascites were found in 9 cases. Ultrasonography and CT scan showed moderate ascites in 11 cases and subcentimetric nodules in 20 cases. A laparoscopic exploration was performed on all our patients. Miliary nodules were found in 14 cases, adhesions between the peritoneum and organs were noted in 13 cases and caseous necrosis was obvious macroscopically in 43% of cases. However, we noted isolated abdominal lymphadenopathy in 4 cases. The surgical biopsy had interested especially peritoneal nodules, lymphadenopathies, and the liver in 5 cases. Anatomopathological examination revealed granulomatous inflammation with caseous necrosis compatible with tuberculosis infection in all cases.

Conclusion: Diagnosis of peritoneal TB is challenging due to its non-specific clinical presentation. This is why in the case of suspected peritoneal tuberculosis, laparoscopy with peritoneal biopsy is the diagnostic tool of choice and should be performed without delay.

S037 THE LINKAGE BETWEEN URETERAL TELOCYTES, SK3 CHANNEL EXPRESSION AND LOCAL INFLAMMATION AMONG CONGENITAL HYDRONEPHROSIS PATIENTS

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INTRODUCTION: Expression of vanin-1 and ureteral telocytes correlate with UPJO development. This study was conducted to assess the density of telocytes and its co-expression of vimentin and small-conductance calcium-activated potassium (SK3) channels related to fibrosis and local inflammation in the ureter in this group of patients.

PATIENTS AND METHODS: The samples were taken from 20 patients with congenital intrinsic UPJ obstruction. Control group (CG) consisted of 18 patients with non-obstructive disease of the urinary tract –predominantly renal tumors. Routine histology was performed and followed by Masson Trichrome staining for collagen deposits and toluidine blue staining for mast cells assessment. Tissue specimens were immunolabelled, with telocyte markers (c-kit, CD34, PDGFRα, vimentin and SK3) and vanin-1. The semiquantitative analysis of telocytes density and vanin-1, SK-3 expression was performed, using a simple scale with one, two or three pluses.

RESULTS: Density of telocytes was decreased (one plus) in UPJO group compared to CG group (three pluses). In the UPJO group intense inflammatory and fibrotic processes were observed and mast cells number was elevated (81.8±26.9) in comparison with CG group (38.7±18.5). Vanin-1 level was higher in UPJO group, while the vimentin expression was decreased. SK3 positive cells were present in the ureteral wall, but no significant differences between groups were observed.

CONCLUSIONS: A declined density of telocytes and prevalence of mast cells and vanin-1 overexpression accompanied UPJO development and correlated with local inflammation and collagen accumulation. Both factors contributed to fibrotic transformation in UPJO patients.

The protocol was approved by the ethical committee 122.6120.84.2016

S038 URETERO-PELVIC JUNCTION OBSTRUCTION: CONSIDERATIONS ON THE APPROPRIATE TIMING OF CORRECTION BASED ON AN INFANT POPULATION TREATED WITH A MINIMALLY INVASIVE TECHNIQUE. Neil Di Salvo; Giovanni Parente; Tommaso Gargano; Chiara Cordola; Mario Lima; Pediatric Surgery Unit, Sant'Orsola University-Hospital, Bologna

Aim of the study: To compare outcomes between patients who underwent surgical correction early in life with patients who underwent a delayed correction with the same minimally-invasive technique.

Methods: We retrospectively analysed two groups of patients with severe UPJO undergoing one-trocar assisted pyeloplasty (OTAP): group I operated in the first 90 days of life, group II operated between 3 and 12 months of life. Indications for surgery were the same for all patients. We analysed demographic and intraoperative data, early post-operative outcomes and hydronephrosis' improvement through the Hydronephrosis severity score (HSS) considering a minimum of 1-year follow-up. Student-T and chi-square test were used with $P < 0.05$ defining a statistically significant difference.

Main results: 34 underwent early correction (Group 1) while 34 (group 2) delayed surgery. We observed no statistically significant differences between groups in regards of mean operative time, conversion rate to open surgery, mean hospital stay, early complications (urinary leakage) rate and mean Antero-Posterior Diameter (APD) reduction rate at the 1 year-follow-up. Moreover no statistical improvement was seen between groups in regard of Separate Renal Function (SRF) at 1-year-follow-up renogram. However, a greater urinary flow improvement measured at 1-year-follow-up renogram was noted in group I ($p <0.037$). Also, thanks to the HSS calculated before and 1 year after surgery, we registered an important improvement in Group I patients ($p = 0.023$).

Conclusions: There is no significant difference, in terms of intraoperative data and early postoperative outcomes, between patients undergoing an early or a delayed correction. Nevertheless, we registered a significant improvement in those patients with an impaired SRF that underwent an early correction, especially in terms of urinary flow.

S039 ROBOT-ASSISTED LAPAROSCOPIC PYELOPLASTY (RALP) IN CHILDREN WITH COMPLEX PELVI-URETERIC JUNCTION OBSTRUCTION (PUJO): RESULTS OF A MULTICENTRIC EUROPEAN STUDY. Ciro Esposito[1]; Lorenzo Masieri[2]; Thomas Blanc[3]; Mariapina Cerulo[1]; Quentin Ballouhey[4]; Fulvia Del Conte[1]; Laurent Fourcade[4]; Vincenzo Coppola[1]; Giuseppe Autorino[1]; Maria Escolino[1]; [1]Federico II University of Naples, Naples, Italy; [2]Meyer Children Hospital, Florence, Italy; [3]Hôpital Necker-Enfants Malades, Paris, France; [4]Hopital de la Mère et de l'Enfant, Limoges, France

Purpose: This study aimed to report a multi-institutional experience with robot-assisted laparoscopic pyeloplasty (RALP) in children with complex pelvi-ureteric junction obstruction (PUJO).

Methods: A total of 232 RALP were performed in 4 European centers over the last 5 years. Only patients undergoing complex RALP were included. RALP was defined complex in the following cases of PUJO: 1) anatomic variations including ectopic kidney, renal malrotation, horseshoe kidney or duplex kidney, 2) nephrolithiasis, and 3) recurrent PUJO after failed open pyeloplasty.

Results: Fifty-six out of 232 patients (24.1%) underwent complex RALP and included 20 girls and 36 boys with an average age of 8 years (range 5-12) and an average weight of 30 Kgs (range 19-35). The PUJO was associated with anatomic variations in 36 patients (64.3%) and was complicated by nephrolithiasis in 4 cases (7.1%). The other 16 patients (28.6%) had a recurrent PUJO after failed open pyeloplasty. Most patients (78.5%) were symptomatic, with mainly colicky flank pain. A dismembered Anderson-Hynes pyeloplasty was performed in 52 cases (92.9%) and an uretero-calycostomy was done in 4 patients (7.1%). Crossing vessels were identified and de-crossed in 11 cases (19.6%). The average operative time including docking was 178.5 minutes (range 117-255) whereas the average anastomotic time was 64.8 minutes (range 50-76). Conversion to laparoscopy was required in 2 cases (3.6%) whereas no intra-operative complications occurred. Patients were discharged on post-operative day 2 following catheter and drain removal. The JJ stent was removed at mean 22.4 days postoperatively. The average follow-up was 15.1 months (range 10-39). The overall success rate was 96.4%. Regarding postoperative complications, urinary tract infections (UTIs) and stent-related irritative symptoms occurred in 7 patients (12.5%) and were managed with medical therapy (II Clavien), whereas recurrence of PUJO was recorded in 2 patients (3.6%) who were re-operated with no further recurrence (IIIb Clavien).

Conclusions: RALP was safe, feasible and with good mid-term outcome even in complex PUJO. An accurate pre-operative planning associated with a standardized technique represented key-points to manage successfully these complex cases. Despite its higher costs, the da Vinci robot demonstrated to easily adapt to patient's anatomy and provided several technical advantages, overcoming the potential challenges involved in the minimally invasive management of such difficult cases.

S040 TRANS PERITONEAL LAPAROSCOPIC PYELOPLASTY IN CHILDREN WITH RECURRENT PELVI URETERIC JUNCTION OBSTRUCTION: A VIABLE OPTION Chalapathi Gontumukkala, MS, MCh; Kurnool Medical College

Purpose: To assess the results of transperitoneal laparoscopic pyeloplasty(LPP) in children with recurrent pelviureteric junction obstruction.(PUJO).

Patients & methods: A total of 50 children were treated for congenital PUJO from July 2018 to December 2019 in a medical college hospital. Among these 50, 8 children were operated for recurrent PUJO. All children with recurrence were treated by trans-peritoneal LPP. DTPA scan was done in all eight patients during follow up. Mean operation time, blood loss, post operative stay, complications, functional status of renal unit after surgery were assessed.

Results: There were 8 patients with recurrent PUJO. Six were males and two were females. The mean age was 4years and mean follow up was 8 months. The causes of recurrence were, 2 children had anterior crossing vessels,2 had duplex moiety with lower pole pujo,1 child had long stenotic ureter, 2 had postoperative leak and fibrosis, 1child had gross hydronephrosis with complete intra renal pelvis. Five of 8 children had associated anomalies that were missed during open pyeloplasty. The mean operation time was 210 min. The average approximate blood loss was 30 ±5ml. Symptomatic relief was seen in all eight patients (100%). DTPA scan was repeated in all children 8 months following surgery. Seven of the 8 children showed significant improvement in renal unit function and drainage, where as in one child there was no significant improvement. The success rate is 87.3%.

Conclusions: Laparoscopic pyeloplasty is viable alternate to open pyeloplasty in children with recurrent PUJO. The results are comparable. Trans peritoneal LPP is superior to open pyeloplasty in detecting and managing the associated anomalies as it gives wider exposure of the kidney and the associated anomalies are not missed.

S041 COMPARISON OF RETROPERITONEAL ROBOTIC VERSUS RETROPERITONEAL LAPAROSCOPIC PYELOPLASTY FOR URETEROPELVIC JUNCTION OBSTRUCTION IN CHILDREN Hiroyuki Koga, MD; Hiroshi Murakami, MD; Takanori Ochi, MD; Hiroki Nakamura, MD; Shogo Seo, MD; Yuihiro Miyake, MD; Go Miyano, MD; Geoffrey J Lane, MD; Atsuyuyi Yamataka, MD; Department of Pediatric Surgery Juntendo University School of Medicine

Aim While robotic pyeloplasty is being performed more commonly in children for ureteropelvic junction obstruction, there are very few reports in the English literature comparing pyeloplasty performed using retroperitoneal robotic or retroperitoneal laparoscopic approaches probably because the retroperitoneal approach itself is technically challenging. We compared retroperitoneal robotic pyeloplasty anastomosis (RPA) with retroperitoneal laparoscopic pyeloplasty anastomosis (LPA) for ureteropelvic junction obstruction in children.

Methods Five independent surgeons were asked to score perceived difficulty of suturing (DOS) during anastomosis blindly from intraoperative video recordings using the following scale: 5 = impossible; 4 = difficult; 3 = tedious; 2 = slow; and 1 = easy. They were also asked to compare RPA with LPA and score + 1 if RPA appeared superior to LPA, 0 if RPA appeared equivalent to LPA, and − 1 if RPA appeared to be inferior to LPA. All LPA cases were matched for age, weight, and anastomosis diameter with RPA cases. All surgery (RPA and LPA) was performed in the lateral decubitus position. The retroperitoneal space was accessed using a closed technique to avoid air leakage and subcutaneous emphysema under direct vision in both groups. A double J stent (4.7 Fr) was placed in an anterograde fashion transcutaneously by using a guide wire; ureter end first, then the renal pelvis end.

Results RPA (n=8) were performed between 2018 and 2020; LPA (n=34) were performed between 2011 and 2019. DOS was lower in RPA with less variance. RPA was scored + 1 unanimously. Total anastomotic time (TAT) and TAT per suture were significantly shorter for RPA. The coefficient of variation for the time taken to place one suture was smaller for RPA than for LPA. However, although overall operative time was similar for both techniques, it took significantly longer to secure the larger retroperitoneal space required for RPA. There was one anastomotic leak and one anastomotic stricture with LPA, and no anastomotic complications with RPA. Conventional re-pyeloplasty was required for one LPA case.

Conclusions RPA was found to be superior to LPA. RPA results in a more stable anastomosis that can be performed quicker, with less complications compared with LPA. Robotic surgery can be performed successfully without difficulty, is comfortable for the operating surgeon, and has rapid learning curves. Although still considered as emerging technology, achieving expertise is a definite advantage to improve performance and reduce anastomosis-related complications.

Table 1: Patient demographics

	RPA (n=8)	LPA (n=34)	*p* value
Age at surgery (years)	8.4 ± 4.5 (range 3.0 to 16.8)	8.5 ± 3.9 (range 3.2 to 15.1)	NS
Weight at surgery (kg)	31.0 ± 16.4 (range: 16.3 to 56.0)	29.6 ± 16.1 (range 13.0 to 57.0)	NS
BMI (kg/m^2)	17.9 ± 2.9	16.9 ± 2.8	NS
Size of anastomosis (mm)	10.5 (range 4 to 20)	11.3 (range 5 to 20)	NS

RPA: retroperitoneal robotic pyeloplasty anastomosis , LPA: retroperitoneal laparoscopic pyeloplasty anastomosis , BMI: body mass index, NS: not significant

Table 2: Pyeloplasty anastomosis and postoperative outcome

	RPA (n=8)	LPA (n=34)	*p* value
Anastomotic time (minutes)	63.5 ± 17.7	133.0 ± 31.6	*p*<0.001
Number of stitches	10.3 ± 3.2	10.1± 3.5	NS
Anastomotic time/number of stitches (minutes)	6.2 ± 0.4	14.4 ± 5.4	*p*<0.001
CV for anastomotic time/number of stitches	0.14	0.37	
Difficulty of suturing during pyeloplasty anastomosis	1.3 ± 0.5	3.2 ± 0.7	*p*<0.001
Independent surgeon scores	+1[#]	-	
Total operative time (minutes)	312.3 ± 70.4*	349.9 ± 134.9	NS
Time taken to create retroperitoneal space (minutes)	47.1 ± 18.3	24.3 ± 9.6	NS

RPA: retroperitoneal robotic pyeloplasty anastomosis , LPA: retroperitoneal laparoscopic pyeloplasty anastomosis CV: coefficient of variation, NS: not significant, #: score was +1 for RHJ for all 5 independent surgeons,
*: includes robot docking time

S042 MICRO-PCNL IN CHILDREN. DISILLUSION OR INAPPROPRIATE EXPECTATION? Ergun Ergun, Dr[1]; Beytullah Yagiz, Dr[2]; [1]Ankara University Department Of Pediatric Surgery; [2]19 Mayis University Department Of Pediatric Surgery and Pediatric Urology

The prevelance of urinary stone disease is increasing in children. Treatment options include ESWL, endoscopic and percutaneous approach as in adults but some modifications are necessary due to special body habitus of the children.

The charts of the 15 patients who underwent micro-PNL for kidney stones are retrospectively evaluated.

Median age of the patients were 2,4 years and median stone size was 12 mm(9-20). Right kidney was involved in 10 patients and left kidney in 5. Plain x-ray and ultrasonography was performed in all of the patients but only 7 underwent CT for imaging. Ureteral stent was inserted in 12 patients (for passive dilatation in4 and for obstruction in 8). Adequate stone samples for analysis of stone composition could be collected in 12 patients. Stone composition were calcium oxalate in 8, uric acid in 3 and ammonium urate in 1. Three patients needed additional endoscopic interventions. Fifteen patients underwent 31 sessions and 13 were stone-free (≤3mm)(87%). Median follow up was 9 months (3-15 months).

A patient needed pleural drainage and ureteral stent due to obstruction by the stone pieces at the level of ureterovesical junction (steinstrasse). Another patient required prolonged antibiotic medication (12 days) for infection.

Management of urinary stones in children is challenging due to their delicate body habitus. Management options are usually modified from adult guidelines and patient characteristics (age, anatomic variations, location and size of the stone..) are the major determinants. MicroPNL is the smallest percutaneous device currently, and low image quality, inability to retrieve fragmented stones and lower stone-free rates are the major disadvantages.

MicroPNL is a reliable minimal invasive technique especially suitable for infants. Passive dilatation with ureteral stenting may increase the success and lower the complication rates. In children, primary concern should be minimally invasiveness rather than achieving stone free status in one stage.

V011 LAPAROSCOPIC TRANS URETERO-URETEROSTOMY FOR UNILATERAL PRIMARY OBSTRUCTIVE MEGAURETER Ankur Mandelia, Dr; Ashwani Mishra, Dr; SGPGIMS, Lucknow, India

A 5 day old boy underwent right end ureterostomy for an antenatally diagnosed primary obstructive megaureter. At 18 months of age, laparoscopic trans uretero-ureterostomy procedure was planned. The essential surgical steps were: 1. Recipient ureter (left) was stented 2. Donor ureter (right) was dissected and mobilized 3. Donor ureter was passed through a tunnel under the recto-sigmoid mesentery 4. A longitudinal ureterotomy was performed on the medial aspect of the recipient ureter 5. End (right) to side (left) uretero-ureteral anastomosis was performed, avoiding tension or angulation 6. Peritoneal windows were closed. Operating time was 210 minutes with minimal blood loss. Post-operative recovery was uneventful. Renal parameters are stable at follow up. Conclusion: In select cases where uretero-neocystostomy of a dilated ureter is technically difficult, laparoscopic trans uretero-ureterostomy presents a feasible, safe and effective option. It is associated with minimal blood loss and postoperative pain, faster recovery and excellent cosmetic result.

V012 LAPAROSCOPIC A-H PYELOPLASTY A MODIFIED TECHNIQUE OF URETERO-PELVIC ANASTOMOSIS. VS Narayana Kotte, MS, MCAH; Osmania Medical College

Aim: To design an anastomotic technique, easier to execute, meticulous, more comfortable.

Method: The technique of suturing of uretero-pelvic anastomosis modified. No Prolene stitch to pelvis, suturing started at upper end of anastomosis used as a stay stitch. Continuous suturing from above downwards to the lower angle completed, with knot outside. The DJ stent passed with ease and the suturing continued from below upwards till it reaches the upper stay suture and tied over with knot outside again.

Results: Thirty six cases operated with this technique, from 1 months to 8 years age. Mean operating time 1Hr 40mts. All cases recovered well, discharged on 4th POD.

Conclusions: avoiding prolene stitch minimizes risk of tare to an inflamed pelvis. Anastomosis done with ease, confidence and more meticulously. Stent insertion is better facilitated in this technique.

S043 TOWARD ESTABLISHING NEW GUIDELINES ON THE MANAGMENT OF THE URETEROPELVIC JUNCTION OBSTRUCTON IN THE ERA OF LAPAROSCOPY: REVIEW OF THE LITERATURE AND META-ANALYSIS Yasmine Houas; Cyrine Saadi; Nesrine Chebil; Meriem Oumaya; Yosra Kerkeni; Sondes Sahli; Nada Sghairoun; Riadh Jouini; Children Hospital Bechir Hamza

AIM OF THE STUDY: As the minimally invasive approaches have completely changed the approach of ureteropelvic junction (UPJO), our aim was to review the literature to establish guidelines on that matter

METHODS: We performed a critical review of the literature published between 2003 and 2018 using MEDLINE, COCHRANE and EMBASE databases. The search strategy used the terms “pyeloplasty”, “ureteropelvic junction obstruction” ,”Transposition” and “children”.

MAIN RESULTS: 50 articles were reviewed. The total of patients included were 10466 . The mean age at operation was 49 months. The indications for surgery were clinical sympltoms (55,87%), renal pelvic anteoposterior diameter higher than 2cm (24,43%), impaired renal function lower than 40% (24,43% or delayed wash out curve on the renal scan (76,02%). A minimally invasive technique was performed in 82,48%: it was a vascular transposition (VT) or a liberation of the junction without a dismembered pyeloplasty(DP) (3,45%), retroperitoneal DP (7,2%) , transperitoneal DP (76,23%) and a robotic one (16,24%). The VT had a high rate a success (96,35%) when a kincking of the junction is found by a vessel or adhesions.

CONCLUSION: This review recommends a primary laparoscopic exploration to resolve a kicking of the UPJ when a surgical treatment is indicated. DP should be performed if an absence of vidange of the junction is noted preoperatively or as a second line treatment.

S044 LAPAROSCOPIC GROIN HERNIA REPAIR IN CHILDREN: HERNIORRHAPHY OR TRUE HERNIOTOMY – RELIABILITY IS THE ISSUE

Anatole Kotlovsky, MD, PhD[1]; Igor Poddoubny, MD, PhD[2]; Andrey Prityko, MD, PhD[3]; Vladimir Krougly, MD, PhD[1]; Oleg Chernogoroff, MD[1]; Vitaly Ovchinnikov, MD[3]; [1]Z.I. Krouglaya Central Children's Hospital, Oryol; [2]Evdokimov State Medical University, Moscow; [3]St Luka's Clinical & Research Centre for Children, Moscow

Background and Objective: The optimal laparoscopic technique for pediatric inguinal hernia repair continues to be discussed. Our objective was to compare the reliability of two intracorporeal techniques employed in our practice: herniorrhaphy and true herniotomy.

Material and Methods: A retrospective comparative review of patient outcomes was conducted following laparoscopic groin hernia repair undertaken during 2013-2019.

The techniques used, both intracorporeal, involved the following key elements: herniorrhaphy – closing hernia defect including the gaping fascia-muscular structures with varied suturing while leaving the sac intact; true herniotomy - dividing the sac circumferentially at the neck followed by purse-string closure of the peritoneal defect.

Results: In total, there were 272 patients aged between 4 months and 17 years with 336 groin hernia defects including metachronous and rare defects.

The herniorrhaphy was performed for 186 indirect hernia defects; true herniotomy – for 142 indirect, as well as for six direct and two femoral defects. The intraoperative course was uncomplicated in all cases.

Following repair of indirect hernia defects, the overall rate of postoperative hydrocele and follow-up recurrence was lower in the herniotomy series - 0.7% vs herniorrhaphy - 5.37%, with statistically significant difference between them ($p = 0.02$). Remarkably, no recurrence was noted after herniotomy.

Conclusion: In our experience true herniotomy appears to be a more robust technique, applicable for all types of groin hernia defects in children. A prospective randomized controlled study is warranted in this topic.

S045 SHOULD AN INCIDENTAL PATENT CONTRALATERAL PROCESSUS VAGINALIS IN A CHILD HAVING AN LPEC PROCEDURE FOR INGUINAL HERNIA BE TREATED? - A PROSPECTIVE STUDY

Haruki Kato, MD[1]; Go Miyano, MD, PhD[1]; Toshiaki Takahashi, MD[2]; Shiho Yoshida, MD[1]; Eiji Miyazaki, MD[2]; Takanori Ochi, MD[1]; Shogo Seo, MD[1]; Yuichiro Miyake, MD[1]; Hiroyuki Koga, MD, PhD[1]; Geoffrey J Lane, MD[1]; Atsuyuki Yamataka, MD, PhD[1]; [1]Pediatric General & Urogenital Surgery, Juntendo University School of Medicine, Tokyo, Japan; [2]Department of Pediatric Surgery, Seirei Hamamatsu General Hospital, Shizuoka, Japan

Aim: During laparoscopic percutaneous extraperitoneal closure (LPEC) of an inguinal hernia (IH), most surgeons inspect the contralateral processus vaginalis and repair it if it is patent. We are the first to classify patent contralateral processus vaginalis (CPV) and selectively perform LPEC repairs, and present our findings.

Methods: This prospective study was commenced in October 2014. All patients with symptomatic IH who underwent LPEC by December 2019 were enrolled. Patients over 16 years old, with bilateral IH, and those followed-up postoperatively for less than 12 months were excluded. Patent CPV was classified according to the presence of a peritoneal fold.

Type (I) patent CPV was not covered by any peritoneal fold, type (II) was partially (1/4 to 3/4) covered, and type (III) was completely covered by a peritoneal fold. These types of patent CPV were repaired by LPEC, except for type (III) cases with CPV orifices less than 2 mm, which were not repaired and were labelled non-repaired type III (IIINR). A closed CPV was classified as having (a) completely flat peritoneum (f-type), i.e., the peritoneum was continuous around the cord, or (b) a shallow dimple associated with the inferior epigastric vessels (d-type). We compared our postoperative incidence of IH on the untreated side with data from another institute whose policy was to close all patent CPVs irrespective of morphology, for the same period, 2014 to 2019.

Results: We treated 586 patients for unilateral IH by elective LPEC [Figure 1]. Mean age at elective LPEC was 50 months (range: 2 - 182 months). Of these, 297 patients had a patent CPV: type I (n=175), type II (n=47), type III (n=75) (type IIINR, n=44), and 289 patients had closed CPV: f-type (n=237) or d-type (n=52). During follow-up, none of the patients with a patent CPV diagnosed by laparoscopic evaluation and repaired during elective unilateral LPEC developed IH on either side. Interestingly, no type IIINR patent CPV patient developed IH on the untreated contralateral side. However, of the 289 patients with closed CPV, four developed IH on the untreated contralateral side, including two with f-type and two with d-type closed CPV [Figure 1].

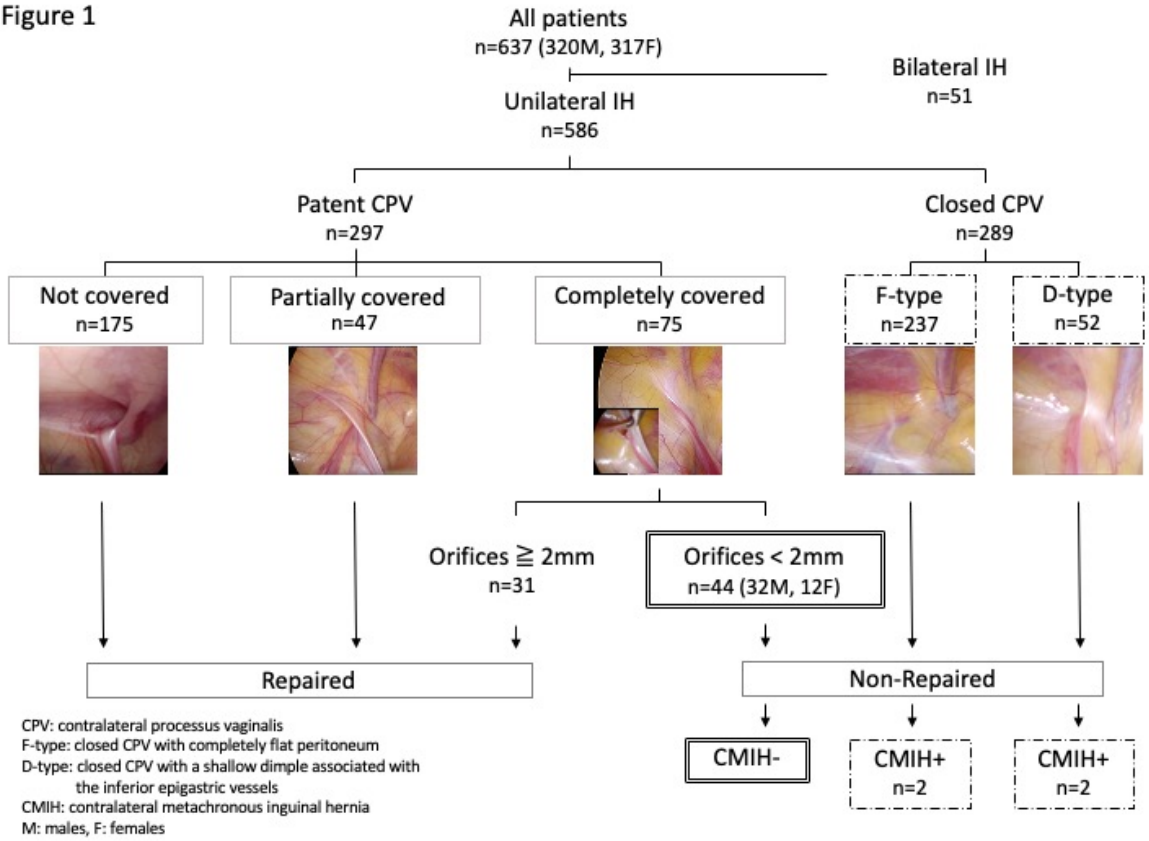
The mean interval from elective unilateral IH repair (LPEC) to development of IH on the untreated contralateral side was 12 months (range: 6 - 21 months); three patients developed IH on the contralateral side within 1 year.

We compared the incidence rate of Contralateral Metachronous Inguinal Hernia (CMIH) type IIINR, f-type and d-type. Although without statistical significance, there was a tendency for a higher incidence rate of CMIH with d-type, compared with IIINR or f-type CPV.

Our incidence of CMIH in elective unilateral IH repair cases (0.68%: 4/586) was similar to data from another institute (0.35%: 3/847)(p=NS).

Conclusion: There must be a spectrum of causes for the subsequent development of IH on the contralateral side in unilateral IH cases treated by LPEC that requires further detailed research, because there appear to be patent CPV cases (type IIINR) who do not develop IH and closed CPV cases who do.

Figure 1



S047 COMPARING THREE DIFFERENT METHODS OF INGUINAL HERNIA REPAIR IN CHILDREN: A SINGLE-CENTER EXPERIENCE Audelia Eshel Fuhrer, Dr; Yevhenii Yakir, Dr; Igor Sukhotnik, Prof; Yoav Ben-Shahar, Dr; Tal Koppelmann, Dr; Dept Pediatric Surgery, Dana-Dwek Children's Hospital, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

Background: Inguinal hernia repair is a commonly performed procedure in children. Advanced laparoscopic techniques allow us to perform a transinguinal laparoscopic evaluation (TILE) in addition to the traditional open inguinal repair, or an abdominal laparoscopic procedure. A transcutaneous laparoscopic procedure is executed under visualization with an umbilically placed 5-mm scope and a 2-mm stab incision for suturing the neck of the sac. We aimed to compare all three methods described for inguinal hernia repair in children, in a single institution.

Methods: A retrospective cohort study including all children aged 0-18 years who underwent inguinal hernia repair at our institution from January 2018 to March 2020. All patients were divided into three experimental groups: Group A- traditional open inguinal repair; Group B- open inguinal repair+ TILE; Group C- transcutaneous laparoscopic procedure. The main outcomes included: operative time, change of planned side, length of hospital stay, recurrence rate and complications.

Results: Our cohort consisted of 215 children out of which 151 (70%) were boys. Median age was 5 months. 106 children underwent open surgery (49%), 72 children underwent open repair+ TILE (33%) and 37 children underwent laparoscopic repair (17%). A total of 15% of all unilateral planned repairs were switched intraoperatively to bilateral repair due to surgical findings (28/190). A switch was made in 29% of open with TILE group (21/72) and in 19% of laparoscopy group (7/37). Laparoscopy group had significantly shorter operating time compared to the open group (diff=8 minutes, $p=0.008$) and open+ TILE group (diff=16 minutes, $p<0.001$), accounting for laterality. Median postoperative length of stay was 2 days, with no significant differences between the groups ($p=0.270$). Overall recurrence rate was 2%, with laparoscopy group having significantly higher rates compared to the open+ TILE group (5.4% vs. 0% respectively, $p= 0.046$) and no significant difference compared to the open group (2.8%, $p=0.463$). Open surgery group had significantly higher rates of minor complications compared to the other groups, including: surgical site infection, immediate or late post-operative hematoma or edema and hydrocele, with 3.5 times higher rates compared to open+ TILE group ($p=0.003$) and 5.6 times higher rates compared to laparoscopy group ($p= 0.007$). Testicular atrophy occurred in 3 cases of the male cohort (2%), with no cases observed within the laparoscopy group and no significant differences comparing the groups ($p=0.769$).

Conclusion: Our study shows that laparoscopic inguinal hernia repair in the pediatric population is a safe and feasible option, baring potentially lower complications risk, same length of stay and shorter operating time, compared to the other techniques presented. The most prominent advantage of laparoscopic repair is the ability to evaluate the contralateral side, entailing a conversion to a bilateral repair subsequently reducing the risk of metachronous contralateral inguinal hernia. Other benefits include sparing spermatic cord handling, superior cosmetic results and an alternative approach of repair in cases of recurrence.

S048 RAPID ADOPTION OF LAPAROSCOPIC INGUINAL HERNIA REPAIR IN INFANTS – ANALYSIS OF SAFETY AND EFFICACY Melanie Justice; Camille Meschia; Robin Petroze; Shawn Larson; Janice Taylor; Moiz Mustafa; Saleem Islam; University of Florida

Purpose: Pediatric inguinal hernia repairs are one of the most common elective procedures performed. The standard approach over decades has been an open repair with high ligation of the hernia sac. However, With the advent of laparoscopy, , there has been a shitf away from the standard open repair with high ligation of the hernia sac. The purpose of this study was to describe the shift over time from open to laparoscopic repair, understand the patient selection, and evaluate outcomes.

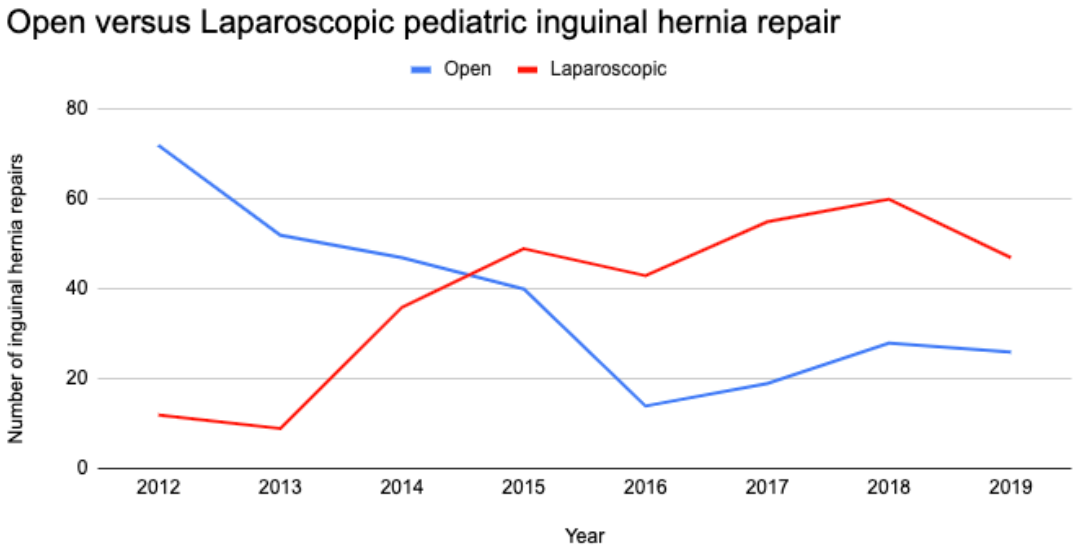
Methods: All patients under 2.5 years who underwent an inguinal hernia repair during the study period (2012-2019) were included. Demographic, clinical, operative, and post-operative data were collected. Univariate analysis was used to compare the open and laparoscopic groups.

Results: 616 inguinal hernia repairs were performed, with 314 laparoscopic and 302 open. Mean gestational age at birth was 33.7 weeks with a mean birth weight of 1.87 kg. The average age at diagnosis was 137 days with repair being done at 178 days of life. The laparoscopic procedure became the predominant method for infants in only 3 years after adoption of the method. Comparison (see Table 1) reveals that patients selected for laparoscopy were significantly smaller as well as more premature. In addition to a high proportion of NICU repairs (33 vs. 19.5%, p=0.001), there was also significantly more black patients (37.7 vs. 28.8%, p=0.001) and a larger percentage of public insurance (69.7 vs. 50%, p=0.001) in the laparoscopic group. Recurrence rates were higher with laparoscopy (13/313 vs. 3/302, p=0.02), and were more common in the first half of the study, while open repairs had more metachronous contralateral hernias.

Conclusions: These data show that our practice shifted to laparoscopic repairs in infants to become the predominant method. The laparoscopic approach was noted to be both effective and safe even in smaller and higher risk patients. Further analysis and multicenter studies would be helpful in understanding the evolving role of laparoscopic inguinal hernia repair in infants.

Table 1

	Laparoscopy (n=314)	Open (n=302)	p value
G. Age (wks)	32.07	34.92	<0.001
Age at dx (days)	62	179	<0.001
Wt at surgery (kg)	4.31	5.94	<0.001
Duration of OR (min)	84	86	0.57
Bilateral repair (%)	50.5	20.9	<0.0001
GA/Intubation(%)	98.7	49.1	<0.0001
Incarceration(%)	15	10	0.42
Males(%)	79.9	91.4	<0.001
BPD(%)	26.5	13.9	<0.001
Metach. hernia (n)	0	8	0.003



S049 SKIPPING THE CORD IN LAPAROSCOPIC PIRS: IS IT REASONABLE? Ergun Ergun[1]; Beytullah Yagiz[2]; [1]Ankara University Faculty of Medicine, Department of Pediatric Surgery; [2]Ondokuz Mayis University, Faculty of Medicine, Department of Pediatric Urology

Introduction: Laparoscopic inguinal hernia repair in children was introduced as a minimal invasive method. One of the most common methods was percutaneous internal ring suturing (PIRS) which was described nearly 15 years ago. The principal of the procedure is preperitoneal dissection of internal inguinal ring and to place a purse-string suture containing the whole peritoneum on the ring. However, the main concern is trapping the spermatic cord and/or damaging the vasculature of testes in the male patients. This may be avoided with a careful dissection or in some cases, the surgeon may skip the peritoneum just over the cord and/or the vessels. The aim of this study is to compare the recurrence and hydrocele rates of children in whom the peritoneum on the cord and/or vessels was skipped and did not during laparoscopic PIRS repair.

Material and methods: The charts of children who underwent laparoscopic PIRS repair between 2017-2019 due to inguinal hernia were analyzed. Recurrence and complications were evaluated. The video records were watched and the data on skipping (group 1) or not skipping (group 2) the cord and the vessels was noted. Then recurrence and complication rates were compared between these two groups.

Results: There were 107 children who underwent surgery. 19 of them were excluded from the study due to lack of operation videos, 40 of them since they were girls and two because of the conversion to open surgery due to anesthetical considerations. Among the rest 46, 21 children had right, 18 had left and 7 had bilateral inguinal hernia. In total 53 inguinal hernia repair was performed. The video investigation was revealed there were 22 hernias in group 1 and 31 hernias in group 2. There were one recurrence in each group. No other postoperative complications were observed.

Conclusion: Even though the principal of this surgical procedure is to close the internal inguinal ring closely, sometimes -on purpose or not- this may not be possible. For avoiding spermatic cord or vessel damage, skipping the cord seems an acceptable path which seems not to increase recurrence or complication rates and also ensures spermatic structures' safety.

S050 LAPAROSCOPIC RECURRENT INGUINAL HERNIA REPAIR IN CHILDREN WHO UNDERWENT OPEN PROCEDURE Ergun Ergun[1]; Beytullah Yagiz[2]; [1]Ankara University Faculty of Medicine, Department of Pediatric Surgery; [2]Ondokuz Mayis University,Faculty of Medicine, Department of Pediatric Urology

Introduction: Inguinal hernia is one of the most common surgical diseases in childhood. Besides conventional open repair, recently laparoscopic methods has become more common. Each method has a recurrence rate of 1-2%. Open repair of recurrent inguinal hernia may challenge pediatric surgeons due to the difficulty in dissection of hernia sac from important and delicate structures such as spermatic cord and testicular vessels. On the other hand, laparoscopic approach offers an easier repair without engaging these. The aim of this paper to present the experiment in laparoscopic repair of recurrent inguinal hernia.

Material and Methods: The children who underwent laparoscopic inguinal hernia repair due to recurrent disease between 2015-2019 were included. Laparoscopic percutaneous internal ring suturing with non-absorbable sutures was performed in all patients. All children had open inguinal hernia repair primarily.

Results: A total of 20 children were operated(19 boys and 1 girl). Mean age of the children was 4.4 years(3 months-17 years) and mean weight was 21 kilograms(4.5-56). There were not any intraoperative adhesions or secondary findings due to the first operation. There were no intraoperative complications. Mean follow up time was 16.6 months. No recurrence or any other postoperative complication was observed.

Conclusion: Laparoscopic assisted percutaneous internal ring suturing method may be favourable in children with recurrent inguinal hernia who underwent open inguinal hernia repair previously. Thus possible harm to the cord and the vessels due to the scars of primary operation may be avoided.

S051 SINGLE INCISION LAPAROSCOPIC PERCUTANEOUS EXTRAPERITONEAL CLOSURE OF INTERNAL RING FOR INCARCERATED INGUINAL HERNIA IN CHILDREN: A SINGLE CENTER EXPERIENCE WITH 102 CASES Tran N Son, PhD; Hoang V Bao, Dr; Saint Paul Hospital, Hanoi, Vietnam

Objectives: To present our experience of single incision laparoscopic percutaneous extraperitoneal closure of internal ring (SILPEC) for incarcerated inguinal hernia (IIH) in children.

Methods: Medical records of all children undergoing emergency SILPEC for IIH after unsuccessful attempted manual reduction at our center between June 2016 and September 2020 were reviewed. For SILPEC, one 5.5mm port for the camera and one 3.5mm port for the grasper were placed at a single umbilical incision. The hernia was reduced by combined external manual pressure and internal pulling with a bowel grasper. A 17G epidural needle and a small wire–lasso were used for extraperitoneal closure of the internal ring. Contralateral persistent processus vaginalis (CPPV) was treated in the same procedure.

Results: In total 2904 consecutive patients with inguinal hernia (IH) underwent SILPEC during that period, 104 patients (3.6%) had IHH. There were 84 boys (80.8%) and 20 girls (19.2%) with a median age of 18.5 months (ranged 1 month to 11 years). 63.5% of patients had IHH on the right and 36.5% - on the left side. At the time of surgery under general anesthesia, IHH was found spontaneously reduced in 26.9%; the hernial contents were bowel in 52.9%, great omentum in 13.5%, and ovary in 6.7% of the patients. All these hernias were reduced successfully without conversion or additional ports. In an infant with incarcerated terminal ileum - cecum –appendix, a cecal perforation was found; the cecum was brought to the minimally extended umbilical incision and the perforation hole was sutured. In one case with a nonviable necrotic ovary, oophorectomy was performed. CPPV was detected intraoperatively in 44.2%. Median operative time was 24 minutes for unilateral and 30 minutes for bilateral procedures. There were no intraoperative complications. Postoperative transient hydrocele was noted in 4.5% of the patients. The median postoperative stay was 2 days. At a median follow-up of 21 months, there was no case of hydrocele, testicular atrophy, or iatrogenic cryptorchism. Recurrence occurred in 2 patients (1.9%). Compared to the 1.5% recurrence rate of 2800 patients with non-incarcerated inguinal hernia undergoing elective SILPEC during the same period, there is no significant difference (p=0.669)

Conclusions: SILPEC for IIH in children is feasible, safe, with excellent postoperative cosmesis. There is no significant difference in the recurrent rate between emergency SILPEC for IHH and elective SILPEC for non-incarcerated IH.

S052 EXPERIENCE IN PERFORMING SINGLE-INCISION LAPAROSCOPIC PERCUTANEOUS EXTRAPERITONEAL CLOSURE FOR ABDOMINOSCROTAL HYDROCELE: A MINIMALLY INVASIVE APPROACH WITHOUT EXCISING THE HYDROCELE SAC Takahiro Jimbo, MD, PhD; Kouji Masumoto, MD, PhD; Hajime Takayasu; Toko Shinkai; Ysuhisa Urita; Kentaro Ono; Fumiko Chiba; Takato Sasaki; Yudai Gotoh; Tsubasa Aiyoshi; Nao Tanaka; Yasunari Tanaka; Akari Ito; Tetsuta Mizusaki; Tsukuba University

Introduction: Abdominoscrotal hydrocele (ASH) is characterized by a large scrotal hydrocele that communicates in an hourglass fashion with an abdominal component through the inguinal canal. ASH is most commonly treated by the excision of the large hydrocele sac through an inguinal approach. This approach can be difficult and it may lead to complications, because a large and thickened sac can sometimes obscure the spermatic cord. Various surgical approaches have so far been described, however, no clear consensus treatment modality has yet been established. Laparoscopic repair for standard pediatric hydroceles has also been described. On the other hand, the number of laparoscopic repairs for ASH described in the literature is mostly limited. We herein describe our experience utilizing a laparoscopic approach for ASH using a single-incision laparoscopic percutaneous extraperitoneal closure (SILPEC) technique.

Methods and results: Three patients were treated for ASH. Two patients were preoperatively diagnosed to have ASH by ultralsonography. All patients underwent SILPEC, which is recognized as the standard procedure for repairing inguinal hernias and standard hydroceles in Japan. The average operative time was 73 minutes. The scrotal hydrocele was pushed into an inguinal canal under pnuemoperitoneum in two of the three patients and we could clearly recognized the orifice of the internal inguinal ring. The other patient had a rare type of hydrocele that filled the scrotum and extended through the inguinal canal and into the extra-peritoneal space along with the spermatic duct(Fig.1). In all three cases, the Processus vaginalis (PV) could be clearly identified at the internal inguinal ring. In two of the three patients, we were able to perform standard SILPEC after the scrotal hydrocele was fenestrated and pushed into the inguinal canal. One patient with a scrotal hydrocele that extended into the extra-peritoneal space was treated with a simple closure of the PV by SILPEC. There were no intraoperative complications. In addition, there has been no recurrence during the 18-month average follow-up period.

Discussion: ASH are recognized to be an uncommon type of hydrocele and the PV and hydrocele usually tightly adhere to them. As a result, the excision of the hydrocele sac is often challenging due to such adhesions between the sac and the spermatic vessels and vas. Compared to common hydroceles, perioperative complications have been reported to include injuries to the vas, testis atrophy, and hematoma. On the other hand, we could recognize and evaluate the PVs in the operative field of SILPEC and we did not experience any adhesion around the scrotal hydrocele sac. Therefore, the simple closure of the PV could be performed by utilizing the SILPEC procedure. These techniques are considered to be a minimally invasive approach for performing dissection between the PV and spermatic cord. Our experience and the findings of previous reports regarding the laparoscopic approach for ASH still consist of a small number of studies owing to the rarity of ASH. We need to assess a larger number of laparoscopic approaches for ASH in order to elucidate the effectiveness of each different approach.

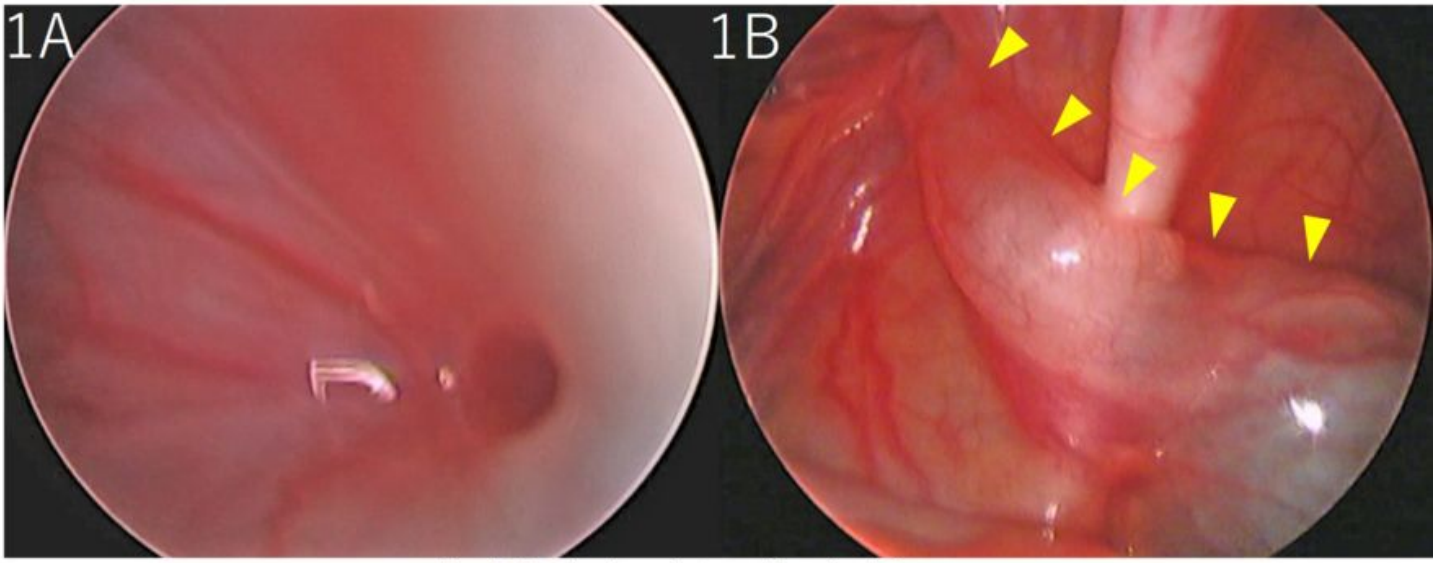


Fig.1 The findings internal inguinal ring
1A: Processus vaginalis(PV), 1B: hydrocele along with spermatic duct (arrowhead)

S053 LAPAROSCOPIC MANAGEMENT OF INFANTILE HYDROCELE IN PEDIATRIC AGE GROUP Ahmed Elhaddad, MD; Sherif Shehata, MD; Mohamed Shehata, MD; Mohamed Awad, MD; Pediatric Surgery Unit, Surgery Department, Faculty of Medicine, Tanta University, Egypt.

Introduction: Persistent patent processus vaginalis PPV is a common cause of hydroceles in children and explains approximately 60% of the cases in infants. Despite its spontaneous regression, yet 10 % may need surgical intervention. Laparoscopic hydrocelectomy for different types of hydrocele in pediatric age group is still growing and need to be investigated to reach guidelines.

Patients and methods: 60 patients with infantile hydrocele were studied with the inclusion criteria (appearance of hydrocele after 1 year of age, persistence beyond 1 year of age, presence of a reducible or communicating hydrocele and presence of cord hydrocele). For all patients three ports were used one at the umbilicus for optic and the other two working on both sides. On the same side internal inguinal ring IIR, the type of hydrocele were evaluated and managed laparoscopically. In addition the contralateral IIR was examined and managed accordingly.

Results: The internal inguinal ring IIR on the same side was closed in 5 cases (Type I) and patent (Type II and III) in 55 cases (91.75%) with the difference in its shape [open IIR in 20 cases 33% (Type II), covered by peritoneal seal in 8 cases 13% (type II), narrow communication with hydrocele (pin hole) in 16 cases 27% (type II), open IIR with no communication in 11 cases 18% (type III)]. Communicating hydrocele (type II) (44 cases) was managed through excision of the sac as far as possible, evacuation of hydrocele then closure of the IIR. Type III A and Type III B were managed similarly in addition to delivery of the encysted part (one or two cysts), evacuation followed by excision of a wide ellipse of the wall. Type I with closed ring, the peritoneum was opened laterally and the cord dissected, with the help of external compression the hydrocele evacuated and the lateral wall of the tunica vaginalis was excised and the IIR was closed. The contralateral IIR was open in 80% of cases and dissection of the sac and closure of the ring was done.

Conclusion: laparoscopic hydrocelectomy is safe, applicable and feasible for management of different types of hydrocele in pediatric age group. The IIR is patent in nearly all cases with/out communication to the hydrocele. The contralateral IIR can be managed in the same session. Laparoscopic hydrocelectomy with/out hydrocelotomy and IIR closure is essential in preventing recurrence.

NB: The classification was based on this reference {Chang YT, Lee JY, Wang JY, Chiou CS, Chang CC. Hydrocele of the spermatic cord in infants and children: its particular characteristics. Urology. 2010;76(1):82}.

S054 MINIMALLY INVASIVE TOTAL EXTRAPERITONEAL VARICOCELE REPAIR – FIRST DESCRIPTION IN CHILDREN Raphael N Vuille-dit-Bille, MD, PhD; Vivienne Sommer-Jörgensen, MD; Stefan G Holland-Cunz, MD; Martina Frech-Dörfler, MD; Department of Pediatric Surgery, University Children's Hospital of Basel, Switzerland

Introduction: The aim of the present study was to report the first two pediatric cases treated with minimally invasive total extraperitoneal varicocele repair (MITEV) using the total expraperitoneal (TEP) approach.

Materials and Methods: Two male adolescents (12 and 13 years) were included in the present study, both with unilateral grade III varicoceles and ipsilateral testicular hypotrophy. A 5mm camera port was inserted just below the belly button and two 5mm working ports were used, one above the symphysis in the midline and one in the left lateral hemiabdomen just below the arcuate line.

Results: Operation times were 61 and 48 minutes. There were no intra- or postoperative complications. The peritoneum was not perforated, and the abdominal cavity was not entered. Both patients had complete resolution from varicoceles on follow-up clinical exam and ultrasound performed six months after surgery.

Conclusion: MITEV reflects a new minimally invasive access to the retroperitoneum in children with varicocele.

S055 IPEG 2020: THE VIRTUAL VIENNA EXPERIENCE Bethany Slater, MD[1]; Matthew Clifton, MD[2]; Samir Pandya, MD[3]; [1]University of Chicago; [2]Emory University; [3]UT Southwestern Medical Center

Introduction: The COVID-19 pandemic forced the cancelation of conventional in-person academic conferences due to the risk of virus transmission and decreased ability to travel. The International Pediatric Endosurgery Group (IPEG) decided to have its annual 2020 meeting virtually. The content was divided into video and podium content. The video content was distributed via social media, email and via a pediatric surgery based app at a rate of 3 videos per week for 13 weeks. The podium presentations were presented over four 2-hour virtual sessions. These presentations were pre-recorded. The investigators were invited to the live event and large, live moderator panels facilitated the discussion. A widely available video conferencing platform was used.The purpose of this abstract is to describe the main lessons learned as well as the advantages and disadvantages of the virtual meeting.

Methods: The logistics, structure, and participant numbers were reviewed. The performance of the video content was based on number of impressions, plays and embeds. Interviews were conducted with a few key opinion leaders of the IPEG leadership. In addition, post-meeting surveys were conducted to elicit feedback.

Results: Video content was viewed on average 117 times (1 – 390) with an average of 57 plays (0 – 223) and 151 embeds (0 – 151). There was an obvious increase in viewership towards the latter period. With regards to the live events, the average number of registrants was 541 (359 – 701). The average number of actual attendees was 226 (188 – 284), making it approximately a 43% attendance rate. Participants registered from 123 different countries and Antartica was the only continent from where there were no participants. The ratio of non-member to member was 3:1.

Discussion: The main advantage of the virtual meeting was the ability to attract more participants from a wider catchment area due to the lack of expense, travel restrictions, and time commitment. In addition, given that session were recorded, they could be viewed on participant's own time and contributed to enduring material. The main disadvantages include the loss of in-person networking, possible technical issues (although this was not seen during the meeting). Our main difficulty was to coordinate the timing across different time zones for the live sessions.

S056 EFFECTIVENESS OF TELESIMULATION FOR MINIMAL INVASIVE SURGERY (MIS) ESSENTIALS SKILLS TRAINING. INITIAL EXPERIENCE IN A PEDIATRIC SURGICAL SIMULATION CENTER. Georgina Falcioni, MD; Hsien C Yang, MD; Maximiliano A Maricic, MD; Susana P Rodriguez, MD; Maria M Bailez, MD; Hospital de Pediatria Dr. JP Garrahan

Introduction. Since 2012, we have been developing low-cost models for MIS hands-on training adopted in mentor-guided, cognitive-comprehensive surgical training modules. As a special request, we introduced the Essentials Skills Training Module(ESTM) and shared it with IPEG(Mastery Learning Essentials^{TM}), with the aim of providing effective training tools in MIS.

In the context of the COVID-9 pandemic, access to in-person training activities had temporarily been interrupted; however, we believed that MIS training remained crucial and must not be postponed. With previous experience in MIS-telementoring, we adopted the ESTM for the implementation of a tele-assisted training module(T-ESTM).

Objective. To evaluate the effectiveness of T-ESTM for development of MIS essential skills.

Materials and Methods. We recruited residents and surgeons from different institutions. The academic lectures, tutorials for ergonomics, training-model assembly, and 7 performance tasks were accessed through an online campus. T-ESTM was scheduled into 2 sessions of 3 hours through the Zoom® virtual meeting platform.

Each participant was tele-assisted by one experienced and standardly trained educator. Initial(pre-telementoring) and final(post 5-hour telementoring) assessment scoring (adapted from GOALS) as well as timing for Task 2(circle-cutting pattern), 3 (extracorporeal Roeder knot) and 5 (intracorporeal Square knot) were registered.

Mean and SD were calculated and paired t-test used for comparison data with the STATA12.0 software program.

Results. 25 participants were recruited. The mean age was 30±5.6 years. 83.1% were surgical residents and 20.8% surgeons. 56% performed low complexity procedures. 45.8% had experience with simulation training. 82.8% perceived themselves to have low level of training in MIS.

Table 1. Score assessment registration

Score	Initial Assessment Mean±SD	Final Assessment Mean±SD	Mean Difference(%)	P-value
Task2	14±2.4	16.6±1.8	2.6(16.3%)	p<0.001*
Task3	15.1±4.1	19.5±3.2	4.4(21%)	p<0.001*
Task5	19.7±4.5	25.8±3.6	6.1(25.5%)	p<0.001*

Table 2. Time assessment registration

Time	Initial Assessment Mean±SD	Final Assessment Mean±SD	Mean Difference(%)	P-value
Task2	408.8±125.6	257.2±87.6	-151.6(37%)	p<0.00001*
Task3	317.9±278.0	181.0±141.2	136.9(43.17%)	p<0.0004*
Task5	484.6±469.9	252.8±155.2	-231.8(47.83%)	p<0.018*

Discussion. Our experience in MIS education has been previously reported. The challenge was to reproduce the equivalent effectiveness of the ESTM through telesimulation strategies. We observed statistically significant improvements in the scoring and reduction in time for all the assessed tasks. Our data support MIS telesimulation as a reproducible and effective educational tool for remote hands-on performance training, as well as the replicability of our didactics and pedagogical approach.

S057 THE FUTURE OF MIS EDUCATION. ADVANTAGES OF TRAINING SIMULATORS AND OF ONLINE, WORLDWIDE CAPACITATION. Enrique Buela[1]; Carolina Millan[1]; Soledad Valverde[1]; Ignacio Diaz Saubidet[1]; Ruth Kaller[1]; Mauricio Copete[2]; Juan Duenas[2]; Dario Varona[2]; Carlos Melo[2]; Fernando Rabinovich[1]; Santiago Calello[1]; Gaston Bellia Munzon[1]; Pedro Villamizar Beltran[2]; [1]Fundacion Hospitalaria; [2]Clinica Imbanaco, Cali, Colombia

Background: Simulators are emerging with the development of medical engineering technology and virtual training.

Objective: To describe the course´s baseline experience and self-reported evaluation of MTBOX1 simulators, remotely operated by surgeons worldwide, with different levels of experience in laparoscopic pediatric surgery. To report the benefits of the MTBOX1 simulator, virtual assessment and instructor´s training to practice at home, at the office, etc. instead of traveling for a presential course that doesn´t let you reproduce the simulator and lasts 2-3 days only.

Methods: Each trainee received at home the already validated MTBOX1, manufactured with polypropylene and 3D printed parts, covered in thermoformed EVA foam, simulating the abdominal wall of a small infant (Figure 1). Also, 3/0 Ethibond sutures and 5-mm laparoscopic surgical instruments were provided.

The last 5 courses enrolled 46 surgeons from 9 different nationalities, who were classified into 3 groups according to their level of experience and to the number of patients operated on with MIS during 2019: G1: novice (<10), G2: intermediate (10-60), G3: expert (<60). MIS tasks to be fullfilled were:

- Transference
- Dissection
- Extracorporeal knots
- Suture and intracorporeal knots
- Resection and anastomosis of tubular sutures

Theoretical and audiovisual material of progressive learning was sent through the online platform Classroom. Each class had a duration of 3 hours through Zoom platform. Each instructor interacted with no more than 2 students per encounter. He had a vision composed of three cameras to score their advances and difficulties:

- internal vision of the endocamera (to evaluate the execution of the exercise);
- lateral vision through an auxiliary device - smartphone/Tablet (to evaluate ergonomics);
- frontal vision using a computer (to evaluate ergonomics and extracorporeal knots performance) (Figure 2)

Participants completed their progress and self-assessment surveys consisting of a 17 item questionnaire. The score of each exercise per participant was moreover obtained by dividing the time to finish it, by the number of objectives effectively accomplished. Instructors evaluated participant´s progress objectively, regarding ergonomics and MIS skills acquisition, by constant monitoring of their performance and by recording in an excel database useful data to be analized using different statistical softwares as SAS, INFOSTAT, etc.

Results: 100% of the participants were able to organize their personal “training gym” with ease. 100% of the participants gave a very favorable opinion about the simulator regarding appearance, cavity size, features of both the multifunctional tray and exercising models, in addition to the ability of practicing and generating new skills, without inter-group differences; $p<0.01$ according to a two-way ANOVA test. In G1–G3, the scores of the different exercises in correlation with the level of previous experience with MIS, resulted in $p<0.01$, again, according to a two-way ANOVA test.

Conclusion: In our experience, online education and training is effectively possible through an organized platform. The data obtained from the 5 different courses demonstrate the MTBOX1 simulator can shorten learning curves, improve technical skills acquisition, and hasten both ergonomics and competency.

S059 USEFULNESS OF SHORT-TERM TRAINING USING A DISEASE-SPECIFIC NEONATAL ESOPHAGEAL ATRESIA SIMULATOR FOR PEDIATRIC ENDOSCOPIC SURGERY

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BACKGROUND: Highly advanced surgical skills are required to perform neonatal endoscopic surgery because of the remarkable difficulties associated with the small working space and fragility of tissues. In particular, thoracoscopic esophageal atresia/tracheoesophageal fistula (EA/TEF) repair in neonates is technically difficult. Moreover, pediatric surgeons have limited opportunities to perform these endoscopic operations compared with general surgeons due to the small number of patients. In order for pediatric surgeons to efficiently master the necessary skills and safely perform this operation, it is necessary to enhance off-the-job training specific to pediatric surgery. Therefore, we developed a newborn EA/TEF model that replicates the disease's specific anatomy and texture of the organs and membranes, and on which a trainee can perform endoscopic surgical manipulations such as dissection and ligation. Our aim was to evaluate the effectiveness of a short-term endoscopic surgical skill training program using the EA/TEF model.

METHODS: Twenty-three inexperienced undergraduate university students underwent a two-day endoscopic intracorporeal suturing training program, consisting of lectures, box training and EA/TEF model training. They were divided into two groups: a group trained only using the dry box (11 persons; DB) and a group trained using the esophageal atresia model (12 persons; EA). In endoscopic surgical skill assessment using the esophageal atresia model of both groups before and after the training, task time, forceps movement, and two skill assessment methods (i.e., the 29-point checklist method and the error assessment sheet method) using each participant's video were analyzed.

RESULTS: Both short-term training programs improved the accuracy of the procedure as assessed by the 29-point checklist method (DB : $P = 0.012$, EA : $P < 0.001$) and reduced the number of error manipulations as assessed by the error assessment sheet method (DB : $P = 0.045$, EA : $P < 0.0001$). However, in the skills assessment after training, the EA group had a significantly smaller number of errors ($P=0.039$) and was able to manipulate both forceps more cooperatively than the DB group ($P=0.002$). Also, only in the EA group, the task completion time ($P < 0.001$), sum of the total path length of both forceps (right : $P = 0.002$, left : $P < 0.001$) and the number of manipulations of both forceps (right : $P = 0.007$, left : $P < 0.001$) significantly improved after the training.

CONCLUSION: In both groups, the respective short-term training program improved their surgical skills, but the EA group showed significantly fewer errors than the DB group. Therefore, short-term endoscopic surgical skill training using an EA/TEF model may shorten the time needed to obtain the required surgical skills. In the future, we would like to clarify whether the endoscopic surgical skills acquired in training using this model are useful in actual thoracoscopic EA/TEF repair.

S060 MTBOX1 TAKE-HOME TRAINING MODEL Ruth Kaller; Soledad Valverde; Ignacio Diaz Saubidet; Gaston Bellia Munzon; Enrique Buela; Santiago Calello; Fernando Rabinovich; Carolina Millan; Fundación Hospitalaria, Argentina

Background: The unique set of skills required in pediatric laparoscopic surgery highlight the need for new training methods that reduce the need for trainees´ supervision in the OR and long learning curves. Simulation training was developed to meet this need and to allow practicing abilities and ergonomics in a particularly small cavity without putting the patient at risk. Simulation on animal models could additionally be replaced by these new training methods thus enabling a more ethical, ecological and respectful practice; that does not harm other vulnerable, perceptive living beings.

Even though access to training, guidance during training, and mandatory training requirements are expected to make take-home training not just feasible but also effective, the only validated system that has been described for junior to senior surgeons is the MTBOX1, consisting of a 3D-printed simulator and multi-task fixable tray, an online theoretical and practical course, instructor´s remote supervision during a month long period of competitive training, and at last, an objective evaluation system. The latter consisted of a modified OSATs scale[1] for both self-evaluation and expert teams´ evaluations and follow-up of junior to senior surgeons.

Trainees had to perform basic laparoscopic surgery maneuvers as, positioning trocars under vision, demonstrating the appropriate use of dominant and non-dominant hand and making intracorporeal stitches and extracorporeal knots.

Objectives: The purpose was to compare MTBOX1 take-home training model with others reported for pediatric laparoscopic surgery.

Materials and Methods: The current knowledge on training off-site with take-home pediatric laparoscopic simulators were retrospectively reviewed by accessing to major databases as Pubmed, Embase, Medline, Cockrane index, Google Academics, etc.

Results: There were no systematic reviews or meta-analysis. Papers mostly described the practicing of specific skills for particular MIS in children. Very few papers were about the acquisition of basic MIS skills. But none of them was directed to all kind of surgeons, with different levels of experience in pediatric laparoscopic surgeries, aided by a virtual training course, experts´ supervision and an objective evaluation system.

After a few sessions of simulation, junior trainees (G1) reached the same level of basic technical skills on pediatric laparoscopic surgery, which senior trainees (G3) reached after at least 2–3 years of presential MIS in the OR. Also, the execution time improved after the simulation training. This difference persisted even when comparing junior and senior trainees. This data is in contrast with other papers already published on this issue. Though it should be emphasized that, in our study, the number of participants per course were a little bit higher with qualitative and quantitative differences in their surgical experience. All the trainees reported self-assessments that matched with the evaluation of external observers demonstrating the importance of simulation as a reliable auto-evaluation test ($p<0.05$).

Conclusions: Authors found that off-site training was feasible, that training at home allowed for distributed learning, that self-rating could guide unsupervised training, and that mandatory training requirements and testing strongly influence training patterns.

Key Words: MTBOX1; take-home; training model; pediatric MIS

[1]OSATS: Objective structured assessment of technical skills

V013 IMPROVEMENTS IN PEDIATRIC SURGERY SIMULATION WITH USE OF SILICONE MODELING Maria C Mora, MD; Karen A Diefenbach, MD; Nationwide Children's Hospital

Simulation in pediatric minimally invasive surgery has continued to expand over the last decade in both foundational skills and procedure-based simulation. Using simulation for rare anomalies such as choledochal cysts can increase exposure to these conditions. US trainees average 1-2 choledochal cyst excisions per year. Practicing pediatric surgeons may see less than one per year. Neither may see a minimally invasive approach. We present a choledochal cyst model for a hepaticoduodenostomy using a minimally invasive approach. This model can be used as an adjunct to improve skills outside of the operating room. All components except for vascular structures are fabricated using molds and various types of silicone to simulate the appearance, texture, and mechanical properties of the representative structures. Essential steps of the procedure are demonstrated along with operative footage aligning with these steps. Initial reviews of this model have been very positive. However, additional evaluation and validation are required.

S061 THORACOSCOPIC LOBECTOMY FOR CONGENITAL LUNG DISEASE IN INFANTS AND CHILDREN: A QUARTER OF A CENTURY EXPERIENCE WITH OVER 560 CASES. DEFINING A NEW STANDARD OF CARE. Steven Rothenberg; Rocky Mountain Hospital for Children

Objectives: This study evaluates the safety and efficacy of thoracoscopic lobectomy for congenital lung lesions in infants and children.

Materials and Methods: From January 1994 to October 2020, 564 patients underwent video-assisted thoracoscopic lobe resection for CPAM, Sequestration, and CLE. All procedures were performed by or under the direct guidance of a single surgeon. Ages ranged from 1 day to 14 years, and weight from 2.4 to 78 kg. Preoperative diagnosis included CPAM/sequestration (n=533), and CLE (n = 31). An additional 55 patients underwent lobectomy for severe bronchiectasis or malignancy and were not included. The primary mode of hemostasis was vessel sealing, and airway management was by endoclips and endoscopic stapler.

Results: 562 of 564 procedures were completed thoracoscopically. Operative times ranged from 25 minutes to 240 minutes (average, 115 minutes). Average operative time when a trainee was the primary surgeon was 140 minutes. There were 137 upper, 45 middle, and 369 lower lobe resections. There were five intraoperative complications (0.91%), of which 3 (0.55%) required conversion to an open thoracotomy. The postoperative complication rate was 3.1%, and 3 patients (0.5%) required re-exploration for a prolonged air leak. Hospital length of stay (LOS) ranged from 1 to 8 days (mean 2.2) for those admitted for surgery. In patients < 5 kg and < 4 months of age (n=156), the average operative time was 85 minutes, and the LOS was 2.1 days. There were no conversions to open or blood transfusions in the last 15 years.

Conclusions: Thoracoscopic lung resection congenital lung lesions is a safe and efficacious technique and avoids the morbidity of a thoracotomy. With proper training and mentoring it is an exportable technique, which can be performed by pediatric surgical trainees. The procedures are safe and effective even when performed in the first 4 months of life. Early resection avoids the risk of later infection and malignancy. The minimal morbidity of this procedure should be considered when considering non-operative management of these patients.

V014 THORACOSCOPIC LEFT MIDDLE LOBECTOMY IN A PATIENT WITH SITUS INVERSUS AND DEXTROCARDIA Jonathan Durgin, MD; Brianna Slatnick, MD; Danielle Cameron, MD, MPH; Craig Lillehei, MD; Farokh Demerhi, MD; Boston Children's Hospital

This video demonstrates a thoracoscopic left middle lobectomy in a patient with situs inversus and dextrocardia. The patient is an 18-year-old male with Kartagener syndrome and ciliary dyskinesia. He was diagnosed with bronchiectasis at the age of 7 and was found to have a *Mycobacterium abscessus* infection at the age of 17. Respiratory cultures remained positive despite multiple courses of antibiotics. Cross sectional imaging displayed chronic collapse and severe bronchiectasis in the left middle lobe. No abscess nor cavitary lesion was seen. A multidisciplinary team recommended proceeding with a thoracoscopic left middle lobectomy to address the refractory infection.

The accompanying video demonstrates the key portions of the case including careful isolation of the middle lobe along with its venous drainage, arterial supply, and bronchus. The patient tolerated the procedure well and was discharged home on postoperative day 4. He had no complications at 1 month follow up.

S062 THORACOSCOPIC ANTERIOR VERTEBRAL BODY TETHERING FOR IDIOPATHIC SCOLIOSIS IN ADOLESCENTS Steven Rothenberg; Jaren Riley, MD; Rocky Mountain Hospital for Children

Introduction: Idiopathic Scoliosis is a significant problem in children and adolescents. Posterior fusion has been the gold standard but has many limitations including the need to wait for skeletal maturity, decreased spinal motion, and adjacent segment degeneration. A new technique, anterior vertebral body tethering (VBT) ,addresses these issues and avoids much of the morbidity of a posterior fusion.

Methods: Between May 2019 and October 2020 18 patients with idiopathic scoliosis underwent VBT. Ages ranged from 10 to 14 yrs, weight 32 to 54 Kg. 15 patients underwent a thoracic one-sided procedure from 7-8 vertebral bodies in length. Three patients had a double curve requiring a thoracic correction on one side and thoracolumbar on the other. The procedure was performed through a maximum of 4 port sites, the largest 15mm in size. Single lung ventilation was not required, and lung collapse was obtained by use of the Airseal insufflation system, (Conmed, Denver, Co.)

Results: All procedures were completed successfully thoracoscopically. There were no intra-op or post-operative complications. A chest drain was left in for an average of 2 days. The average hospital stay was 3.5 days. There have been no neurologic deficits. An immediate correction of up to 20% was obtained in all patients. While follow-up is limited all patients continue to exhibit growth and correction without complication.

Conclusion: Thoracoscopically assisted VBT is a safe and efficient technique. It avoids the morbidity of a posterior fusion or anterior thoracotomy. While early, the results look promising and further study is warranted.

S063 EFFICACY AND SAFETY OF PECTUS UP TECHNIQUE COMPARED TO THE MIRPE APPROACH TO CORRECT PECTUS EXCAVATUM. A PILOT STUDY Bernardo Núñez, MD; Natalia Álvarez, MD, PhD; Mireia Pérez-Gaspar, MD; Javier Jiménez, MD; Josué E. Betancourth, MD; Saioa Santiago, MD; Clara Esteva, MD; Javier Roberto Güizzo, MD; Paula Jiménez-Arribas, MD; Begoña San Vicente, MD; Hospital Universitari Parc Taulí Sabadell

Introduction: Minimally invasive repair of pectus excavatum (MIRPE) technique is the current most used surgical method for pectus excavatum (PE) correction.

Therefore, other procedures such as Pectus Up technique, described in 2016, have been implemented trying to combine both minimal invasive benefits of MIRPE without entering the thoracic cavity, avoiding its fearsome complications.

The aim of this study is to compare the results of Pectus Up technique (PUT) and Nuss procedure.

Materials and methods: Single center, unblind, non-randomized, prospective pilot study, involving 26 MIRPE and 23 PUT. The primary safety endpoint was the presence of surgical complications, and the primary efficacy endpoint was Haller index measured postoperatively int Pectus Up patients. Secondary endpoints were: intensive care unit (ICU) and hospital length of stay (LOS), duration of surgical procedure, and postoperative pain management. Comparison using chi-square, Mann-Whitney or Student “t” tests were used as appropriate

Results: There were no difference in median age (14.5 and 14 years), Haller index (4.63 and 4.17), or comorbidities. MIRPE and PU procedures showed no difference regarding major or minor surgical complications. The efficacy endpoint of PUT was measured 5.5 (1.5 – 12) months exhibiting a significant reduction in the Haller Index [4.17 (3.7 – 4.7) at baseline and 3.7 (2.9 – 4.1) postoperative, p=0.03]. PUT required less surgical time [60.4±15.5 vs 70.7±15.9 min, p <0.01) shorter ICU and hospital LOS (p<0.01, respectively), and required fewer days of peridural, intravenous and oral analgesia (p<0.01, respectively).

Conclusion: In this pilot study, Pectus Up technique was as safe as MIRPE approach and effective for the correction of PE. Reducing surgical time, ICU and hospital LOS, and achieving better postoperative pain control.

Further studies are warranted to validate these findings and to study long-term outcomes.

V015 A SIMPLE TECHNIQUE FOR NUSS BAR EXCHANGE IN METAL ALLERGY David M Notrica, MD, FACS, FAAP[1]; Dawn E Jaroszewski, MD[2]; Lisa E McMahon, MD, FACS, FAAP[1]; [1]Phoenix Children's Hospital; [2]Mayo CLinic College of Medicine and Science

Occasionally, patients undergoing the Nuss procedure develop or manifest problems that require removal and replacement of the bars prior to reaching the 2 to 3 year dwell period. This video demonstrates a simple technique for bar exchange that avoids an extensive dissection.

The existing bars are straightened. The replacement bar is curved on the left side only, with the right side straight. The replacement bar is then attached to the islet of the existing bar. The new bar is then drawn across the chest. A penetrating towel clip is placed on the left, and the bar is drawn over to the right as far as possible. Medial bends are then done, and the bar is pulled back into position under the muscle. Final lateral bend to the bar complete the shaping. The bar is then secured to the soft tissues without pericostal rib fixation.

S064 STAGED THORACOSCOPIC REPAIR OF LONG GAP ESOPHAGEAL ATRESIA Catarina Barroso, MD[1]; Ana Raquel Silva, MD[2]; Sofia Ferreira de Lima, MD[3]; Ema Santos, MD[3]; Inês Braga, MD[1]; Sofia Morão, MD[3]; Rafaela Murinello, MD[3]; Maria Knoblich, MD[3]; Cristina Borges, MD[3]; Rui Alves, MD[3]; Jorge Correia-Pinto, MD, PhD[1]; [1]Department of Pediatric Surgery, Hospital de Braga; Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho; [2]Department of Pediatric Surgery, Hospital de Braga; [3]Department of Pediatric Surgery, Hospital Dona Estefânia

INTRODUCTION: The surgical repair of long-gap esophageal atresia is still a challenge and there is no consensus on the preferred method of reconstruction. We used to perform thoracoscopic delayed primary esophageal anastomosis(DPA). More recently, we introduced the staged thoracoscopic repair with internal traction and reduced time interval between stages(SR). Herein, we report our results.

METHODS: We reviewed all patients with the diagnosis of long-gap esophageal atresia submitted to thoracoscopic repair, from 2013 to 2019, by our team in two different centers. All esophageal anastomoses were performed via thoracoscopy. In SR patients, a first stage was performed to apply traction between both esophageal pouches: One patient had previous thoracotomy with external traction of the lower pouch; Two patients were submitted to thoracoscopy for internal traction with two to three separate stitches that approximated the esophageal pouches. Following internal traction a second stage was scheduled in a short time interval. Data were collected regarding patient demographics, type of esophageal atresia, mortality, intra and postoperative complications, time to first feeding , length of stay, number of endoscopic dilations, presence of tracheomalacia and GERD.

RESULTS: We have performed thoracoscopic repair of long gap esophageal atresia in 6 patients (4 type A |1 type C|1 type D), in which 3 were DPA while 3 were SR. All patients were male; mean age at the time of surgery was 4.8 months and mean weight was 6300g. Four had been submitted to previous surgeries (2 gastrostomies; 1 fistula ligation and gastrostomy; and 1 external traction of the lower pouch and gastrotomy). In those submitted to SR with internal traction, second procedures were performed 12 and 19 days after the first stage. Results are presented at the table.

Table 1.Patients submitted to thoracoscopic repair of long gap esophageal atresia (n=6).

	Delayed Primary Anastomosis (n=3)	**Traction with Delayed Anastomosis (n=3)**
Intraoperative complications	2†	0
Postoperative complications	2§	2§
Mortality	1	0
Postoperative ventilation time (days)	6|10|-	28|8|28
Time to start feeding (days)	8|22|-	34|27|29
Number of dilations	6|5|-	7|4|0
Tracheomalacia	0	0
GERD	0	1
Follow-up (years)	7|1.6|-	1.8|1.5|1.2

We have considered there was significant tracheomalacia if the patient was submitted to aortopexy; and GERD if anti-reflux surgery was performed. † tracheal perforation in one case and unsuccessful anastomosis in other case(type D); § hydropneumothorax managed conservatively.

CONCLUSION: Even though patients submitted to SR were the most challenging cases, the results were similar or even better than DPA. Staged repair allowed for a comfortable, tension free anastomosis; while thoracoscopy and a reduced time interval between stages added the advantage of reduced adherence formation. Staged thoracoscopic repair of long gap esophageal atresia with short time interval between stages, might be the best approach for the repair of severe long gap esophageal atresia.

V016 MINIMALLY INVASIVE MANEUVERS FOR TYPE B TRACHEOESOPHAGEAL FISTULA AND LONG GAP ESOPHAGEAL ATRESIA: THORACOSCOPIC LIGATION, ENDOSCOPIC STENTING Woo S Do, MD; Christopher W Marenco, MD; Daniel G Cuadrado, MD, FACS; John D Horton, MD, FACS; Madigan Army Medical Center

This case presentation showcases the utility of minimally invasive techniques to address two challenging problems in long gap esophageal atresia with type B tracheoesophageal fistula: (1) the proximal pouch dissection and fistula ligation; and (2) the management of a subsequent anastomotic stricture. At the index operation, thoracoscopy was used to dissect and ligate the proximal tracheoesophageal fistula prior to conversion to open for completion of the esophageal anastomosis. When the subsequent anastomotic stricture failed to improve with dilations alone, endoscopic stenting was performed using self-expanding covered nitinol stents. Endoscopic stenting facilitated improvement in the stricture while allowing for longer intervals between procedures. In conclusion, minimally invasive techniques such as thoracoscopy and endoscopic stenting may provide unique advantages in appropriately selected cases of long gap esophageal atresia.

S065 GRAFT DILATATION AND BARRETT'S ESOPHAGUS AFTER ESOPHAGEAL REPLACEMENT IN LONG-GAP ESOPHAGEAL ATRESIA, A TWO CENTER COMPARATIVE STUDY

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Background: Esophageal replacements (ER) with gastric pull-up (GPU) or jejunal interposition (JI) used to be standard treatment for long-gap esophageal atresia (LGEA). The long-term effects regarding gastrointestinal functionality and anatomical changes however, are unknown.

The aim of this study is to evaluate long-term gastrointestinal function and anatomical changes in adolescents and adults after ER for LGEA.

Methods: A cohort study was conducted including all LGEA patients ≥16 years old who underwent JI or GPU between 1985 and 2003 at two tertiary centers in the Netherlands. Patients were asked to fill out the Reflux Disease Questionnaire (RDQ). Clinical assessment, contrast study and endoscopy with biopsy were performed in all patients. Data was collected prospectively.

Main results: Eleven JI patients and nine GPU patients were included. Median age at follow-up was 24.4 years for JI and 21.5 years for GPU patients. Dysphagia symptoms were reported in 45% of JI patients, compared to 18% of GPU patients (p=0.06). The RDQ showed reflux symptoms in 4/7 of JI patients compared to 6/7 of GPU patients . Barium contrast studies showed dilatation of the jejunal graft in five patients (46%) and redundancy in 36% of the patients. 91% of the JI-patients showed delayed passage of contrast. Endoscopy revealed columnar-lined esophagus in four GPU patients and Barrett's esophagus was histologically confirmed in two patients (22%).

Conclusion: Dilatation of the JI-graft occurs in half of the patients and may be the cause of their dysphagia. Reflux is a common problem after GPU. Barrett's esophagus was confirmed in 22% of the GPU patients, compared to none of the JI-patients. Increased awareness and surveillance is required for this patient group that has a potentially higher risk of intestinal metaplasia of the esophagus.

Keywords: long-gap esophageal atresia, jejunal interposition, gastric pull-up, Barrett's esophagus

S066 LONG-TERM OUTCOME OF CORRECTION OF LONG-GAP ESOPHAGEAL ATRESIA BY THORACOSCOPIC EXTERNAL TRACTION TECHNIQUE Stefaan Tytgat, MD, PhD; E. Sofie van Tuyll van Serooskerken, MD; Johannes Verweij, MD; David Van der Zee, MD, PhD; Maud Lindeboom, MD, PhD; University Medical Center Utrecht

Background: Thoracoscopic external traction technique (TTT) is a relatively new surgical intervention for patients with long-gap esophageal atresia (LGEA) that preserves the native esophagus. The major accomplishment with TTT is that esophageal repair can be achieved within days after birth.

This study evaluates the long-term outcome in LGEA patients treated with TTT, including gastrointestinal outcome, nutritional status and Health-Related Quality of Life (HRQoL).

Methods: A cohort study including all LGEA patients that underwent TTT between 2006-2017 was conducted. Patients and/or their parents were invited to fill out questionnaires regarding reflux symptoms and HRQoL.

Results: TTT was successful in 11/13 patients. Esophageal anastomosis was accomplished at a median age of 12 days (range 7-138), first oral feeding was started at a median of 16 days postoperatively (range 5-37). All patients required multiple dilatations and 10 patients required anti-reflux surgery.

At median follow-up of seven years, five patients reported mild and one moderate reflux complaints. All patients but one reached age-appropriate oral diet. Most patients (80%) were within normal growth range. Overall HRQoL was comparable to healthy controls.

Conclusion: TTT provides good long-term results. Oral feeding can be started as soon as two weeks postoperatively. Almost all patients are able to eat an age-appropriate oral diet. Overall HRQoL was comparable to healthy controls.

S072 INFECTIOUS COMPLICATIONS OF INTERCOSTAL NERVE CRYOABLATION MEDIATED BY PERIOPERATIVE HYPOTHERMIA DURING PEDIATRIC NUSS PROCEDURE

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Intercostal nerve cryoablation (cryoanalgesia) is increasingly used for pain control in minimally invasive repair of pectus excavatum (MIRPE) by Nuss procedure. Cryoanalgesia may lower core body temperature and increase the risk of postoperative infectious complications. In this study we investigated the effects of cryoanalgesia on infectious complications following MIRPE.

We performed a retrospective review of pediatric and adult (age 12-21) patients undergoing MIRPE between June 2017-July 2018 at our institution. Patients treated via multimodal analgesia with cryoanalgesia (Cryo) were compared with patients treated via multimodal analgesia +/- elastomeric pain pumps (Non-cryo). Core body temperature was recorded at the start of the procedure and at recovery. Intraoperative minimum/maximum temperatures were also recorded. The primary outcomes were wound infection and pneumonia within 30 days after operation; secondary outcome was length of stay (LOS). Fisher's Exact and Mann-Whitney U tests were used to compare proportions and medians respectively, with a p-value ≤ 0.05 being significant.

A total of 80 patients were included, 35(43.7%) Cryo and 45(56.3%) Non-cryo. There were no significant differences in median[IQR] for age(15[13.3,16.0];p =0.86), number of bars inserted (2[1,2];p=0.57), or operative time(123.5[98.3, 148.8]; p=0.11) between the two groups. We found no significant differences in median[IQR] minimum temperature (35.4[35.0,35.8];p=0.76), median change in intraoperative temperature (-0.13 oC [-0.44,0.00];p=0.94) or median recovery temperature (-1.10 oC [-1.56,-0.65]; p=0.59) between Cryo and Non-cryo patients. Upon arrival to PACU, temperature was significantly lower in the Cryo group compared to Non-cryo, 36.4 oC [36.2,36.6] p=0.04. There were no postoperative wound infections in either group. There was no significant difference in incidence of postoperative pneumonia(8.57% versus 2.22%,p= 0.31) or median[IQR] for LOS (4[3,4];p=0.57), between Cryo and Non-cryo patients.

Our study demonstrates that cryoanalgesia for MIPRE patients did not result in lower core body temperatures than alternative pain modalities. In addition, there appears to be no significant difference between cryoanalgesia and non-cryoanalgesia patients for LOS or infectious complications.

Variables	Overall N=80 Median[IQR]	No Cryo N=45 Median[IQR]	Cryo N=35 Median[IQR]	P-value*
Age, years	15.0[13.3,16.0]	15.0[13.5,16.0]	15.0[13.0,16.0]	0.86 0.86
Gender	65 (81.3)	34 (75.6)	31 (88.6)	0.14
Weight, kg	54.4[46.9,59.8]	53.8[46.4,60.1]	55.2[50.0,59.0]	0.59 0.54
BMI (kg/m^2)	18.5[16.8,19.8]	18.3[16.5,19.5]	18.8[16.9,19.9]	0.32 0.34
Number of Bars median[IQR] 1 2 3	 2[1,2] 21(26.3) 58(72.5) 1(1.3)	 2[1.5,2] 11(24.4) 33(72.3) 1(2.2)	 2[1,2] 10(28.6) 25(71.4) 0(0)	 0.57 0.57
Fiberwire (vs. stabilizers)	78 (97.5)	45(100)	33(94.3)	0.19
Submuscular (vs Subcutaneous)	76 (95.0)	42 (93.3)	34 (97.1)	0.63
First Recorded Temp, Celsius	35.7[35.1,36.0]	35.7[35.1,36.0]	35.6[35.0,36.1]	0.76
Time to First Temp, min	31[25,42]	31.0[24.5,43.0]	30.5[26.8,41.0]	0.77
Time to Procedure, min	47.5[39.3,53.0]	48.0[42.0,51.5]	46.0[37.0,55.0]	0.6
Proc First Temp, Celsius	35.6[35.3,35.9]	35.6[35.4,35.9]	35.5[35.1,36.0]	0.54
Minimum Temp, Celsius	35.4[35.0-35.8]	35.8[35.0-35.8]	35.4[34.9-35.7]	0.76
Maximum Temp, Celsius	36.2[36.0,36.6]	36.3[36.0,36.7]	36.1[35.8,36.4]	0.19
Extubation Temp, Celsius	36.1[35.6,36.6]	36.3[35.6,36.6]	36.0[35.2,36.4]	0.13
First PACU Temp, Celsius	36.4[36.2,36.6]	36.4[36.2,36.7]	36.3[36.1,36.4]	0.04
Time OR to BH, min	60.0[46.0,72.0]	62[50.0,74.5]	55.5[42.3,70.3]	0.22
OR Time, min	179.0[159.0,209.0]	179.0[152.5,216.5]	179.0[161.0,206.0]	0.44
Procedure Time, min	123.5[98.3,148.8]	112.0[92.0,146.5]	112.0[92.0,146.5]	0.11 0.11
Δtemp intraop (Tproc – Tmin)	-0.13[-0.44,0.00]	-0.12[-0.39,0.00]	-0.13[-0.45,0.00]	0.94
Δtemp recovery (Tpacu – Tmin)	-1.10[-1.56,-0.65]	-1.11[-1.42,-0.62]	-1.08[-1.72,-0.70]	0.59
Δtemp(Max – min)	0.88[0.60,1.18]	0.83[0.58,1.14]	0.99[0.63,1.22]	0.25
Infection	0 (0.0)	0	0	N/A
Pneumonia	4 (5.00)	1 (2.22)	3 (8.57)	0.31
Hypothermia	23 (28.8)	12 (26.7)	11 (31.4)	0.64
LOS mean(SD);median[IQR]) # days <2 2-4 5-7 >7	 3.9(1.4) 4[3,4] 0(0) 62(77.5) 16(20.1) 2(2.6)	 3.9(1.2) 4[3,4.5] 0(0) 34(75.6) 10(27.2) 1(2.2)	 3.9(1.7) 3[3,4] 0(0) 28(80) 6(17.2) 2(5.8)	 0.57 0.57

V017 TRANSORAL ENDOSCOPIC THYROIDECTOMY VESTIBULAR APPROACH (TOETVA): A NOVEL SURGICAL TECHNIQUE FOR SCARLESS THYROIDECTOMY IN PEDIATRIC SURGERY

Emre Divarci, Associate Professor[1]; Hilmican Ulman, MD[1]; Geylani Ozok, Professor[1]; Samim Ozen, Professor[2]; Murat Ozdemir, MD[3]; Ozer Makay, Professor[2]; [1]Ege University Faculty of Medicine Department of Pediatric Surgery; [2]Ege University Faculty of Medicine, Department of Pediatrics, Division of Pediatric Endocrinology; [3]Ege University Faculty of Medicine, Department of General Surgery, Division of Endocrine Surgery

Transoral endoscopic thyroidectomy vestibular approach (TOETVA) is a novel surgical technique in thyroid surgery that provides a feasible opportunity to avoid a visible neck scar. In recent years, TOETVA became popular for the thyroid surgery of selected adult patients with cosmetic concerns.

We conducted a right lobectomy with the TOETVA technique in a 17-year-old adolescent with a suspicious thyroid nodule and reported the procedure as the first case of TOETVA in pediatric surgical literature. In this video, we aimed to describe the details of the operative technique step by step. No complications were encountered during or after surgery.

We believe that TOETVA has a real potential to be introduced into pediatric surgical practice for “selected cases” to give an opportunity for scarless thyroid surgery in children.

Keywords: TOETVA; transoral endoscopic thyroidectomy vestibular approach; scarless thyroidectomy; transoral thyroidectomy; children

S067 ENDOSCOPIC SURGICAL APPROACH FOR PEDIATRIC SOLID TUMORS THAT PERMITS COMPLETE CURABILITY AND EXHIBITS COSMETIC ADVANTAGES Atsuhisa Fukuta; Satoshi Obata; Junkichi Takemoto; Naonori Kawakubo; Toshiharu Matsuura; Department of Pediatric Surgery, Reproductive and Developmental Medicine, Faculty of Medical Sciences, Kyushu University

Background and aims: Many endoscopic surgical procedures have become well established in pediatric surgery. However, thoracotomy or laparotomy is common in the treatment of pediatric solid tumors; these approaches have occasionally resulted in large wounds and postoperative thoracic deformities. In our department, we actively adopt novel endoscopic surgical approaches to aid in achieving complete curability and providing cosmetic advantages by means of wounds that allow removal of excised tumors from the body.

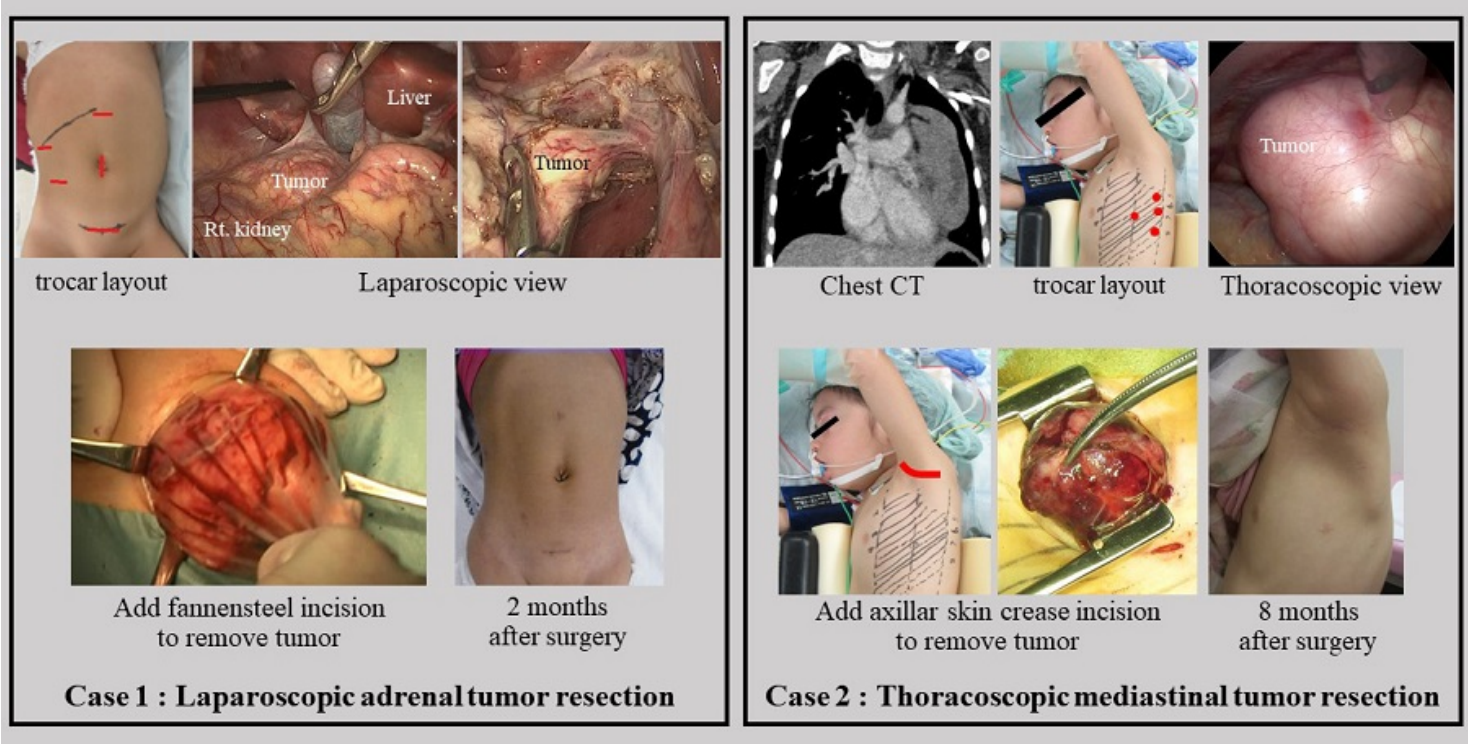
Methods: This retrospective study was performed by reviewing the medical records of patients who underwent endoscopic surgery for treatment of solid tumors in the abdominal, thoracic, and urinary reproductive regions between April 2013 and March 2020. P-values <0.05 were considered statistically significant.

Results: In total, 135 operations for removal of pediatric solid tumors were performed in our institution. Twenty-eight of the 135 operations underwent endoscopic surgery. Eleven patients had neuroblastoma, seven patients had ganglioma, and 10 patients had other solid tumors. For treatment of the seven patients who had excessively large tumors that were difficult to remove from the trocar wound, axillar skin crease or Pfannenstiel incisions were used. The median operation time was 162 minutes in malignant tumor and 207 minutes in non-malignant tumor. The median bleeding volume was 1 ml in malignant tumor and non-malignant tumor. The median length of hospitalization was 7.5 days in malignant tumor and 8 days in non-malignant tumor. One patient had Clavien–Dindo grade 3b complications, but no patients required delayed chemotherapy or experienced surgery-related deaths. All patients exhibited satisfactory operative scarring, earlier recovery, and cosmetic outcomes. The 2-year survival rate was 90.3%, and both of recurrence patients were metastatic lung tumor cases.

Conclusion: In our department, we actively promote the use of endoscopic surgery when surgeons expect to achieve surgical treatment outcomes similar to those of laparotomy and thoracotomy. We presume that an appropriate surgical procedure can be selected based on tumor size, localization, and diagnosis. We advocate treatment approaches that consider the patient's quality of life while permitting complete curability and maintaining endoscopic surgical advantages.

The comparison of Malignant tumor and Non-malignant tumor.

	Malignant tumor (n = 16)			Non-malignant tumor (n = 12)			*P* value
	median	min	max	median	min	max	
tumor diameter (cm)	2.5	0.4	4.5	7.5	2.2	10	< 0.05
operation time (min)	162	69	360	207	110	512	0.271
bleeding volume (ml)	1	1	60	1	1	100	0.191
length of hospitalization (days)	7.5	4	19	8	6	14	0.748



V018 3D PRINTED MODEL AIDED IN MINIMALLY INVASIVE GANGLIONEUROBLASTOMA RESECTION Katlyn G McKay; Muhammad O Ghani, MBBS; Cameron Henry, MD; Sumit Pruthi; Harold N Lovvorn, MD; Irving J Zamora, MD; Vanderbilt University

The creation of 3D models of tumors and their surrounding structures is becoming a useful tool for preoperative and intraoperative surgical planning, but has rarely been used in pediatric cases. This case details the presentation and oncologic course of a 2.5-year old female patient with a ganglioneuroblastoma. A 3D model of the tumor was created based on pre-operative computerized tomography (CT) images, and the physical model demonstrated clear planes and lack of invasion into surrounding structures, making surgical resection an option. The 3D model was then utilized as a guide intraoperatively for the laparoscopic operation during difficult portions of the case. The tumor was successfully removed in entirety, and the patient was discharged following an uneventful post-operative course. The use of 3D printing in a pediatric abdominal oncologic case was novel, and could be a beneficial tool in future cases to complement a minimally invasive surgical approach.

S068 THORASCOPIC RESECTION FOR THORACIC INLET NEUROBLASTIC TUMORS IN YOUNG CHILDREN Steven C Mehl, MD; Richard S Whitlock, MD; Sanjeev A Vasudevan, MD; Jed G Nuchtern, MD; Jennifer H Foster, MD; Bindi Naik-Mathuria, MD, MPH; Texas Children's Hospital

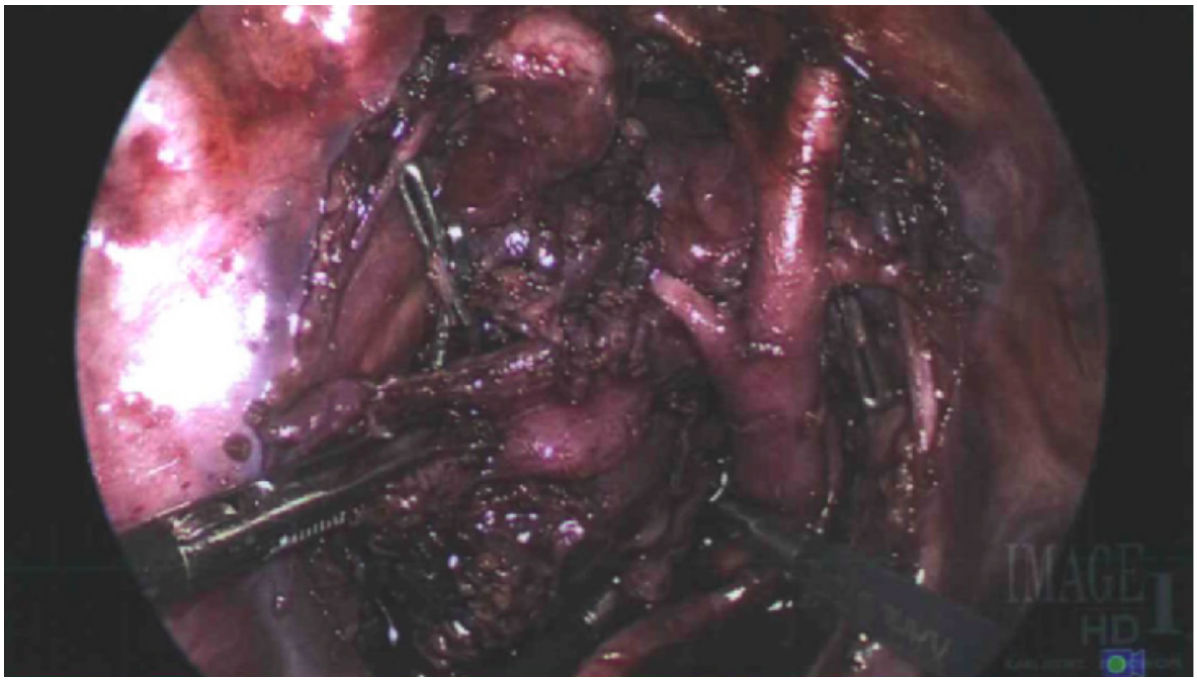
Background: Pediatric thoracic neuroblastic tumors range from benign (ganglioneuroma) to malignant (neuroblastoma). Thoracic inlet/cervicothoracic tumors are rare, and can be particularly challenging to resect due to proximity to mediastinal vessels and nerves. Open surgical approaches are highly morbid, including sternotomy or partial “trapdoor” incisions. Our purpose was to evaluate the feasibility and effectiveness of thoracoscopic resection of this group of tumors.

Methods: We performed a single-center retrospective chart review for children who presented with thoracic inlet neuroblastic tumors between 2011 - 2020. Demographics, tumor characteristics, treatment, operative complications and outcomes were collected and analyzed. Continuous outcomes are reported as median with interquartile range (IQR).

Results: Eight patients were identified, the median age at diagnosis was 13 months (IQR 6 – 32), and over half (5/8) presented with Horner’s syndrome. Median tumor size at diagnosis was 4.1 cm (IQR 3.6 – 4.4). Diagnostic biopsy was percutaneous in 50% (4/8) and thoracoscopic in 38% (3/8). One tumor was a ganglioneuroblastoma and the rest were neuroblastoma; 50% (4/8) were intermediate risk, and only 1 was high-risk. None had N-Myc amplification. Neoadjuvant chemotherapy was given in 50% (4/8) with 38% (3/8) undergoing upfront surgery; one patient was observed without chemotherapy or surgery. Tumor shrinkage following neoadjuvant chemotherapy was minimal (median 1.1 cm, IQR 0.5 – 2.9) for most, but one had complete regression. Six patients had thoracoscopic resection.

For thoracoscopic resections, median intraoperative estimated blood loss was 15 mL (IQR 10 – 28), median operative room time was 199 minutes (IQR 152 – 259), and median hospital length of stay was 2 days (IQR 2 – 2.75). There were two complications: 1 recurrent laryngeal nerve injury and 1 new-onset Horner’s Syndrome; symptoms for both improved with time. There were no bleeding complications, phrenic nerve injuries, or chylothoraces. Complete gross total resection was feasible for all and there were no recurrences or mortalities with median follow-up of 3 years.

Conclusion: Thoracoscopic resection for thoracic inlet neuroblastic tumors is feasible with adequate oncologic resection and minimal morbidity. Larger, multicenter studies are needed for validation.



Tumor bed following resection with skeletonized subclavian artery, carotid artery, and vagus nerve.

V019 LAPAROSCOPIC LEFT PARCIAL ADRENALECTOMY FOR LARGE ADRENAL CYST Catarina Barroso, MD[1,2,3]; Inês Isabela Braga, MD[1,2,3]; Emanuel Dias, MD[1,3,4]; Jorge Correia-Pinto, MD, PhD[1,2,3]; [1]Pediatric Surgery Department, Hospital CUF Porto; [2]Pediatric Surgery Department, Hospital de Braga; [3]Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho; [4]Urology Department, Hospital de Braga

Case report: This is the case of a 17 yo female presenting with abdominal pain. A retroperitoneal mass was identified at an MRI and the patient was proposed for laparoscopic excision. The surgical procedure included: i) positioning in right lateral decubitus; ii) placement of 4 ports in the left hemiabdomen (1x10mm; 3x5mm); iii) identification of the cystic lesion adjacent to the left adrenal gland; iv) mobilization of the descending colon; v) mobilization of the spleen; vi) exposure and dissection of the lesion; vii) identification of anatomical landmarks (tail of the pancreas, splenic artery and left renal vein); viii) ligation and division of the main adrenal vein; ix) excision of the lesion by performing partial adrenalectomy; x) hemostasis; xi) repositioning of the colon. Postoperative follow-up was uneventful. Histological examination revealed an epithelial adrenal cyst.

Conclusion: Laparoscopic partial adrenalectomy is a safe and effective treatment for symptomatic and large benign adrenal cysts.

S069 SYNCHRONOUS BILATERAL ADRENALECTOMY FOR RARE CAUSE OF HYPERCORTISOLISM IN CHILDREN: FROM OPEN TO ROBOTIC SURGERY. A SINGLE-CENTER EXPERIENCE OF 27 YEARS Berenice Tulelli; Alix Besançon; Michel Polak; Sabine Sarnacki; Thomas Blanc; Necker Enfants-Malades University Hospital

Aim: Autonomous secretion of cortisol from the adrenal glands represents approximately 15% of all cases of Cushing's syndrome (CS) in childhood. Particularly rare causes of CS are McCune-Albright syndrome (MAS) and Carney complex (CNC). Surgical strategy is the definitive treatment to correct hypercortisolism and its complications.

Synchronous bilateral adrenalectomy (SBA) represents an exceptional indication.

Our aim is to analyze our medical and surgical management of this rare condition

Methods: Patients who underwent SBA between 1992-2019, were identified. Gender, age, diagnosis, surgical indication, operative time, bleeding, post-operative complications, hospital stay, and outcome were retrospectively analyzed. Bilateral adrenal tumors were excluded.

Results: Nine children were included: 5 MAS, 3 CNC, 1 congenital adrenal hyperplasia. Indications for SBA were non-responsiveness to medical treatment, medical contra-indication, neonatal Cushing's severity and poor control of hyperandrogenism. Mean age at surgery was 3.4 years (1.5 month-9.3 years). SBA was performed by robotic-assisted laparoscopy (n=4), laparotomy (n=2), laparoscopy (n=1), retroperitoneoscopic approach (n=1), and bilateral lombotomy (n=1). Mean length of hospital stay was 25 days. One post-operative complication occurred: a retroperitoneal collection in the adrenal bed, needing percutaneous drainage. At last follow up (mean 7,6 years) all patients were compliant with treatment, no acute adrenal crisis occurred, but seven patients (77%) had CS-related complications.

Conclusion: SBA is a very rare procedure in children and has to be performed in advanced pediatric surgery center. Robotic SBA is a safe and feasible procedure, even in infants. Oral supplementation is life-long therapy that needs strict observance, endocrinology periodic monitoring and education of parents.

S070 LAPAROSCOPIC (HEMI)NEPHRECTOMY (LN) FOR WILMS' TUMOR Maciej Murawski, PhD[1]; Joanna Stefanowicz, Prof[2]; Marcin Losin, PhD[1]; Andrzej Golebiewski, Prof[1]; Piotr Czauderna, Prof[1]; [1]Department of Surgery and Urology for Children and Adolescents, Medical University of Gdansk; [2]Department of Pediatrics, Hematology and Oncology, Medical University of Gdansk, Poland

Background: Laparoscopy for the resection of Wilms' tumors has remained debatable, but evidence that neoadjuvant chemotherapy causes tumor shrinkage and encapsulation rendering them more resistant to tumor spillage has made laparoscopic nephrectomy (LN) a feasible option. Moreover, if a nephron-sparing surgery is possible it should be preferred which decreases the pool of patients feasible for laparoscopy.

Materials and methods: Forty-two consecutive children with primary renal tumor underwent a nephrectomy from December 2013 to November 2020; 11 had a LN. There were 8 children with Wilms' tumor (2 boys and 6 girls), with age between 13 months and 7 years. All patients received neoadjuvant chemotherapy according to the current SIOP protocol. The mean tumor volume before and after chemotherapy was 174,4 ml (range 14,7-501) and 32,8 ml (range 4,3-50,3) respectively. The most important aspects of surgical technique are discussed in the presentation.

Results: Seven nephrectomies and one heminephrectomy (tumor volume 4,3 ml) were performed. No patients had an intraoperative tumor rupture. All children had an attempt of lymph nodes sampling (their number per pathology assessment ranged 0-7). There were no intraoperative events. One complication after heminephrectomy occurred, which was urine leak. The child required an open reoperation 8 days after LN. An opened calyx was sutured and a double-J catheter was placed. Five patients had stage I tumor and 3 had stage II locally. Seven patients had an intermediate-risk and one had high-risk blastemal Wilms' tumor. There were no local and distant relapses. Seven patients remained disease-free at a median follow-up of 59,6 months (range 42-83). One child remains on treatment, 4 weeks after surgery.

Conclusions: This report demonstrates the feasibility of LN in children with Wilms' tumors. The patients should be carefully selected and specific training in laparoscopy is necessary, particularly with regard to laparoscopic heminephrectomy.

S071 PEDIATRIC NEPHRECTOMY: COMPARISON OF PERIOPERATIVE OUTCOMES OF 3 DIFFERENT MINIMALLY INVASIVE AND OPEN APPROACHES Hazem Mosa, Mr; Adele Giannettoni; Pankaj Mishra, Mr; Arash Taghizadeh; Anu Paul, Ms; Massimo Garriboli, Mr; Evelina Children's Hospital London

Paediatric Nephrectomy: comparison of perioperative outcomes of 3 different minimally invasive and open approaches

Aim of the study: Minimally invasive surgery (MIS) is now the gold standard for nephrectomy in paediatric patients. Different approaches are used by paediatric urologists including Retroperitoneoscopic (one or two Instruments) and transperitoneal. All approaches have advantages and limitations with none considered superior to others. The aim of our study is to compare the perioperative outcomes of different techniques (Single Instrument Retroperitoneoscopic (SIRP), Two Instrument Retroperitoneoscopic (TIRP), Transperitoneal (TP) and open) for performing a nephrectomy in the paediatric population.

Patients and Methods: Retrospective review of electronic patient notes in the period from January 2009 to January 2020 at a single centre was carried out. We included all patients who underwent nephrectomy surgery. We excluded patients who underwent other procedures under the same anaesthetic, underwent hemi-nephrectomy and those with incomplete records. The primary outcome measures were operative time, intraoperative complications, postoperative complications and length of hospital stay. One-way ANOVA test was used to analyse continuous variables (operative time & hospital stay). Chi square test was used to compare categorical variables (intraoperative and post-operative complications).

Results: A total of 213 nephrectomies performed in 199 patients were analysed (7 bilateral synchronous nephrectomies). SIRP (N=35), TIRP (N=50), TP (N=74) and Open (N=54). Median Age (Month) was 71 (5-220) for SIRP, 113 (7- 211) for TIRP, 67 (10-210) for TP and 21 (1-192) for Open. No statistical difference was identified for mean operative time (minutes +/- SD P= 0.067) [(151+/-44) for SIRP, (153+/-39) for TIRP, (154+/-46) for TP and (145+/-86) for Open nephrectomy] or mean hospital stay (Days +/- SD(P=0.69) [(1.3+/- 0.66) for SIRP, (1.6+/- 0.83) for TIRP, (1.7+/-1.39) for TP and (1.7 +/- 1.42) for open nephrectomy].

Intraoperative complications were significantly more in the open group (P=0.03). These were bleeding requiring transfusion (N=3) and diaphragmatic injury (N=1). There were no intraoperative complications in SIRP and TIRP group. One patient had intraoperative bleeding and required transfusion in the TP group.

Postoperative complications were only noted in the open group. This was post-operative urinary retention requiring catheterization.

There was no conversion to open surgery in the SIRP and TIRP groups. Conversion rate was 5.4% (4/74) in the TP group.

Conclusion: All minimally invasive approaches are safe and comparable to open nephrectomy in terms of operative time and hospital stay. MIS nephrectomy had significantly less complications than open surgery.

Study	N	Complications				
		Overall	RP		TP	Open
			SIRP	TIRP		
Kim *et al.* (2009)	689	6%	4.3%		3.5%	-
Gundeti *et al.* (2007)	102	6%	3%		3%	-
Ku *et al.* (2004)	23	4.3%	-	-	0%	7.7%
Garg *et al.* (2006)	28	0%	0%	-	-	-
Our study (2020)	213	2.3%	0%	0%	1.3%	7.4%

Table 1: Reported outcomes of paediatric nephrectomy surgery using SIRP, TIRP, TP and open approaches

IS001 AS AN ARTIFICIAL INTELLIGENCE SUBTYPE, DEEP LEARNING STUDY FOR DIFFERENTIATION AND IMAGE RECOGNITION OF FILLED OR EMPTY ORGAN LUMENS: A STUDY ON A MEDICAL IMAGING IN CHILDREN. Baran Tokar, MD[1]; Ozer Celik, PhD[2]; Tehran Abbasov, MD[1]; Ilknur Ak Sivrikoz[3]; [1]Eskisehir Osmangazi University, School of Medicine, Department of Pediatric Surgery, Eskisehir, Turkey; [2]Eskisehir Osmangazi University, Faculty of Science, Department of Mathematics-Computer, Eskisehir, Turkey; [3]Eskisehir Osmangazi University, School of Medicine, Department of Nuclear Medicine, Eskisehir, Turkey

Objective: Artificial intelligence (AI) can perform cognitive functions such as problem-solving and object recognition. As an AI subtype, deep learning (DL) study may support pediatric surgeons in the preoperative or postoperative decision-making process by image recognition on medical scans. This study aimed to determine the accuracy of DL in the detection of whether the pelvicalyceal lumen (PCL) is filled or empty on diuretic renography.

Method: Prespecified labeling was performed on 1260 renal images in 29 frames of the diuretic renography in 36 children. All children had unilateral or bilateral hydronephrosis. Renal images of the patients with poor renal function and urinary stasis in ureter were excluded. The Tensor Flow Object Detection API was used to deploy object detection models. Sensitivity, precision, and F1 score were determined for the detection of the right or left kidney as an object. Supervised- training was applied for differentiation of filled and empty renal collecting systems labeled by a clinician.

Results: In 1260 labeled renal images, left or right kidney and the renal collecting system were detected with 94% sensitivity, 96% precision, and 95% F1 score. The number of the renal image labeled was 638 for filled PCL (group I) and 358 for empty PCL (group II). For training 300 images were selected from each group. The learning rate was 0.01, the epoch was 20000, architecture was inceptionV3 and the batch size was 100 in DL. For testing, 58 images were selected from each group and the accuracy was 88% for group I and 66% for group II.

Conclusions / Future Directions: AI modalities could be applied to surgery to improve diagnosis and management. DL could serve for image recognition in medical scans and endoscopic images of pediatric surgical cases. Although the study was conducted in the urinary system, the findings may suggest that with a relatively large number of labeled scans used for training, DL could differentiate the organ and a contrast-filled organ lumen. The next study will focus to detect the intensity of the contrast in PCL with an evaluation of the frames of diuretic renography as time series.

IS002 EXPERIENCE OF THORACOSCOPIC ESOPHAGEAL RECONSTRUCTION FOR 53 PATIENTS WITH PURE ESOPHAGEAL ATRESIA Jun Wang; Yangwen Lin; Wenjie Wu; Jia Shi; Yiming Gong; Wei Xie; Juming Yu; Department of Pediatric Surgery, Xinhua Hospital, Shanghai Jiao Tong University School of Medicine

Objective: To summarize and analyze the pre-operative preparation, operative decision-making, the choice of operative methods, the complications post-operation of 53 type I Esophageal atresia (EA) in order to explore the appropriate treatment strategy.

Materials and Methods: 53 pure EA were admitted from January 2015 to December 2012, including 33 males and 20 females. Twenty-three patients were born in our hospital or transferred to our hospital immediately at birth (group A). Thirty patients were transferred to our hospital after gastrostomy in local hospitals (group B). The gap of these pure EA was 1~7.5 vertebral bodies (4.5±1.5). In 50 cases, the proximal and distal esophageal bougienage stretching for elongation was performed preoperatively to shorten the gap distance. The imaging examination of the other 3 cases found that there was no need for bougienage stretching to match the conditions for surgical esophageal reconstruction.

Results: 53 cases were successfully completed esophageal reconstruction, thoracoscopic surgery 44 cases, open surgery 9 cases (4 cases in group A and 5 cases om group B), among them 6 cases (4 cases in group A/2 cases in B group) received conventional open surgery to reconstruct the esophagus after bougienage stretching to shorten the gap in early stage. Colon replacement surgery was performed in another 3 cases in group B because of failure of natural waiting and bougienage stretching for esophageal elongation. 44 cases of thoracoscope esophagus reconstruction were successful completed, in which of 19 cases in gourp A and of 25 cases in group B.

One-stage of thoracoscopic esophageal reconstruction of 2 cases in group A was performed successfully without gastrostomy because of short gap found by using a probe to evaluate the distal esophagus during the laparoscopic gastrostomy. 1 case in group B with the age of 42 days-old received the successful esophageal reconstruction directly after esophageal imaging examination when he came to our hospital. All 53 csses were cured and discharged, the survival rate was 100%.Between the two groups A/B, the gap was 4.7±1.2 vs 4.3±1.7 vertebral body (P=0.411) pre-operation, the age of first time of bougienage stretching was 46.7±62.0 vs 98.9±60.0 days respectively (P = 0.001), the age of receiving the esophageal reconstruction was 98.2±75.1 vs 156.5±71.1 days (P = 0.001). All patients with anastomotic stricture underwent esophageal dilation, but the frequency of esophageal dilation in group A was significantly less than that in group B (8.2 ±7.9) vs (12.3 ±5.6) times (P = 0.004). Between the two group A/B, postoperative anastomotic leakage occurred in 4/10 cases, anastomotic stenosis in 19/27 cases, gastroesophageal reflux in 10/14 cases, secondary hiatal hernia in 3/4 cases, tracheal-esophageal fistula in 2/1 cases, respectively. There was no statistical difference between the two groups.

Conclusion: the proximal and distal esophageal conditions should be evaluated to determine the timing and method of operaton during gastrostomy in pure EA. The thoracoscopic esophageal anastomosis is the preferred operative method. Early postnatal internal strectch of bilateral esophagus is helpful shorten the waiting time and to complete esophageal reconstruction earlier.

IS003 OVERCOMING THE TECHNICAL LIMITATIONS OF INTRAOPERATIVE RECURRENT LARYNGEAL NERVE MONITORING IN NEWBORNS AND INFANTS

Jay Meisner, MD[1]; Claire M Lawlor, MD[2]; Sukgi Choi, MD[1]; Benjamin Zendejas, MD, MSc[1]; [1]Boston Children's Hospital, Boston, MA; [2]Children's National Hospital, Washington, DC

Objective of technology or device: Recurrent laryngeal nerve (RLN) injuries are common after pediatric cervical and thoracic procedures and can result in significant morbidity - adversely affecting quality of life. Intraoperative Nerve Monitoring (IONM) is used to monitor the function of and prevent injury to the RLN during at risk procedures. Commercially available IONM systems exist in the form of endotracheal tubes (ETT) with integrated electrodes (NIMS, Medtronic, for ETT size 4 or greater), or as single or dual channel adhesive surface electrodes (Dragonfly, Neurovision) that can be placed on any sized ETT. However, dual channel electrodes - which allow simultaneous yet separate monitoring of each vocal cord - are only available for children 4 years or older. Hence, the IONM of infants has been limited to single channel surface adhesive electrodes or the challenging placement of percutaneous needle electrodes into the thyroid cartilage or transorally into the vocalis muscle. In order to overcome these IONM challenges, we present a modification to the Dragonfly (Neurovision) dual channel surface adhesive electrode that allows for individual RLN monitoring in newborns and infants.

Description of technology and method of its use or application: The double channel surface electrode sticker (Dragonfly, Neurovision) has four sensors (one positive and one negative sensor per channel). The two outer sensors are trimmed leaving the two inner sensors intact. The sticker is applied to the ETT as close to the balloon cuff as possible. A voltmeter is used to identify the active leads in order to connect these to the receiving box. Additional ground and active needle electrodes (placed in a neck or shoulder muscle outside of the operative field) are used to complete the circuit by replacing the polarity of the previously trimmed sensors (video link https://youtu.be/QiYL8NtRSKM).

Preliminary Results: From July 2019 to October 2020, we have used the modified dual channel dragonfly sensor in 40 patients for 45 procedures (successful monitoring confirmed in 37 cases, 82%). Patients were as young as 1 day old (median age 7.5 [IQR 3.8-19] months) and as small as 2.8 kg (median weight 7.5 [IQR 4.9-10.1] kg). "At risk" procedures included esophageal atresia with or without tracheoesophageal fistula repairs (31%), tracheopexies for tracheobronchomalacia (82%) and vascular ring divisions (13%). Though all these operations were performed via an open surgical approach, there is a long (26cm) thin (3Fr) stimulator probe (Drytouch, Neurovision) that can easily fit through an infant sized port during thoracoscopic cases. No complications were attributed to IONM.

Conclusions and future directions: With a simple modification to the commercially available dual channel Dragonfly (Neurovision) surface electrode, it is possible to effectively monitor RLN function in newborns and infants. Age and size are no longer barriers for nerve monitoring during at risk cervical and thoracic procedures. Going forward, we plan to examine the effectiveness of RLN IONM during minimally invasive surgical procedures in newborns and infants, and examine the impact of IONM on RLN injury prevention.

IS004 AUGMENTED REALITY POWERED SIMULATION TRAINING FOR MINIMALLY INVASIVE SURGERY Hsien F Yang Chen, MD[1]; Georgina F Falcioni, MD[1]; Maximiliano M Maricic, MD[2]; Juan M Rojo, Ing[3]; María Marcela F Bailez, MD[1]; [1]Garrahan Children's Hospital; [2]Pedro de Elizalde Children's Hospital; [3]Independent

Objective of the technology or device: To introduce Augmented Reality (AR)-Powered solution to guide and self-assess low-cost simulation skill-training modules for Minimally Invasive Surgery (MIS).

Description of the technology and method of its use or application: The technology consists in combining low-cost DIY (do-it-yourself) physical haptic-models with AR-solution app to guide and assess essential and focused psychomotor skills in MIS training modules.

Each application-powered module is carried out from any smart device (tab and pad type) and integrates:

1. The Academic Session that embraces pre-recorded masterclass, bibliography, and guidelines recommendations.

2. The Practical Session with step by step DIY (do-it-yourself) tutorial-videos for the low-cost training box and inanimate surgical model set-up; and task-instruction videos with emphasis in patient safety, ergonomics, technical issues, and specific psycho-motor goals (e.g. safe needle grabbing-manipulation, and extracorporeal or intracorporeal secure knot tying).

3. The Hands-On Session after the calibration test of the surgical model and instruments with the app, the AR technology consists in limiting a 3D framework registering continuously motion parameter of each hand and turns on a warning color when a instrument is out of framework, a voice warning when both instruments are too apart or one hand is too idle after 10 seconds. The motion parameter feedback resumes in instruments' path length, angulation, number of movements for each one, idle time of each hand and total time in completing the task registered in a progression graph with each practice. Each task-performance can be repeated as many times as needed by the user and each one is recorded for immediate revision to answer an self-assessment sheet regarding technical issues and task-targets. Option to tele-assistance and tele-mentoring can be requested.

4. The Assessment Session articulates the Academic Session evaluation (multiple-choice) and the data obtained in the Hands-On Session, reflected in a customizable graphical learning curve and brief conclusion. Satisfaction survey for feedback is a requisite.

Tele-assessment and debriefing with an educator aligned with the program can be requested.

Conclusions / Future Directions: All educational branches are in a process of profound paradigm shift, trying to adapt themselves to the new needs generated by technology and social context. The way of learning MIS skills should be adapted to new trends (Augmented Reality, Mixed Reality, Artificial Intelligence) as reliable, accurate and accessible training tools for the next generations. Haptics must not be lost as questioned with Virtual Reality, therefore the utility of physical models. We believe in the requirement of adding this prototype to simulation training modules by developing a standardized training curriculum and becoming a low-cost resource to any MIS surgical practitioner, promoting accessibility of all patients to the benefits of MIS through the expertise achieved in the art of surgical education

IS005 DIAGNOSING APPENDICITIS BY ULTRASOUND WITH ARTIFICIAL INTELLIGENCE Kentaro Hayashi, MD[1]; Tetsuya Ishimaru, MD[1]; Jaesung Lee[2]; Shun Hirai[2]; Tomoaki Ooke[2]; Takahiro Hosokawa, MD[3]; Kanako Omata, MD[1]; Yohei Sanmoto, MD[1]; Tomo Kakihara, MD[1]; Hiroshi Kawashima, MD[1]; [1]Saitama Children's Medical Center, Department of Pediatric Surgery; [2]Morpho, Inc.; [3]Saitama Children's Medical Center, Department of Radiology

Objective of the study: Appendicitis is usually diagnosed in children via ultrasound. However, this is difficult because the use of sonography requires significant personnel training and skills, leading to excessive utilization of CT by pediatricians and emergency physicians. This study aimed to evaluate whether artificial intelligence (AI) can support the procedure.

Methods: Among 70 abdominal ultrasound videos containing 85-347 images each, 50 were used to train the AI neural network. The appendixes in each image were annotated by four pediatric surgeons. Verification of appendix detection by the AI was done using the remaining 20 videos. These were then evaluated by three other pediatric surgeons. We defined “detection percentage” as the volume of true appendixes successfully detected by the AI divided by the total volume of appendixes visualized by the sonographer in the video, and each video was categorized into "Most” (>50%), "Partial” (10-50%), and "None” (<10%). We also defined “percent accuracy” as the volume of true appendixes successfully detected by the AI divided by the total volume of appendixes detected by the AI, and each video was categorized into "Most” (>50%), "Partial” (10-50%), and “None” (<10%). This study was approved by the research ethics committee of our institution.

Main results: From the 50 videos, 6,914 images were used to train the neural network, and 3,454 images contained annotated appendixes. In terms of detection percentage among the 20 test videos, 10 (50.0%), 4 (20.0%), and 6 (30.0%) videos were judged as "Most,” "Partial,” and "None,” respectively. As for the percent accuracy, 7 (35.0%), 7 (35.0%), and 6 (30.0%) videos were judged as "Most,” "Partial,” and "None," respectively. Regarding scan area depth, 6 (30%) videos had scan areas that were 8-cm deep; 2 (10%), 7-cm deep; 7 (35%), 6-cm deep; 2 (10%), 5-cm deep; 2 (10%), 4-cm deep; and 1 (5%), 3.5-cm deep. Among 14 test videos with scan area depth ≤7 cm, 9 (64.3%), 4 (28.6%), and 1 (7.1%) videos were judged as "Most,” "Partial,” "None" in terms of detection percentage, respectively, whereas for percent accuracy, 6 (42.9%), 7 (50.0%), and 1 (7.1%) video was judged as "Most,” "Partial,” and "None", respectively. Among the remaining 6 test videos, 1 (16.7%), 0 (0.0%), and 5 (83.3%) were judged as "Most,” "Partial,” and "None” in terms of detection percentage, respectively, whereas for percent accuracy, 1 (16.7%), 0 (0.0%), and 5 (83.3%) were judged as "Most,” "Partial,” and "None,” respectively.

Conclusions: Artificial intelligence may facilitate the diagnosis of appendicitis via ultrasound. Furthermore, sonograms with a shallow scan area may be easily assessed by AI for appendicitis. In the future, we will evaluate whether AI support is useful for pediatric residents in the detection of appendicitis.

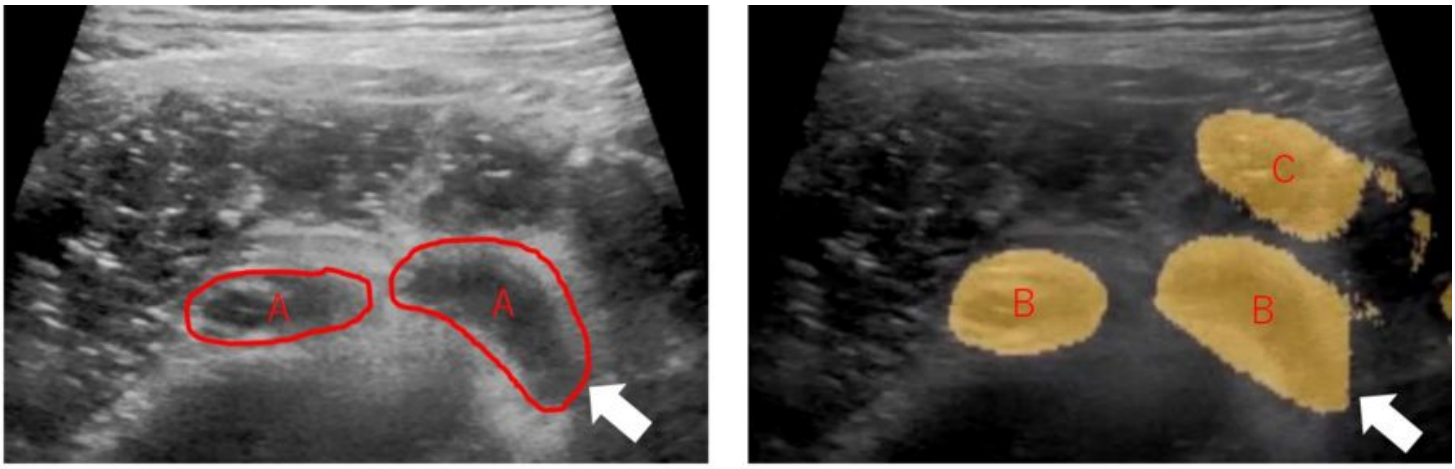


Fig 1. Appendix as identified by sonographer (A, left). Appendix as identified by AI (right); (B) true positive, (C) false positive. Discrepancy between sonographer-identified true appendix and AI-detected true appendix is indicated by the white arrows. Detection percentage = B/A; Percent accuracy = B/(B+C)

IS007 ESOPHAGEAL MAGNAMOSIS FOR THE TREATMENT OF TYPE-B ESOPHAGEAL ATRESIA IN A CHILD WITH PROHIBITIVE OPERATIVE RISK: A NOVEL DEVICE AND INDICATION

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Objective of the technology or device: We describe the first use in the United States of a novel magnamosis device system for delayed esophageal anastomosis. The patient is a medically complex, 1-year-old male with Type-B long gap esophageal atresia (EA), trisomy 21, congenital hypothyroidism, pulmonary hypertension, severe bronchopulmonary dysplasia, severe tracheobronchomalacia requiring tracheostomy and chronic ventilation, and congenital cardiac septal defects. Before transfer to our institution, the infant, presumed to have isolated EA, underwent thoracotomy to attempt esophageal anastomosis, but was ultimately deemed not possible.

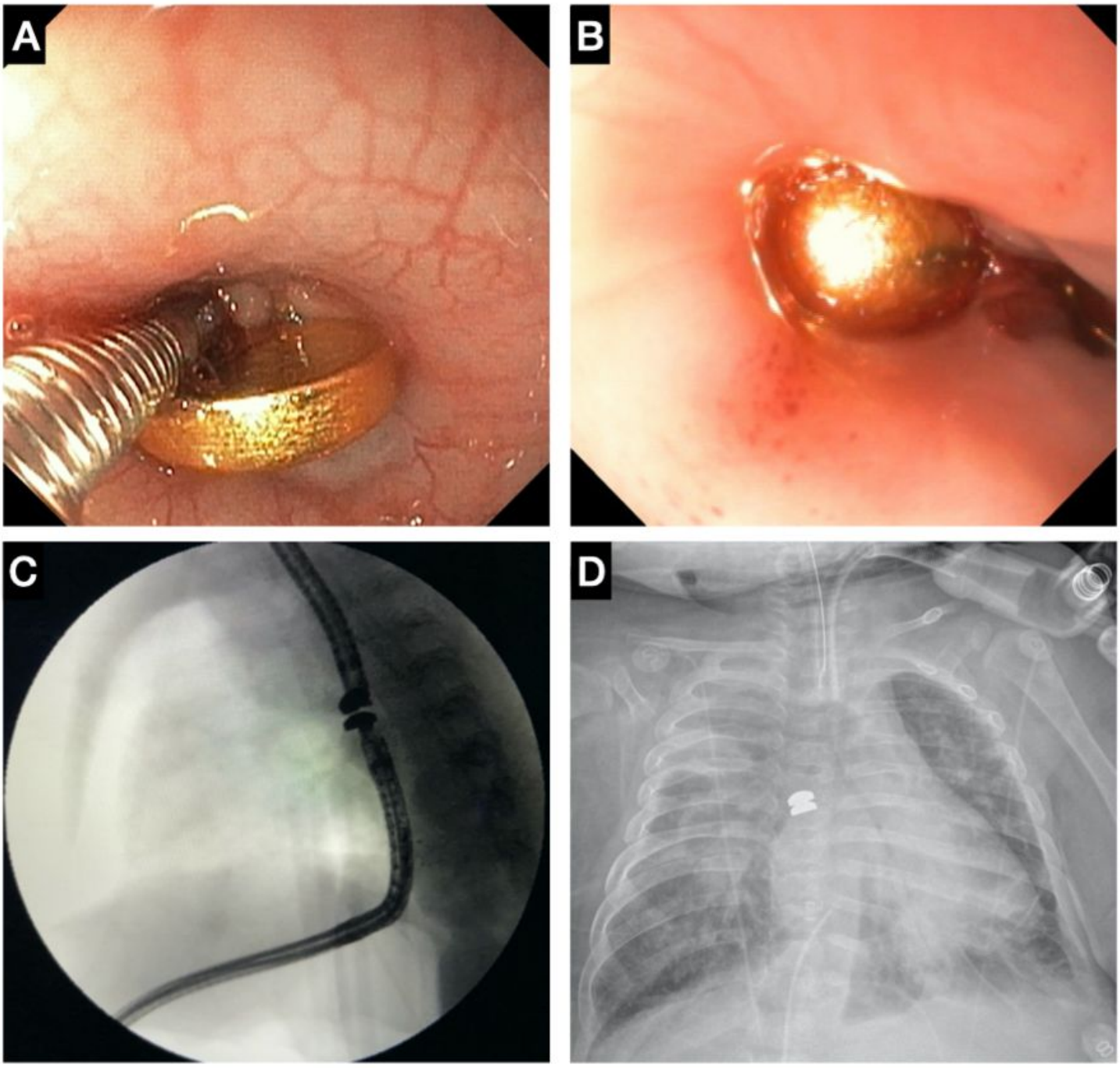
After transfer, we discovered a proximal pouch fistula on bronchoscopy. In stages, we performed cervical division of the proximal fistula, a left thoracoscopic aortopexy and then a right thoracoscopic posterior tracheopexy with approximation of the esophageal ends without anastomosis. After a period of 8-weeks, fluoroscopy confirmed the ends remained in close apposition. He subsequently required tracheostomy for ventilator dependence. Given his multiple thoracic operations and poor cardiopulmonary condition, he was further considered high-risk for handsewn anastomosis due to gap tension and generally poor tissue integrity resulting from prior dissections of both esophageal pouches.

Connect-EA (Mini-Magnamosis) is a novel medical device system currently being developed by Myka Labs (San Francisco, CA) for the treatment of EA. The system employs magnetic force to form a robust primary esophageal anastomosis via an endoluminal approach. Given the advantages of avoiding a high-risk re-operation, mitigating the risk of complications with a handsewn anastomosis and minimizing anesthesia time, we received FDA approval for compassionate use of the Connect-EA in this patient.

Description of the technology and method of its use or application: The mini-magnamosis devices (MDs) are disc-shaped and 8mm in diameter, with unique bi-curved mating surface that generates a force profile designed to create a robust, healthy anastomosis. The procedure was performed using a combination of endoscopy and fluoroscopy to confirm apposition of the endoscopes in the esophageal pouches on both anteroposterior and lateral views. A ferromagnetic endoscopic grasper was used to deliver each MD to its destination from the tip of the endoscope. First, an MD was endoscopically positioned in the distal esophageal pouch (Fig A). With the distal endoscope left in place, the second MD was similarly placed in the proximal esophageal pouch (Fig B). The endoscopes were adjusted under fluoroscopy to bring the MDs into proximity until they were magnetically mated. (Fig C) Orientation of the mated MDs was confirmed on x-ray.

Preliminary results: The patient tolerated the 38-minute procedure well and was returned to the PICU in stable condition. The position of the MDs remained stable on immediate post-operative and daily chest x-rays. (Fig D) Gastrostomy tube feeds were restarted post-operative day 2. The patient has remained stable throughout the peri-operative period with no procedural complications.

Conclusion: The Connect-EA (Mini-Magnamosis) procedure is easily carried out endoscopically, does not require complex post-operative management, and provides a novel endoluminal alternative to a handsewn esophageal anastomosis. The approach effectively minimizes anesthesia exposure, avoids need for major operative intervention and should be considered for future use in similarly complex patients.


A
B
C
D

IS008 A NOVEL LOW COST MINIMALLY INVASIVE SYSTEM ALLOWS FOR THE TRANSLATION OF MODERN PEDIATRIC SURGICAL TECHNOLOGY TO LOW- AND MIDDLE-INCOME COUNTRIES Jeffrey Lukish, MD[1]; Jasmine Ellis Daveys, MD[2]; Tae Kim, MD[3]; [1]Children's National Hospital; [2]Milton Kato Memorial Hospital, St Vincent and the Grenadines; [3]University of Minnesota Health System

Objective of the Technology: There is a critical need for pediatric surgical humanitarian care. The role of minimally invasive surgery (MIS) in these environments with its reduction in pain and wound care, operative time, length of hospitalization, and morbidity is logical. However, the costs, logistics and feasibility of MIS in Low- and Middle-Income Countries (LMIC) can be challenging. Our goal was to develop a new low cost rapidly deployable minimally invasive surgical system (RDMIS) for use during remote pediatric general surgical (GPS) missions in LMIC.

Description of the Technology: RDMIS system components consist of a universal serial bus (USB) interfaced laparoscopic camera, portable computer and a battery powered wireless portable laparoscopic light source. The surgeon transports the RDMIS in a single standard carry-on luggage. Utilizing prepositioning logistics from prior World Pediatric GPS missions, a standard MIS tower system (sMIS) was maintained on site.

Preliminary Results: The RDMIS was utilized to carry out procedural components of laparoscopic appendicostomy, laparoscopic hernia and laparoscopic cholecystectomy. Both sMIS and RDMIS were interchanged during the cases to allow for subjective comparison of surgical exposure and visualization. The RDMIS system allowed for safe and effective visualization and dissection of surgical structures. All children recovered uneventfully and were discharged the following day and have had no complications. The sMIS system costs were 507% more than those of RDMIS.

Conclusions and Future Directions: RDMIS appears to be a safe, inexpensive option that will allow for the translation of modern MIS technology during GPS in remote locations. Further studies validating the RDMIS are indicated, however, the lower costs, ease of transport and potential benefit to children in the LMIC may be significant.

IS009 ARTIFICIAL INTELLIGENCE AND COMPUTER-AIDED IMAGE DIAGNOSIS IN PEDIATRIC SURGERY: AUTOMATED DETECTION OF PYLORIC STENOSIS WITH ULTRASONOGRAPHY

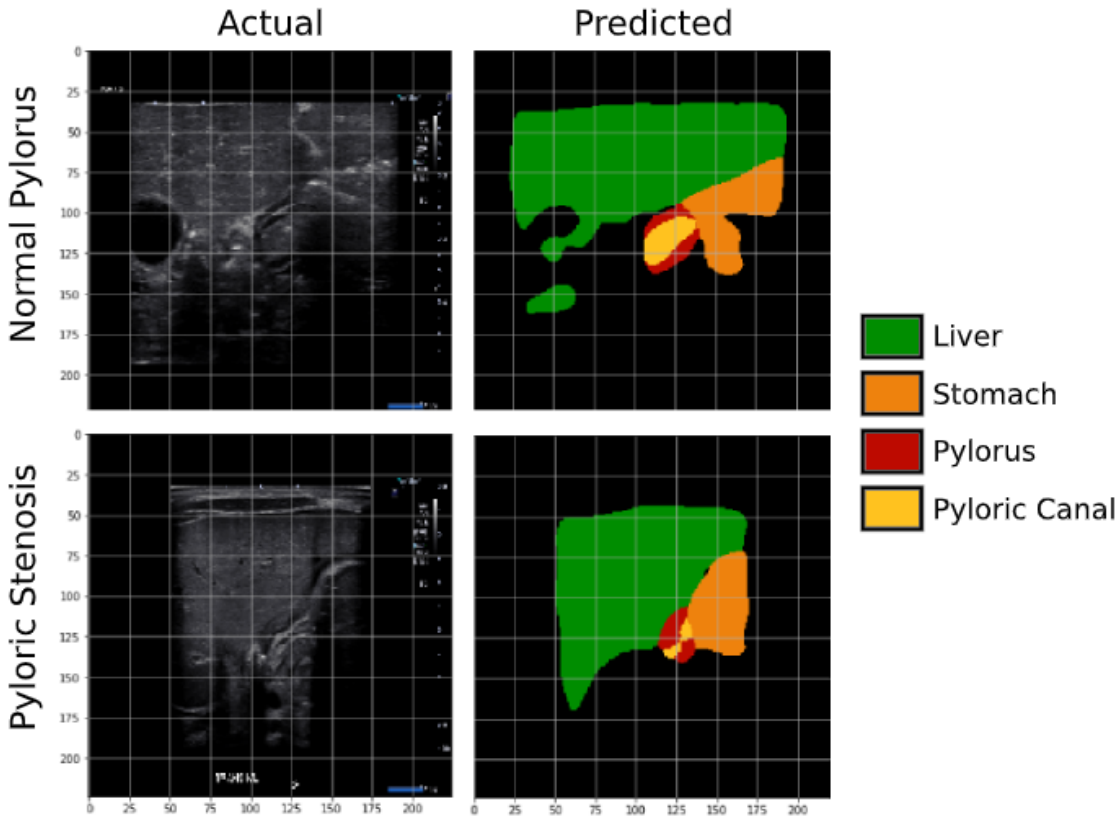
Alejandra M Casar Berazaluce, MD[1]; Ravi Yadav[1]; Smruti Deoghare[1]; Alexander Gibbons, MD[2]; Surya Prasath[1]; Todd A Ponsky[1]; Beth A Rymeski[1]; [1]Cincinnati Children's Hospital Medical Center; [2]Akron Children's Hospital

Objective: Pediatric subspecialty expertise is a limited resource in healthcare, with access to pediatric radiologists and surgeons limited to <50% of the world's population. Artificial intelligence methods are being increasingly utilized to augment physicians' capabilities including computer-aided diagnosis. We sought to evaluate the feasibility of creating automated detection tools for pediatric surgical conditions through a pyloric stenosis ultrasound proof-of-concept model.

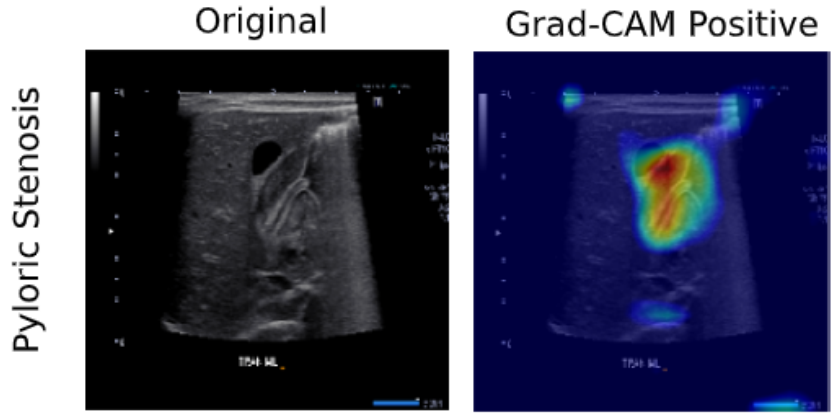
Methods: Still images from abdominal ultrasounds interpreted by expert radiologists at a quaternary children's hospital were retrospectively acquired, deidentified, and annotated. A total of 120 images were included in the first stage of development of this model. We benchmarked state-of-the-art deep learning convolutional neural networks (VGG16, U-Net) for semantic segmentation and binary classification of pyloric stenosis.

Preliminary Results: Our first segmentation model achieved 85% pixel-to-pixel accuracy – a satisfactory result that continues to improve as further iterations of the model are run. This detailed computer-generated read clearly facilitates the visual identification of the pathology in question, as shown in Figure 1A. The simple version of our classification model without segmentation, displayed in Figure 1B, had 90% accuracy. This represents an excellent result given that complex model customization can proceed from a highly accurate starting point. As these basic models can segment and classify the images with high accuracy independently, a blended customized model – currently underway with expansion to a sample size of >700 and an additional expert annotator – is projected to achieve >99% accuracy.

A. Segmentation



B. Classification



Conclusion/Future Directions: Computer-assisted image-diagnosis of pediatric surgical conditions is feasible. Our independent models displayed high accuracy in segmentation and classification of two-dimensional ultrasound imaging for pyloric stenosis, producing automated labels that allow for clear visual identification of relevant structures and an automated wet read. Further fine tuning of the hyperparameters for the models and data processing enhancements are currently underway and expected to be complete later this year.

IS010 LAPAROSCOPIC GASTROPEXY USING T-FASTENERS WITHOUT THE EXTERNAL BOLSTER Brianna L Slatnick, MD[1]; Jonathan Durgin, MD[1]; Alexander Yang, BS[2]; Robert Crum, MD[1]; Corinne Neumeyer[3]; Heung Bae Kim, MD[1]; Farokh R Demehri, MD[1]; [1]Boston Children's Hospital; [2]Harvard Medical School; [3]Connecticut College

Obective: Laparoscopic placement of Stamm sutures for gastropexy during laparoscopic gastrostomy tube (GT) placement can be challenging in patients with thick abdominal walls. T-fasteners are an effective method of gastropexy primarily used in endoscopic and percutaneous GT placement, but the need for external anchors increases the risk of skin irritation and erosion. We describe our experience utilizing buried T-fasteners for laparoscopic GT placement with elimination of external bolsters.

Methods: Pediatric patients requiring enteral access who underwent laparoscopic GT placement using the buried T-fastener method for gastropexy from 6/2019 to 9/2020 were reviewed. Gastropexy was achieved by passing pairs of T-fasteners under laparoscopic +/- endoscopic guidance through the fascia and stomach in a square configuration around the GT. Each pair was passed through a single stab incision, allowing the absorbable suture to be tied in the subcutaneous tissue after bolster removal (Figure). Operative time and 30-day postoperative complications including local wound infection, granuloma occurrence, bleeding, and tube replacement are reported.

Results: Nineteen patients underwent single-port laparoscopic GT insertion using the buried T-fastener technique. The mean age was 7.2 years (sd 6.9) and mean weight 21.6 kg (sd 16.5). Tubes sizes ranged from 12 French/1.5 cm to 16 French/3.0cm. Twelve procedures consisted of gastrostomy tube insertion alone, with a mean operative time of 55 min (range 36-75; sd 11.8). Three patients developed a local wound infection requiring antibiotics, two of whom were immunosuppressed. Three developed granulomas. No postoperative bleeding occurred. Four patients underwent uncomplicated tube replacement within 30 days for dislodgement or stem upsize.

Conclusion: The buried T-fastener technique is an efficient method for primary button gastrostomy placement with a secure gastropexy. While wound infection and granuloma rates are comparable to those reported for alternate techniques, this method eliminates the need for additional trocars or external bolsters and may be helpful in patients with thick abdominal walls.

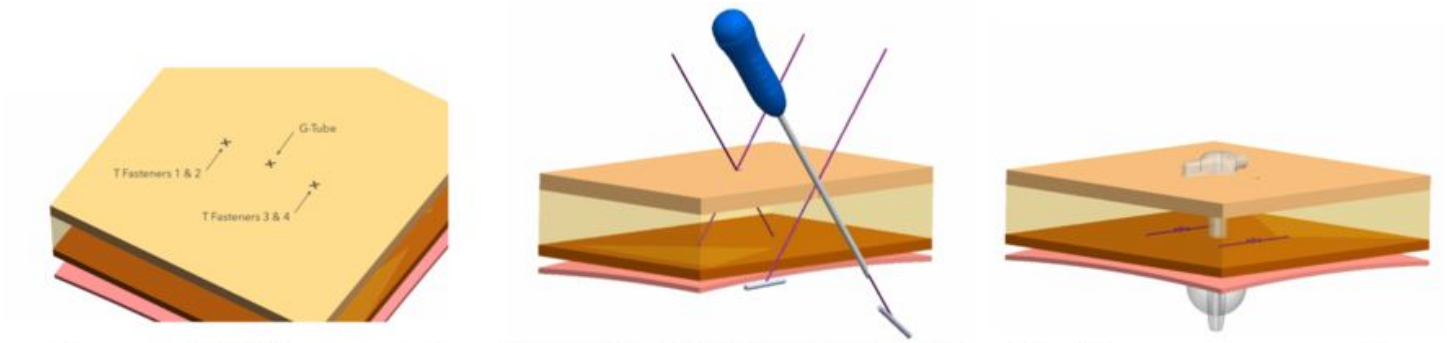


Figure. Buried T-fastener technique: Two small stab incisions placed on either side of the gastrostomy tract allow passage of paired T-fasteners in a square configuration with buried absorbable sutures to create a secure gastropexy.

IS011 NOLAPSE – THE STOMAL PROLAPSE PREVENTION DEVICE Caressa Chen, MD[1]; Mohammad Sahlabadi, PhD[1]; Folarin Erogbogbo, PhD[2]; Sunghoon Kim, MD[1]; Olajire Idowu, MD[1]; [1]UCSF; [2]San Jose State University

An estimated 500,000 people in the US alone have an intestinal stoma. Stomal prolapse is a common complication with an annual incidence of 100,000, resulting in emergency room visits, hospitalizations and surgical procedures. Our invention, the NoLapse, is the first anti-stomal prolapse device created to prevent stomal prolapse non-operatively. It will decrease the significant morbidity and cost of care associated with this complication.

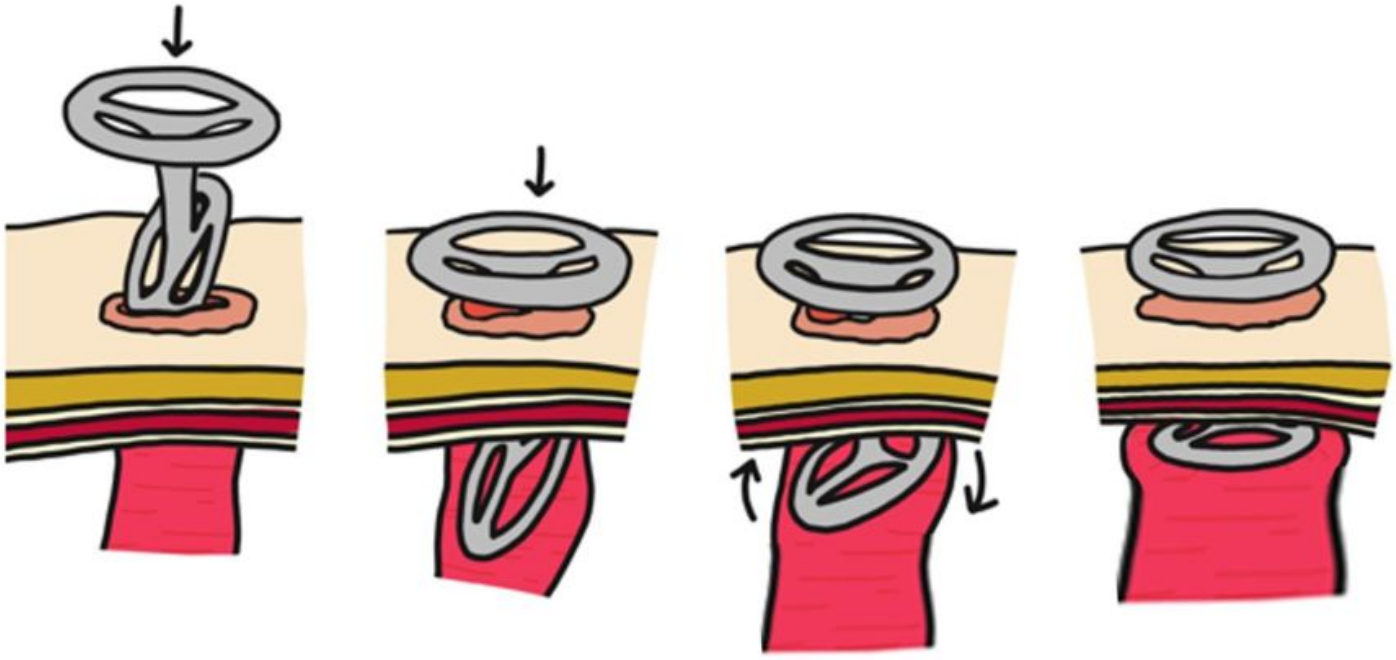
The device is made of two flexible rings connected by a rod (Fig. 1). The inner ring is placed within the bowel lumen, positioned up against the peritoneal lining, and dampens the propagation of intestinal peristaltic waves to prevent bowel intussusception. The outer ring rests on the stomal surface and prevents the device from falling into the bowel lumen (Fig. 2). The NoLapse is made of medical-grade biocompatible silicone with semi-rigid and foldable properties. It is easy to insert or remove from a stomal opening without general or local anesthesia. Nolapse does not cause stomal obstruction and is compatible with ostomy appliances and accessories.

Initial benchtop studies demonstrated feasibility and efficacy. Benchtop studies were followed by a porcine cadaver study. Using a pig cadaver, an ileal stoma was created which could be prolapsed and reduced manually. Upon insertion of the device, stomal prolapse could not be induced with direct manual pressure. The forces applied to the bowel to attemp a prolapse were estimated to be 13 N, much higher than the physiologic intestinal peristaltic force (0.5 - 2 N). We also demonstrated that the NoLapse does not obstruct fecal discharge by showing applesauce easily exits the stomal opening with the NoLapse in place. Lastly, we measured the minimum pulling force required to pull out the device without folding the rings to be 12.2 N.

We plan to finalize design specifications and optimize the material/manufacturing methods. An accompanying stomal sizing kit will be made, to measure the diameter of the fascial opening and abdominal wall thickness, to help in selecting the correct-sized device. To evaluate safety and efficacy in vivo, we will perform live porcine stomal studies where the device will be left in place for 24 hours, 1 week, or 2 weeks. The preliminary results thus far indicate NoLapse is an effective and safe device that may help future patients with stomal prolapse.

Figure 1. 

Figure 2.



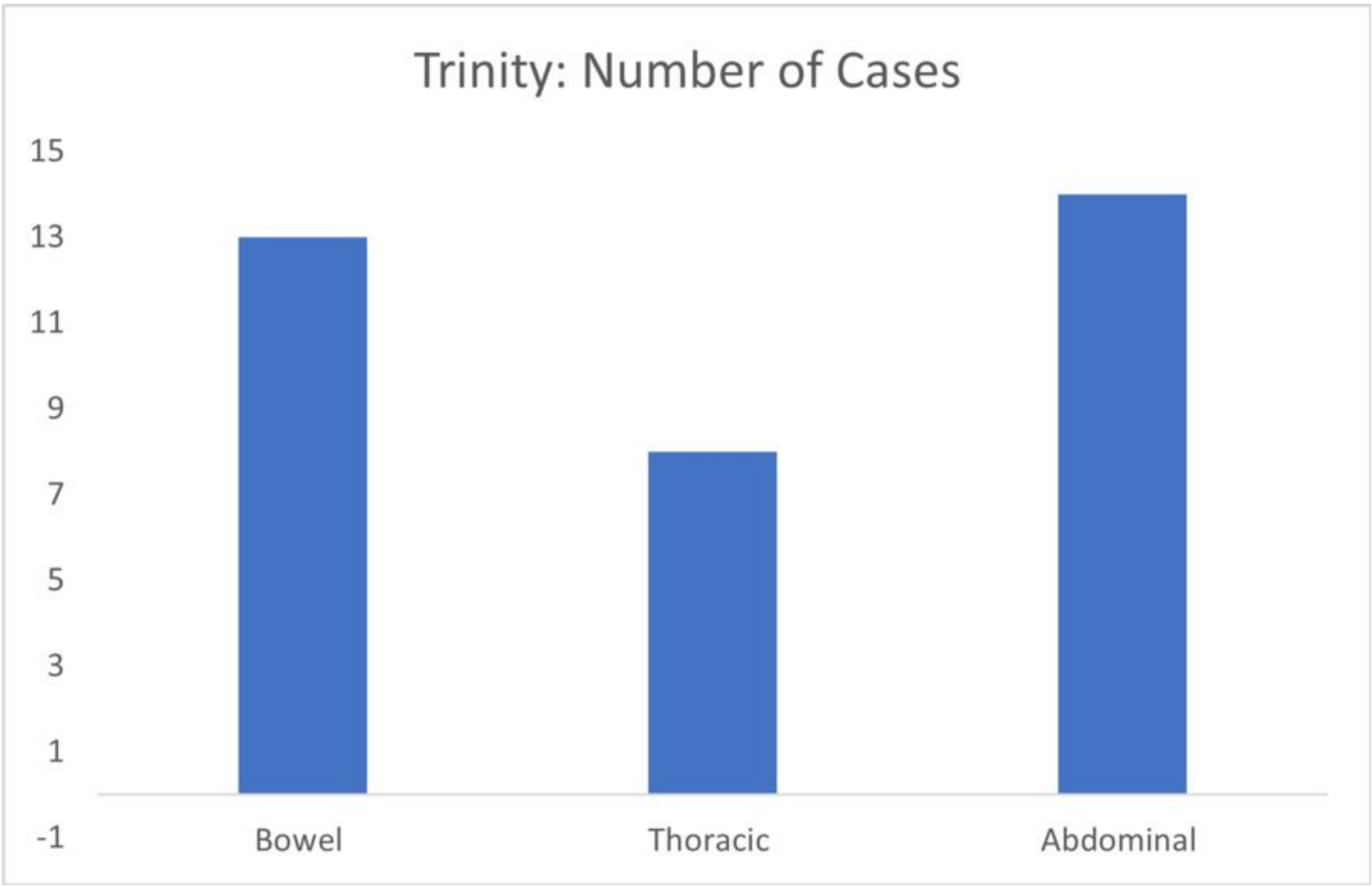
IS012 INITIAL CLINICAL EXPERIENCE WITH A NEW VESSEL SEALING TECHNOLOGY Bethany Slater, MD, MBA[1]; Irving Zamora, MD, MPH[2]; Steven Rothenberg, MD[3]; [1]Comer Children's Hospital, University of Chicago Medicine; [2]Vanderbilt Children's Hospital; [3]Rocky Mountain Hospital for Children

Objective of the technology: Vessel sealing offers the distinct advantage in surgery of providing an effective way to seal blood vessels without leaving behind any foreign material in the body. A drawback of energy-based vessel sealing is the inherent heat that is generated during sealing, which may result in thermal injury to adjacent structures. Thermal injury to organs can clinically manifest after surgery and cause complications.

Description of the technology and method of its use or application: The CoolSeal™ Trinity is a bipolar electrosurgical instrument intended for use in minimally invasive or open surgical procedures where ligation and division of vessels and lymphatics is desired. The device uses a novel, low power, advanced bipolar mechanism for vessel sealing. The generator delivers only 50W compared to up to 350W for other systems. The energy delivery is optimized so it is focused to the target tissue and delivered quickly with average seal times of less than 1.5s. The optimized power and quick sealing times leads to minimized thermal damage.

Preliminary results: Over a two-month trial period, 35 patients underwent minimally invasive procedures with the new 5 mm Trinity vessel sealing device. The device with a dual-action Maryland style grasper dissector was capable of sealing vessels and/or tissue bundles. Fourteen sites used the device on a range of bowel, thoracic, and abdominal procedures (Table 1). The average age of the patients was 10.7 years old (range 4 months-38 years) and average weight 43.6 kg (range 7.6 kg-115 kg). Surgeons were surveyed on their perception using a 5-point Likert Scale, 5 being highest satisfaction, with regards to: usability in tight spaces (4.6), visualization (4.7), seal time (4.8), thermal spread (4.7), grasping and dissection capability (4.8, 4.7 respectively), and seal quality (4.6). There were no surgeon complaints or adverse events in this preliminary data set.

Conclusion: This initial clinical experience demonstrates that the device exceeds surgeons' expectations as they relate to safety and their perception of the device. In this initial experience, the CoolSeal™ technology provided a sealing system that optimizes energy delivery for high quality seals while minimizing the risk of thermal injury. The dual-action capability of the Maryland jaws allows for more precise dissection and allows surgeons to keep the device in the cavity and thus might decrease operative time. Further studies need to be done to quantify this impact. The size, design, and optimal thermal profile of the device enables safe and effective minimally invasive surgery in a wide range of patients and procedures.



IS013 A NOVEL MULTI-FUNCTIONAL DEVICE SYSTEM FOR ENDOLUMINAL CREATION OF A PRIMARY ESOPHAGEAL ANASTOMOSIS FOR THE TREATMENT OF ESOPHAGEAL ATRESIA Lauren L Evans, MD; Mohammad Sahlabadi, PhD; Caressa Chen, MD; Mohammad Karimzada, MD; Michael R Harrison, MD; University of California San Francisco

Objective of tech or device: Morbidity after esophageal atresia repair is considerable due to complications of the esophageal anastomosis and thoracotomy for open repair. The rates of anastomotic leak and stricture remains significant. Furthermore, thoracoscopic repair is limited by technical difficulty and thus, over 90% of esophageal repair is performed open.

The Connect-EA (mini-magnamosis) is a novel device system, being developed by Myka Labs (San Francisco, CA), for minimally invasive esophageal atresia repair that employs magnetic force to create an esophageal anastomosis via an endoluminal approach. The Connect-EA decreases anastomotic complications and increase adoption of thoracoscopic repair by eliminating the need for a handsewn esophageal anastomosis. Magnetic force induces the gradual formation of a robust anastomosis that is less prone to leak or stricture. The technical challenges of a thoracoscopic handsewn esophageal anastomosis have limited the adoption of minimally invasive repair. Providing an alternative, technically simple approach to creating an esophageal anastomosis will allow for increased utilization of thoracoscopic repair and significantly decrease the need for thoracotomy.

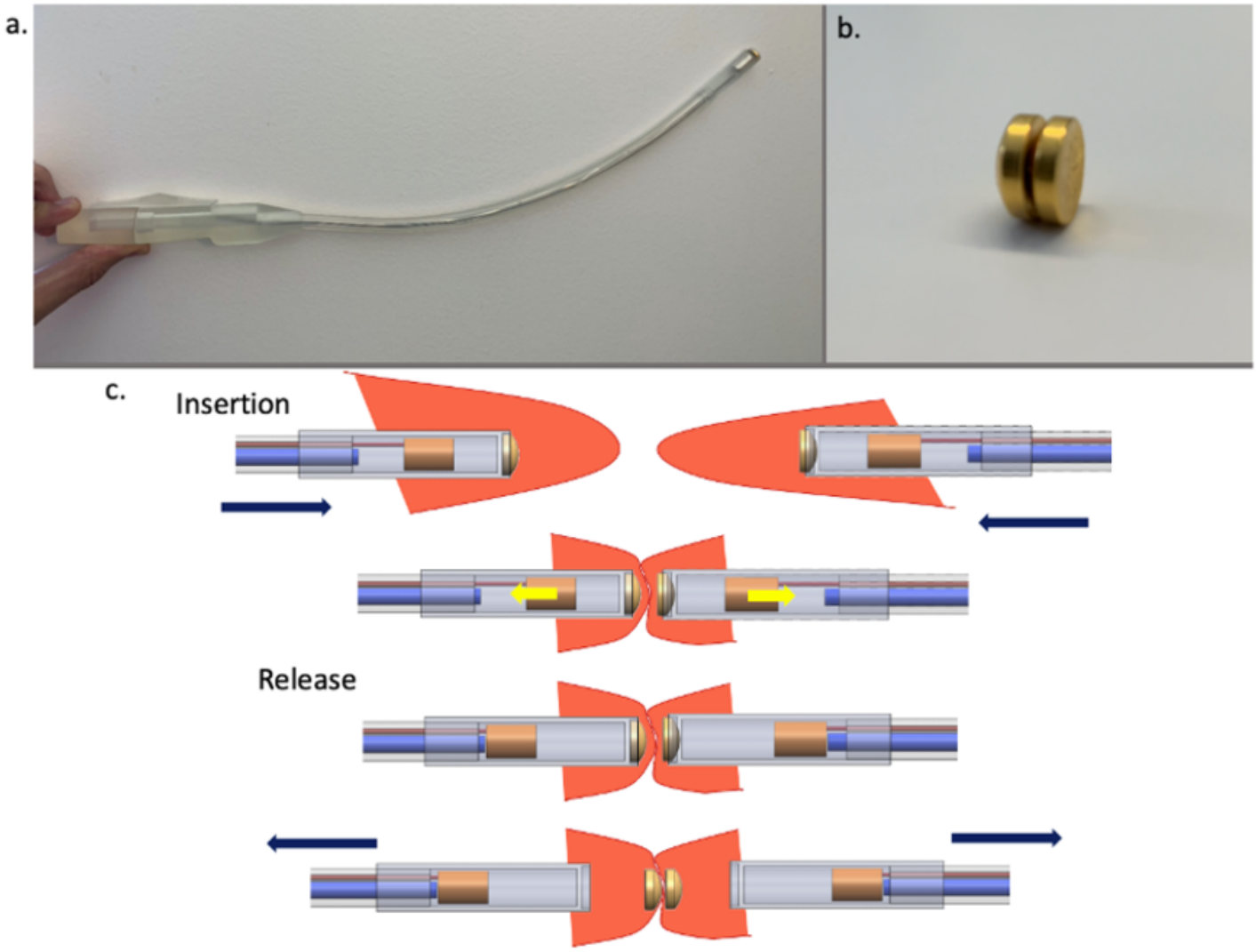
Description of tech and method of its use of application: The Connect-EA device system includes catheter-based delivery devices and mini-magnamosis devices (Fig 1a). The disc-shaped mini-magnamosis devices are 8mm in diameter and incorporate rare earth magnets (Fig 1b). A unique bi-curved mating surface creates a force profile designed to bring about a robust, healthy esophageal anastomosis. The delivery device optimizes the safety and user experience during placement of the mini-magnamosis devices. The delivery device employs different degrees of magnetic force to serve three distinct functions: insertion, release, and retrieval of the mini-magnamosis devices. The position of an internal magnetic mechanism determines the amount of magnetic force between the delivery device and mini-magnamosis devices. The handle allows the user to determine the function of the catheter by adjusting the internal mechanism to a corresponding predetermined position (Fig 1c).

The Connect-EA is inserted through the mouth and a gastrostomy site to access the upper and lower pouches. To aid in navigating the gastroesophageal junction, the delivery device is embedded with a malleable stylet.

Prelim results if available: To evaluate the mini-magnamosis devices, two preclinical studies have demonstrated excellent short- and long-term outcomes with no major adverse events, such as anastomotic leak, and have demonstrated the formation of a robust anastomosis with histological findings protective of stricture formation. Additionally, we have completed four in-human compassionate use cases with no adverse events and excellent long-term outcomes.

The delivery device is a recent invention and remains in the early stages of development. Early usability studies were positive with surgeons stating the device effectively delivers the compressive device components and is easy and intuitive to use.

Conclusions/further directions: The Connect-EA shows promise as a minimally invasive alternative to traditional EA repair with potential to improve patient outcomes. In parallel with further development, we plan to explore the use of magnetic compression for stricturoplasty to treat recalcitrant esophageal stricture.


a.
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Insertion
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IS014 STORYCASTS: A NOVEL APPROACH TO INTERACTIVE SURGICAL EDUCATION Rodrigo Gerardo; Ramy Shaaban; Todd Ponsky; Cincinnati Children's Hospital Medical Center

Case-Based Learning (CBL) has been widely used for decades across different medical specialties aiming to promote the learner's clinical reasoning through real-world scenarios. There are multiple types of technology where CBL has been applied such as written problem-based learning, high-fidelity simulations, 3D simulations, and VR/AR applications. They all share the same goal; to enhance learner's ability to diagnose and manage a case scenario. However, these tools still fall short in their ability to most accurately depict the key component of medical training – learning to make the correct clinical decision. Moreover, with the COVID-19 pandemic forcing several medical training programs to move toward remote learning, several trainees are left without the experience of in-person patient care. Here, we propose a new form of CBL that could supplement both of the aforementioned deficits. We introduce video-based mobile CBLs, which we call Storycasts.

Storycasts are a new innovative educational tool that aims to enhance CBL through video-based simulation akin to a "choose your own adventure" story but with the accessibility of a podcast – hence the name: Storycast. This educational tool uses video-recorded scenarios and allows learners to choose between clinical decisions to manage medical cases. This tool aims to enhance clinical reasoning skills through simulation, scaffolding, and collaboration. In this proposal, we describe the concept and design of Storycasts as well as highlight the potential benefits that Storycasts could provide to the world of medical education.

S058 THE ROLE OF MOTION TRACKING IN ASSESSING TECHNICAL SKILL ACQUISITION USING A NEONATAL 3D-PRINTED THORACOSCOPIC ESOPHAGEAL ATRESIA/TRACHEO-ESOPHAGEAL FISTULA SIMULATOR

Clara Choi[1]; Nicola Luenenschloss[2]; David Nair[2]; Nick Cook[2]; Rory Jones[3]; Spencer W Beasley[2]; Jonathan M Wells[2]; [1]University of Otago; [2]Christchurch Hospital; [3]Symulus

Introduction: Acquiring the technical skills for thoracoscopic repair of esophageal atresia with tracheo-esophageal fistula (EA/TEF) is challenging. This is compounded by the low incidence of EA/TEF, meaning that trainee pediatric surgeons have limited exposure during their training. To address this, a high-fidelity 3D-printed pediatric thoracoscopic EA/TEF simulator was developed. The aim of this study was to assess and validate motion tracking as an assessment tool to distinguish between surgeons of different expertise using the simulator.

Methods: Participants performed a single intracorporeal suture between the EA and TEF with a time limit of 15 minutes. The attempt was video-recorded and assessed by a blinded pediatric surgeon using a modified Objective Structured Assessment of Technical Skills (OSATS) score. Motion tracking was used to record the total relative path length of right and left surgical instruments for their attempt. Statistics recorded as median (range) and statistical significance as $p<0.05$.

Results: 17 Participants: 9 medical students, 3 registrars (1 pediatric surgical and 2 adult general surgical) and 5 surgical consultants (2 pediatric, 3 adult upper gastrointestinal) performed the task. The median OSATS scores were 28 (22 – 29) for consultants, 12 (6 – 22) for registrars, and 7 (6 – 11) for medical students. A significant difference in scores was only found between consultants and medical students.

15 participants were classified as right-handed for the task. The handed-ness of the remaining 2 participants are unknown. Data from two medical students was unusable due to motion-tracking recording errors. For registrars, median left-hand total path length, 2.47 (2.14-4.12) was higher compared to right-hand path length 1.21 (1.04-1.42); ($p<0.05$). There was no significant difference between right- and left-hand path length for consultants and medical students. Median right-hand total path length was greatest in medical students and lowest in consultants. Median right-hand total path lengths were: medical students 1.86 (1.53 – 2.62), registrars 1.21 (1.04 – 1.42), consultants 0.68 (0.61 – 0.85); ($p<0.05$). Median left-hand total path length was greater in medical students 2.26 (1.20 – 3.20) and registrars 2.47 (2.14 – 4.12 compared to consultants 1.45 (0.59 – 1.67). There was no significant difference in left-hand path length between medical students and registrars.

Conclusion: The differing levels of technical ability between groups was validated by the OSATS scores. Most participants were right-handed so we assume the right hand is more efficient and will have a lower path length than the left hand. Consultants having the lowest total relative path length for either hand suggest they were the most efficient in their movements. The similar high path lengths in both hands for medical students indicate their relative low level of skill with either hand. The difference between right- and left-hand path length in the registrars likely reflects the improved right-handed technical skills in contrast to the still developing left hand. Further focus on the left hand during simulation training may improve left-handed economy of movement.