(S19) LAPAROSCOPIC MOBILIZATION OF UROGENITAL STRUCTURES IN THE REPAIR OF LONG COMMON CHANNEL CLOACA

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Purpose: Patients with cloaca malformations have a wide range of presentations, each of which requires a tailored surgical approach. The common channel length dictates operative approach and a longer common channel (>3cm) often necessitates an abdominal and perineal approach. While laparoscopy has been applied to rectal separation, the use of minimally invasive techniques for urogenital separation has not previously been described.

Methods: We conducted a review of nine children with cloacal malformations who underwent operative repair by two primary surgeons that included laparoscopic rectal mobilization and urogenital separation. Relevant clinical parameters were reviewed to evaluate the safety and efficacy of this procedure. This study was approved by the institutional ethics review board.

Results: Laparoscopic assisted posterior sagittal anorectovaginourethroplasty with urogenital separation was successfully performed in all nine patients. Median [interquartile range] age was 12 [7, 15] months, at a weight of 7.6 [7.0, 8.8] kg. Common channel length was 3.5 [3.0, 3.6] cm, urethral length was 1.1 [0.9, 2.1] cm, and vaginal length was 4.8 [4.1, 5.4] cm. Operative time was 544 [529, 569] minutes, with estimated blood loss of 40 [20, 50] cc and intraoperative blood transfusion requirements of 0 [0, 10] cc/kg. There were no intraoperative complications. Perioperative complications included one bowel obstruction due to twisted pull-through, two patients with rectal prolapse, four patients with vaginal stenosis, and one patient with urethral stricture. Postoperative length of stay was 6 [5, 11] days.

Conclusions: Complete separation of the rectum as well as urogenital structures in long common channel cloaca can be safely performed without laparotomy. Urogenital separation enables repurposing of the common channel into a functional urethra, which may play a role in enhancing urinary continence. The primary perioperative complications seen (bowel twist, urethral stricture, and vaginal stenosis) may occur regardless of approach and further prospective study is required to establish if their incidence differs between laparoscopic and open approaches.

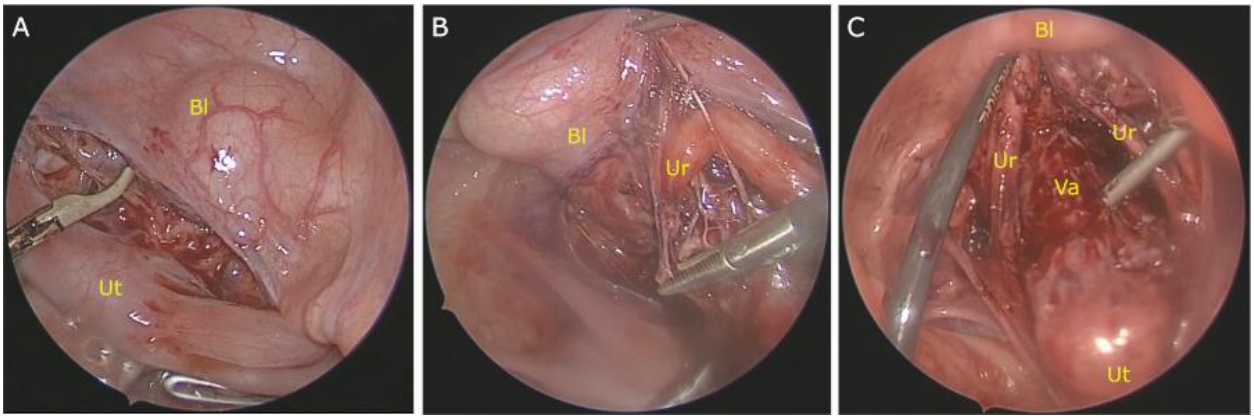

Image Laparoscopic view A) after opening of the peritoneum between the bladder (easily identified by the presence of Foley catheter balloon) and vagina, B) visualizing and protecting the ureter during dissection, and C) after dissection is complete. Bl = Bladder, Ut = Uterus, Va = Vagina, Ur = Ureter.

(S20) SINGLE-INCISION LAPAROSCOPIC-ASSISTED ANORECTOPLASTY FOR TREATING INTERMEDIATE ANORECTAL MALFORMATIONS CHILDREN WITH RECTOBULBAR FISTULA

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Purpose: Laparoscopic-assisted anorectoplasty (LAARP) is considered to benefit to the patients with vesico-prostatic fistula. The aim of this study is to present the details of our LAARP technique for improving the short- and long-term outcomes in the patients with high and intermediate types of anorectal malformations (ARM).

Methods: 330 patients with high-type (174 cases) and intermediate-type (156 cases) anorectal malformation (aged 8 days to 15 years) underwent LAARP from 2001 to 2019. LAARP was performed for full mobilization and resection of the dilated rectum, visualization and enlargement of the center of the longitudinal muscle tube (LMT) from pelvic and perineal aspects, intra-rectal closure of the fistula and rectal pull-through in the LMT.

Results: LAARP was performed in all patients and no patient was converted to open procedure. The urethral diverticulum was found in three patients (1.02%, 3/294) according to postoperative protocol voiding cystourethrogram withoutbut was not associated with any symptoms such as urinary tract infection, urinary incontinence and dysuria. Rectal prolapse requiring surgical intervention developed in 25 (7.6%) of 330 patients needed surgical intervention. Anal stricture occurred in three patients and anoplasty was performed 5 months after LAARP. Anal retraction occurred in two patients and re-pullthrough was conducted at 5 and 6 days respectively after LAARP. 228 patients who were older than 3 years were followed up. The median follow up period was 5.8 years (range =3-15 yrs). 217 patients (95.2% (217/228)%) had voluntary bowel movement. movements ; 202 patients (88.6% (202/228) patients %) were free from soiling or with grade 1 soiling. ; 30 patients (13.6%) and 25 patients (11patients11.3%) suffered from grade 1 and grade 2 constipationsconstipation respectively, while no patient withhad grade 3 constipation.

Conclusion: Our experiences demonstrateexperience demonstrates that the LAARP has advantages on rectal mobilization and resection, intrarectal fistularintra-rectal fistula closure and accurate tunnel formation in the LMT with minimal trauma. The improvement of the short-term and long-term outcomes after LAARP has been shown not only for high-type ARM but also for intermediate-type ARM.

Keywords: Laparoscopic-assisted anorectoplasty, high-type anorectal malformation, intermediate-type anorectal malformation, sphincter muscle complex, long-term outcomes.

(S21) RECTAL PROLAPSE AFTER LAPAROSCOPICALLY ASSISTED ANORECTOPLASTY FOR ANORECTAL MALFORMATIONS

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Aim: Rectal prolapse is one of the common postoperative complications of anorectoplasty for anorectal malformations (ARM). Laparoscopically assisted anorectoplasty (LAARP) was introduced in 2000 and has been implemented widely. However, the incidence of rectal prolapse is said to be more frequent in patients who had undergone LAARP than in those who had undergone the conventional procedure. Clinical research in patients with rectal prolapse after LAARP remains scarce, and little is known about the characteristics, etiology, and relationship of bowel function with rectal prolapse after LAARP. The aim of this study was to clarify the characteristics of patients with rectal prolapse after LAARP and to estimate the causes and evaluate the impact of rectal prolapse after LAARP on postoperative bowel function.

Methods: Our hospital introduced LAARP in 2000. The medical records of patients who underwent LAARP for high- or intermediate-type ARMs at a single institution between 2000 and 2019 were retrospectively reviewed. Clinical data, including postoperative fecal continence, were compared between patients with (group P) and without prolapse (normal, group N). Fecal continence was evaluated using the clinical assessment score for fecal continence developed by the Japanese Study Group of Anorectal Anomalies. For patients who underwent pelvic magnetic resonance imaging (MRI) prior to LAARP, atrophy or asymmetry of the anal sphincter and levator ani was evaluated by a radiologist.

Results: Of the 49 patients, 29 (59%) had a rectal prolapse after LAARP (group P) and 20 did not (group N). We found no significant difference in sex, type of ARM, the incidence of associated spinal or lumbosacral anomalies, procedure time, and postoperative bowel function at ages 4, 8, 12, and 16 years. However, LAARP was performed significantly earlier in group N (median [range], 180 days [123–498 days]) than in group P (210 days [141–570 days]). In group P, 18 patients (62%) developed prolapse before colostomy take-down at a median (range) onset of 20 days (5–1130 days) after surgery. Twenty-six patients (90%) underwent surgical prolapse repair, but 8 patients required redo procedures. The indications for surgery and the procedures performed varied. Among the 25 patients who underwent preoperative pelvic MRI, 22 (88%) and 12 (48%) had abnormalities of the sphincter muscle or levator ani, respectively. No significant relationship was found between the muscular abnormalities and the incidence of postoperative rectal prolapse.

Conclusions: More than half of the patients had rectal prolapse prior to colostomy closure, implying that the prolapse might be caused by congenital or procedural factors rather than postoperative bowel control, including constipation. However, the preoperative MRI scans showed no relationship between the congenital abnormalities in the pelvic muscles and the incidence of prolapse. Although recurrence after anorectoplasty for prolapse is common, performing LAARP at a younger age and concurrent laparoscopic rectopexy might be useful to prevent postoperative prolapse.

(S22) SINGLE STAGE LAPAROSCOPIC ANORECTAL PULLTHROUGH FOR HIGH ANORECTAL MALFORMATION IN MALE NEONATES

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Introduction: Anorectal malformations occur approximately 1 in 4000 to 5000 live births , with imperforate anus the most common malformation. The standard approach to males with high imperforate anus (HIA) has been a three staged procedure. Thanks to the great advance in neonatal laparoscopy, many pediatric surgeons adopted the single stage laparoscopic anorecal pull through (LAARP) in male neonates. Our study aims to evaluate the effectiveness and the applicability of this technique for male neonates with HIA.

Methodology: Our prospective outcome study included 20 male patients suffering from HIA. It was conducted at the Pediatric Surgery Department , Cairo University during the period from September 2017 to September 2019. Our patients were carefully selected before undergoing the procedure. Ascending cystourethrogram was a fundamental step to properly detect the rectourinary fistula site. Our technique focused performing the rectal pullthrough primarily and anoplasty without a covering colostomy.

Results: Out of the 20 patients, 18 patients had undergone a successful single stage LAARP. Whereas, 2 patient required a covering colostomy to protect the repair following pelvic soiling. 15 patients had recto-prostatic fistula while the remaining 5 had recto-bladder neck fistula. All patients passed stool at the 1st 48 hours postoperatively and were carefully followed up at our NSICU.

Conclusion: Although, it seems challenging to perform it primarily in neonates, our early results are encouraging. Laparoscopy provides excellent visualization of the fistula site and the precise location of the rectum through the complex.

(S23) THE VALUE OF ASCENDING CYSTOURETHROGRAM IN THE DETECTION OF RECTO-URINARY FISTULA IN NON-COLOSTOMIZED ANORECTAL MALFORMATION IN MALE NEONATES

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Introduction: Congenital recto-urethral fistula (RUF) is the most common form of anorectal malformations (ARMs) found in boys.

A recent trend in pediatric surgery has been to perform definitive repair of complex anomalies in one-stage if possible. The issue with single stage repair is that there is no information about the presence of recto-urinary fistula.

In our study, 30 patients were included in order to evaluate the feasibility of ascending cystourethrogram in detection of the recto-urinary fistula and its level.

Methodolgy: The study included 30 male neonates diagnosed with high anorectal malformation and were planned to undergo one-stage repair of the anomaly.

The patient is positioned in dead lateral position with flexed hips & knees. The fluoroscopic C-arm is positioned over the patient's pelvis

The contrast was injected through the catheter under pressure in order to visualize the urinary tract along with the fistula if present.

Results: The study included 30 male patients with high anorectal malformation. ACU study has successfully detected the site of the recto- urinary fistula in 26 candidates while the other 4 were not visualized. The results were 15 recto- prostatic and 5 recto-bladder neck, 6 recto-bulbar and 4 were non visualized.

Conclusion: ACU study is a highly significant preoperative investigation for detection of the fistula level without the need for colostogram in non-colostomized male neonates.

(S24) MASTER AND APPRENTICE OR A SLAVE TO TECHNOLOGY? A RANDOMIZED CONTROLLED TRIAL OF MINIMAL ACCESS SURGERY SIMULATION-BASED TRAINING TECHNIQUES

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Introduction: As Minimal Access Surgery (MAS) simulators become both more advanced and more accessible to surgical trainees, the following question arises; how can these simulators be used to most effectively improve trainees' technical skills? This study set out to assess the efficacy of three different approaches to simulation-based training using a 3D printed neonatal thoracoscopic simulator.

Methods: This was a randomized controlled trial of medical students, novices to MAS, from May to June 2019. Participants (N = 32) were given study information and signed consent forms. Participants performed two tasks on the neonatal thoracoscopic simulator, "ring transfer" and "needle pass", which have previously been shown to have construct validity, as baseline skills testing and were then randomly allocated into four intervention groups of 8.

- Group 1: Three standardised consultant paediatric surgeon supervised sessions on a thoracoscopic simulator.
- Group 2: Three 20-minute self-directed learning sessions on the same simulator.
- Group 3: Self-directed 'virtual training' on the "SimuSurg" minimal access surgery smartphone application (accredited to the Royal Australasian College of Surgeons).
- Group 4: Control, no training.

Post intervention participants repeated both tasks. Videos of the task attempts were de-identified of participant and pre- and post-intervention status and marked by a blinded consultant paediatric surgeon using the Objective Assessment of Technical Skills (OSATS). Ethics were reviewed retrospectively; no concerns were raised.

Results: There was no significant difference in participant demographics (gender or year of study) between groups. There was no significant difference in the baseline OSATS scores for either task in any group. For the 'ring transfer' task Group 1 (mean increase of 6.6, $p<0.001$) and Group 2 (mean increase of 6.3, $p<0.05$) showed significant improvement between their pre- and post-intervention scores across all domains, with no significant change in Group 3 or 4 (figure 1, a). There was no significant difference between Group 1 or 2 in post-intervention scores. For the needle pass task, no group demonstrated significant improvement after intervention (figure 1, b) although there was a trend to improved scores in groups 1 and 2.

Conclusion: This RCT identified that practice on a physical simulator either with consultant tuition or self-directed led to a statistically significant improvement in scores for MAS novices when compared with a smartphone MAS training application or no intervention for a ring transfer task. There was no significant difference between consultant taught or self-directed learning, this suggests that time on the simulator was the most important factor in improvement. This implies that trainees could practice at their convenience rather than requiring consultant supervision. This improvement is not seen in more challenging tasks such as the needle pass, requiring needle manipulation. App-based MAS training with the SimuSurg smartphone application did not improve skills on this simulator.

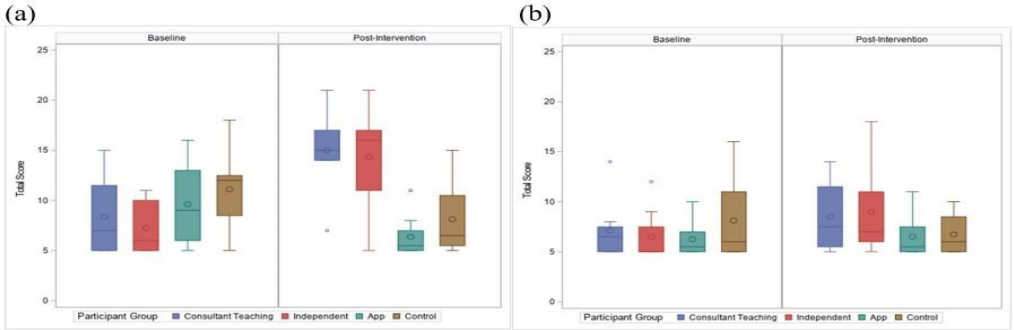

Figure 1:
Box plots of total OSATS score pre- and post-intervention for the ring transfer task (a) and needle task (b) by group.

(S25) COMPARISON OF ROBOTIC VS LAPAROSCOPIC-ASSISTED ENDORECTAL PULL-THROUGH FOR HIRSCHSPRUNG'S DISEASE: A PROSPECTIVE STUDY

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Background: Minimally invasive devices for Hirschsprung's disease (HD) have upgraded to the current da Vinci surgical robot. Accordingly, surgeons need to be instructed by a comparative evaluation of outcomes after robotic surgery and classical laparoscopic surgery for HD.To prospectively compare the surgical outcomes between laparoscopic and robotic-assisted endorectal pull-through procedures for HD.

Methods: In this cohort study during the period from November 2015 to November 2018, 144 children with rectosigmoid HD in Wuhan Union Hospital were enrolled with an informed consent form their guardians. According to the surgical devices, children with HD were generally divided into 2 groups: laparoscopic group (LG) and robotic group (RG). Pelvic dissection in LG was adjacent to the rectum, as with the classical laparoscopic techniques. Rectal dissection in RG was between the proper facia and the muscular layer of the rectum, reaching a deeper and more precise anatomical level. After the trans-anal dissection was established, a pull-through was performed to all patients. Bowel function score questionnaires were sent to children followed up ≥ 3 years and their guardians. The questionnaires were collected in the outpatient setting or on the phone. When stratified by age at surgery, a subgroup of children younger than 12 months (followed up ≥ 3 years) was selected to analyze separately. Clinical data on basic characteristics (age, weight and hospital stay), operative parameters (pelvic dissection depth and retraction time) and postoperative outcomes (defecation frequency, complications and bowel function) in LG and RG were recorded and analyzed.

Results: A total of 62 children (15d~1106d, mean 176d) were allocated to LG, and a total of 82 children (17d~1143d, mean 184d) were allocated to RG. The follow-up period was from 7 months to 3 years (mean 38 months). No differences in age, weight, follow-up time, hospital stay and the overall incidence of complications were found in RG compared with LG ($P>0.05$). RG had significantly deeper pelvic dissection depth compared with LG (LG 1.4cm vs RG 4.2cm; $P<0.001$). As a result, the time interval of anal retraction in RG was obviously reduced during the pull-through procedure (LG 77min vs RG 46min; $P=0.016$). Children gained normal defecation frequency (1-3 times/day or 1 time/1-3 day) sooner after robotic surgery. In the investigation of the postoperative bowel function score among the children followed up ≥ 3 years, a total of 73 questionnaires were provided and the effective recovery copies were 64 (LG=34, RG=30). No significant difference revealed in scores for fecal soiling, fecal accidents or constipation between both groups. However, within the subgroup of children younger than 12 months, more patients in RG obtained better scores for both fecal soiling ($P=0.007$) and fecal accidents ($P=0.009$). The constipation scores were not statistically significant.

Conclusions: Robotic-assisted endorectal pull-through is comparable to the laparoscopic endorectal pull-through. For younger patients (<12 months) with HD, robotic-assisted endorectal pull-through is promising to restore a better long-term functional recovery by further decreasing the injury for nearby neuro-vascular tissue and anal sphincters.