

Laparoscopically assisted anorectal pull-through for rectovestibular fistula

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Purpose Laparoscopically assisted anorectal pull-through (LAARP) has been described as an alternative to posterior sagittal anorectoplasty for the surgical treatment of rectourethral fistula in boys. The aim of the present study was to evaluate the feasibility, safety, efficacy, and advantages of LAARP in the repair of rectovestibular fistula (RVF) in girls.

Patients and methods From January 2010 to January 2015, we conducted a prospective collection of data of our patients with RVF who were treated with LAARP, regarding demographics, VACTERL (vertebral, anal, cardiac, tracheoesophageal, renal, limb malformations) screening, perioperative measurements, complications, and outcome. Anorectal function of these patients was evaluated using Kelly's clinical score.

Results Sixteen girls with RVF underwent LAARP at our hospital. For all these girls, umbilical colostomy had been performed at the time of their birth. The mean age at LAARP operation was 3 months (range=2–5 months). Mean operative time was 99 min. Mean hospital stay was 3.2 days. There were no intraoperative complications. All the patients had their colostomy reversed. No patient had a

stricture at the anorectal anastomosis. The mean follow-up time was 35.7 months (range=6–60 months). The cosmetic appearance was satisfactory. Seven patients, who were older than 3 years, achieved continence and had regular bowel movements with good Kelly's clinical score of 6. For the remaining nine patients, the longest follow-up was 3 years, and therefore continence could not be evaluated.

Conclusion LAARP for the repair of RVF in girls is feasible, safe, and efficient. Long-term follow-up, which would remain unavailable for several years, is necessary. *Ann Pediatr Surg* 12:14–17 © 2016 Annals of Pediatric Surgery.

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Introduction

Pediatric surgeons have long been challenged regarding the best way to restore anorectal function in infants born with anorectal malformations (ARMs). Over the past decade, the operative treatment of many pediatric colorectal diseases has improved through a better understanding of colorectal anatomy and the continued evolution of minimally invasive techniques [1].

Patients and methods

From January 2010 to January 2015, a prospective collection of data of our patients with rectovestibular fistula (RVF) who were treated by laparoscopically assisted anorectal pull-through (LAARP), regarding demographics, VACTERL (vertebral, anal, cardiac, tracheoesophageal, renal, limb malformations) screening, perioperative measurements, complications, and outcome, was conducted. At age 3–5 years, anorectal function of these patients was evaluated by using Kelly's clinical score (KCS). The KCS is based on three parameters: (a) the presence or absence of major fecal accidents, (b) the presence or absence of staining of underclothing, and (c) the sphincter squeeze of the examining finger during rectal examination. Each of these three parameters was assigned up to two points: 2 for normal, 1 for intermediate, and 0 for inadequate. Clinical scores of 5–6 were considered to be good, 3–4 as fair, and 0–2 as poor.

Results

Sixteen girls with RVF underwent LAARP at our hospital; the procedure in all the cases was carried out by the senior author of this report. Associated anomalies included the following: two girls had bilateral vesicoureteric reflux, one had solitary left kidney, and another had lower limb anomaly. For all these girls, umbilical colostomy was performed in the newborn period. The mean age at LAARP operation was 3 months (range = 2–5 months). Mean operative time was 99 min. Mean hospital stay was 3.2 days. There were no intraoperative complications. All the patients had their colostomy reversed. No patients showed ischemia or stricture of the anorectal anastomosis. The mean follow-up time was 35.7 months (range = 6–60 months). None of the patients had rectal mucosal prolapse. The cosmetic appearance and position of the rectum was satisfactory. In the seven patients older than 3 years, continence and regular bowel movements were achieved. In these seven patients, at age 3–5 years, anorectal function was evaluated by using KCS, which was good (a score of 6) in all of these patients. In the remaining nine patients, the longest follow-up was 3 years, and therefore continence could not be evaluated. Three patients are taking oral medications for constipation.

Technique

The patient was placed in a supine position at the end of the table. The skin was prepped from the nipples to the feet. The surgeon stood at the head of the patient and

the cameraman to his right. Foley's catheter was inserted. Veress needle was inserted in the left upper quadrant and closed pneumoperitoneum was created up to 12 mmHg. We used three-ports technique. A 30° laparoscope was placed through the right upper quadrant, and two additional 3.5- or 5-mm ports were placed in the right lower quadrant and left upper quadrant. Furthermore, the patient's position was changed to Trendelenburg position to allow the bowel to fall out of the way. When initiating rectal dissection, anterosuperior traction of the rectosigmoid was carried out by the left hand. Rectal dissection starts at the peritoneal reflection with the use of a hook diathermy or soft grasping forceps attached to diathermy combined with blunt dissection. The mobilization of the rectum continued anteriorly, posteriorly, and laterally from each side (Fig. 1). Traction suture 2/0 silk was used from outside to get the uterus out of the way. Retrorectal dissection was continued distally. Subsequently, the rectum was mobilized anteriorly from the vagina. Separation of the rectum from posterior vaginal wall, which is considered the most important step of the operation, took place under direct vision. Intermittent introduction of an artery forceps from outside into the fistula and the vaginal lumen will guide and help in the final separation. When there was about less than 1 cm remaining in the fistula, as measured from outside by a small Hegar dilator, the rectum was divided by using laparoscopic scissors (Fig. 2), after which the rectum was pulled up and out of the pelvis to allow for inspection and identification of the pelvic floor musculature and puborectalis muscle. The legs were elevated, the hips flexed, and the feet held together upward to facilitate the alignment of the perineal anal site, and the puborectalis sling. The perineum was stimulated externally with an electrostimulator, and the region where the maximal sphincteric contractions are observed was determined and marked as the optimal location for the anoplasty.

A 1.5 cm vertical incision was made at the planned anoplasty site, and an artery forceps was used to bluntly dissect through the intersphincteric plane for about 1 cm. The step Veress needle with radially expanding sheath was then introduced through the perineal opening and midline intrasphincteric plane and advanced between the two bellies of the pubococcygeus muscle in the midline under laparoscopic guidance. Next, the Veress needle was removed from the sheath, and the tract dilated to 5 mm and then to 10 mm, and was then further advanced through the center of the 'V' of the puborectalis sling under laparoscopic guidance (Fig. 3). The rectum was grasped and pulled through the muscle complex, and an anoplasty was performed (Fig. 4). In three cases, we found the pulled rectum to be wide, and requiring tapering posteriorly. The external remaining part of the RVF mucosa (about 1 cm) was excised and closed using 4/0 vicryl. The rectum was retracted upward laparoscopically and sutured intracorporally with the presacral fascia.

Discussion

RVF is the most frequent ARM anomaly encountered in females [2]. According to Wingspread classification of ARMs, RVF is considered as an intermediate type of

ARM. The gravity of its surgical correction is frequently underestimated. A firm union between posterior vaginal wall and the rectum in RVF requires much technical skill, making definitive correction difficult [3]. Various techniques and approaches have been used to repair RVF and place the rectum within the sphincteric muscle complex. RVF is usually repaired using a posterior [4] or an anterior sagittal approach [5].

Posterior sagittal approach to treat ARMs was first reported in a study by Peña and Devries in 1982 [6]. Over the past few decades, for most pediatric surgeons, the posterior sagittal anorectoplasty (PSARP) has emerged as the preferred approach for repairing ARMs [7]. Using PSARP approach with an incision from the coccyx through the perineal body, all the voluntary muscles of continence are identified and divided in the midline. The use of this technique has clearly improved functional outcomes, as evidenced by the many reported experiences [2,8].

In PSARP, it is important to keep the dissection in the midline. The risk for losing it, is challenging for the surgeon and requires a lot of experience. Some authors believe that the wide exposure obtained in PSARP by dividing the perineum into two halves is probably more than what is really needed for RVF [3]. Furthermore, the amount of tissue dissection in posterior approach puts a larger area at risk in case infection occurs.

In 1992, in their study, Okada *et al.* [5] described the anterior sagittal anorectoplasty (ASARP) for the repair of rectoperineal and RVFs. The primary advantage of the ASARP is that the incision is limited to the perineal muscles and anterior fibers of the external sphincter complex, leaving the posterior perineum intact [5] ASARP is considered a less invasive perineal approach compared with PSARP [3]. However, the major limitation of ASARP compared with the PSARP is the relatively limited exposure and potentially difficult mobilization of the rectum [9]. In this regard, redo procedures have been required after the ASARP because of improper positioning of the rectum within the muscle complex [1].

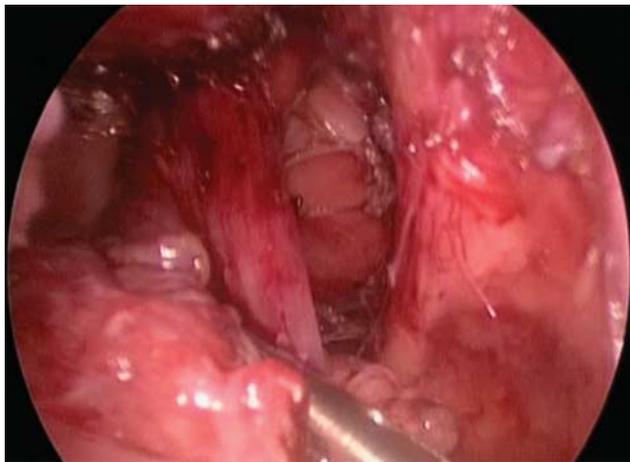
A study by Georgeson *et al.* [10] in 2000 described LAARP procedure, a technique that offered an approach for repairing ARMs without the need for an extensive perineal dissection. As with many new surgical techniques, the 'indications' for LAARP expanded quickly across the entire spectrum of ARMs, even including cloacal anomalies [11–14]. In their study, Tei *et al.* [11] reported two cases of RVF associated with uterovaginal agenesis repaired by using LAARP with good functional outcome, and they recommended LAARP to be applied to selected female ARMs, in particular rectovaginal fistula and RVF with uterovaginal agenesis. A study by Koga *et al.* [15] reported two females with RVF, with absent vagina repaired by using the LAARP approach, and claimed that LAARP would appear to be equivalent to PSARP in terms of anorectal angle, but LAARP would appear to have better postoperative functional outcome compared with PSARP, on the basis of fecal continence evaluation questionnaire results. Yet, the routine use of laparoscopy to repair RVF did not gain wide acceptance, because it was considered an intermediate type of ARM

Fig. 1



Mobilization of the rectum.

Fig. 2



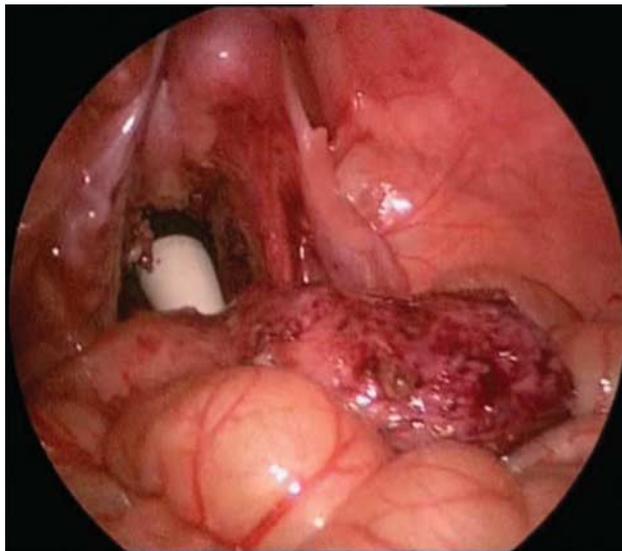
Complete rectal mobilization.

and why to change a winning team with the use of PSARP and ASARP.

To prevent the mobilized anorectum from receding inside and forward, a study by Peña [16] advocated anterior dissection up to a point where rectum and vagina separate completely and have full-thickness walls. Separation of the rectum from the vagina in PSARP and ASARP is tedious and difficult even with the best hands, with a risk for injury to the rectum and vagina, and also ischemia to the rectum. Moreover, by using PSARP and ASARP approaches, there is a risk for retraction of the rectum if the rectum is not fully mobilized. As opposed to LAARP, the rectum is completely mobilized and separated from the vagina from above, with no possibility of retraction or malposition of the rectum. Besides, laparoscopy provides the opportunity to observe other accompanying intraabdominal abnormalities, such as uterine agenesis [17].

Patients with RVF are born with excellent potential for bowel control [18]. Therefore, every effort should be

Fig. 3



10-mm step port advanced through the center of the 'V' of the puborectalis sling.

Fig. 4



Complete anoplasty.

made to preserve the sphincteric mechanism for these patients. It seems odd to divide the sphincteric muscles in the midline in PSARP and anterior sphincteric muscles in ASARP, and then repair them and, hoping the sphincteric muscles would work properly. PSARP was considered to cause damage to sphincter muscles, as well as tiny nerves that maintain anorectal sensation and motility, as a consequence of the large sagittal incision used in the pelvis [15,19–21].

Apart from the incision for the anoplasty site, no perineal incision is required in LAARP. Moreover, in LAARP no reconstruction of any kind of the perineal muscles or anal sphincter is needed. Dividing the muscles complex is unnecessary to repair RVF and thus should be avoided.

Assessment of functional outcomes in terms of fecal continence must wait several more years. Seven of our patients, older than 3 years, achieved continence, had a regular bowel movement, and their parents were satisfied with the current continence status. The remaining nine patients had not reached the age of fecal continence, and thus we could not provide data regarding their fecal continence. Yet, our preliminary follow-up study of post-operative daily stool habits using the KCS for patients older than 3 years revealed that satisfactory fecal continence can be achieved in patients with RVF after LAARP.

This is the first report of routine use of LAARP approach to repair RVF. Although the number of cases is limited, and the follow-up period is short to make any conclusions about the ultimate effectiveness of LAARP, the technique offers many advantages, including excellent visualization, complete separation of the rectum from the vagina from above, adequate downward mobilization of the rectum to perform a tension-free anastomosis with skin, accurate placement of the anorectal pull-through, and minimally invasive abdominal and perineal wounds. The LAARP for the repair of RVF is reproducible and avoids the possible complications of rectovaginal fistula, or a mislocated anus within the sphincter mechanism.

Conclusion

LAARP for the repair of RVF in girls is feasible, safe, and efficient. Long-term follow-up, which would remain unavailable for several years, is necessary.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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