Original Article

Institutional experience with laparoscopic-assisted anorectal pull-through in a series of 17 cases: A retrospective analysis

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Abstract

Aims: To retrospectively analyse the results of laparoscopically-assisted anorectal pull-through (LAARP) for high anorectal malformation (ARM) in male children in our institution.

Materials and Methods: We analysed the hospital records of patients who had undergone LAARP from October 2010 to December 2015 in terms of age, operative time, length of hospital stay and post-operative complications.

Results: Of 17 cases, 13 (76%) were in 6–12 months age group, whereas rest of them were in 12–18 months age group. The recto-prostatic urethral fistula was encountered in 82% ($n = 14$) of patients and rectovesical type in two cases (12%). The mean operative time was 132 min with mean length of hospital stay being 4 days. Rectal mucosal prolapse was the most common complication noted.

Conclusions: LAARP is a feasible approach to male children with high ARMs with less post-operative morbidity.

Keywords: Anorectal malformation, anorectal pull-through, laparoscopic, laparoscopic assisted anorectal pull-through

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Received: 08.12.2016, **Accepted:** 21.03.2017

INTRODUCTION

Laparoscopic-assisted anorectal pull-through (LAARP), introduced by Georgeson *et al.* in 2000 has become the main-stay of treatment of high anorectal malformations (ARM) in boys in many centres across the world. Advantages of LAARP are an excellent visualisation of the fistula, preservation of distal rectum, accurate placement of rectum within the levator ani muscle and lack of division of the muscle complex.[1] In our institution, we started the LAARP technique in 2010 and we report the retrospective analysis of 17 patients who had undergone LAARP till 2015.

Access this article online	
Quick Response Code:	Website: www.journalofmas.com
	DOI: 10.4103/jmas.JMAS_254_16

MATERIALS AND METHODS

Patient records

From October 2010 to December 2015, 17 LAARP surgeries were carried out in our institution with patient's age ranging from 6 to 18 months. A retrospective analysis of outcome was performed in terms of age, operative time, length of hospital stay and post-operative complications.

Inclusion criteria

- Only males
- High ARM with recto-vesical or recto-prostatic urethral fistulae.

How to cite this article: Ramasundaram M, Sundaram J, Agarwal P, Bagdi RK, Bharathi S, Arora A. Institutional experience with laparoscopic-assisted anorectal pull-through in a series of 17 cases: A retrospective analysis. J Min Access Surg 0;0:0.

Exclusion criteria

- Female ARM
- Intermediate or low ARM.

Pre-operative management

All patients have undergone either loop or divided sigmoid colostomy (preference of the surgeon) in the neonatal period. Pre-operative workup included ultrasonography of abdomen, micturating cystourethrography, echocardiography to look for the associated anomalies. Distal loop contrast study was carried out in all the patients to define the anatomy and visualize the fistula before LAARP. Distal loop saline washes were given till the returns became clear. Pre-operative antibiotic regime included cefotaxime 50 mg/kg, amikacin 15 mg/kg, and metronidazole 10 mg/kg intravenously at the time of induction of anaesthesia.

Surgery and ergonomics

LAARP was done with the principles laid by Georgeson *et al*. with few modifications. Number of trocars came down from 4 to 3 over the period [Figure 1]. Child was placed cross-table with laparoscopic equipment at the foot end and the surgeons at the head end. Supraumbilical 5 mm camera port was inserted along with two 5 mm working ports over bilateral flanks depending on the site of colostomy, preferably in the right lumbar and left hypochondrial regions. A transcutaneous bladder hitch stitch was taken after catherisation of the bladder. Bowel was mobilised till the level of fistula with due care to preserve vas and ureter. In the first 3 cases, the fistula was ligated and divided following which only division was done without ligation in the remaining cases, leaving behind a small rim near the urethra. Higher the fistula, easier was the technique and the dissection was terminated as the bowel became significantly narrow. Anterior traction on the fistula shows the bilateral pubococcygeus fibres as a 'horse-shoe'. External muscle stimulation identifies the limits of sphincter complex. A midline incision was made and dissection done in the midline with the guidance of laparoscopic blunt suction cannula. The plane is then dilated with Hegar's dilators (10–12 mm) by railroading over the suction cannula [Figure 1], following which a 10 mm trocar was introduced to deliver the rectum at the perineum with a Babcock clamp. A 16 stitch anoplasty was completed after ensuring the anatomic orientation of the bowel [Figure 2]. A rectopexy was done over the presacral fascia with 2-0 silk sutures to prevent prolapse. 16 Fr silastic drain was placed through one of the port sites and the procedure was completed. All the patients were started on feeds on the 1st post-operative day. The modifications which we inculcated from the literature and included in our series were the transcutaneous bladder stitch for unhampered visualisation of pelvis eliminating the need for a suprapubic trocar, division of fistula without ligation and the dilatation of the intra sphincteric plane by railroading technique with Hegar's dilator and suction cannula.

RESULTS

All patients have completed classical three-stage operation (neonatal colostomy, LAARP and colostomy closure). Out of 17 cases, 13 (76%) were in 6–12 months age group, whereas remaining 4 cases (24%) were in 12–18 months age group. Recto-prostatic urethral fistula was encountered in 82.3% (n = 14) of patients and rectovesical type in two cases (11.7%), whereas the remaining one patient (5.8%) did not have a fistula. The associated anomalies are depicted in Table 1. Rectal mucosal prolapse (RMP) was the most common complication (n = 3, 17.6%) which was treated by mucosal

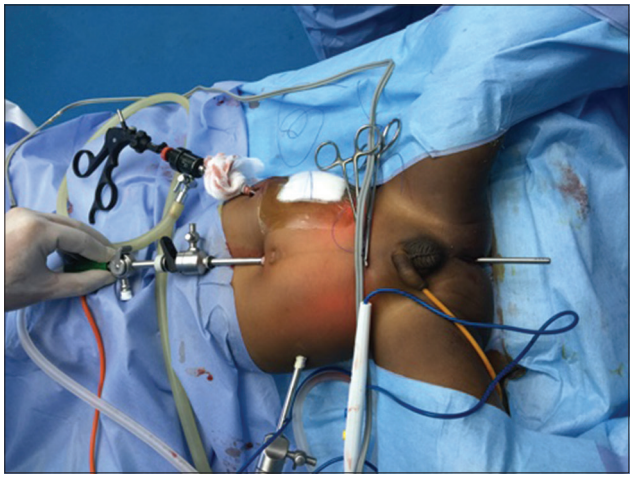

Figure 1: Image showing the position of three ports

Figure 2: Completed anoplasty

trimming. Two cases of anal stenosis (11.7%) were initially managed by dilatation and stool softeners, but one required a posterior triangular anoplasty after 6 months. The child with sacral agenesis had incontinence and is on a strict bowel management programme. The complications are listed in Table 2. Urinary leak with ileus was encountered in 1 child and discharged on the 8th post-operative day after conservative management, whereas all other patients were discharged on the 3rd or 4th post-operative day. All the patients had an indwelling urinary catheter inserted just before surgery and was removed on the 7th post-operative day in the first out-patient follow-up. The child with the ileus had urinary leak inspite of an indwelling catheter probably due to peri-catheter leak. He had 3 cm × 2.5 cm collection in the retrovesical area on ultrasonography despite having a drain at the operated region. That child was managed conservatively by mere removal of debris in the drain tube and flushing the urinary catheter. We considered this complication might have been due to the narrow lumen of the catheter (6F) in this child when compared other kids who had indwelling 8F catheter, which was properly draining resulting in the healing of fistula without ligation. The mean operative time was 132 min (range 120–150 min) with the hospital stay ranging from 3 to 8 days (mean 4 days).

Table 1: Associated anomalies

Serial number	Type of associated anomaly	Number of patients (*n*=17)
1	Sacral anomaly	1
2	Cardiac anomalies	3
3	Solitary kidney	1
4	Hypospadias	1
5	Undescended testis	1
6	Vesico-ureteric reflux	2
7	Downs' syndrome	1

Table 2: Post-operative complications

Serial number	Complication	Number of patients (*n*=17)
1	Rectal mucosal prolapse	3
2	Anal stenosis	2
3	Faecal incontinence	1
4	Post-operative urinary leak with ileus	1

Follow-up

The follow-up ranged from 6 to 36 months (mean 18.6 months) after colostomy closure, which was done 3–4 months following LAARP. All the children were on anal dilatation programme in the period between LAARP and colostomy closure. Sixteen out of 17 patients pass stools 2–3 times/day with good anal squeeze. Two children had constipation which could be treated with a transient course of oral laxatives for 1 month. Distal loop contrast study done prior to colostomy closure showed good angulation of rectum in 15 out of 17 patients. Occasional faecal soiling reported in two patients and severe incontinence noted in only one patient with sacral agenesis and poor musculature; hence, 14/17 patients (82.3%) had acceptable continence.

DISCUSSION

Over the last century, there has been a constant improvement in the surgical techniques for high ARM. Techniques such as endorectal pull-through, abdominoperineal pull through (APPT) and sacro APPT have been replaced by posterior sagittal anorectoplasty (PSARP) due to its ability to provide adequate visualisation, good mobilisation of the bowel, proper identification of the fistula with good post-operative outcome.[2] The revolution came in the past two decades with Keith Georgeson's concept of LAARP which combined the advantages of minimally invasive surgery with the existing principles of PSARP, with less surgical trauma to pelvic musculature and nerves.[1]

LAARP has the advantages over PSARP in the forms of lack of division of muscle complex and lesser perineal wound complications. When compared to APPT, LAARP provides benefits such as avoidance of laparotomy, excellent visualisation of pelvis, less post-operative pain and simultaneous treatment of associated disease like cryptorchidism.[3] Although the long-term results of LAARP are yet to be interpreted, mid-term results from a study showed better defecation function with LAARP than PSARP.[4] LAARP results in earlier appearance of recto anal inhibitory reflex than PSARP.[5] Studies have shown lesser incidence of sphincter asymmetry and perirectal fibrosis with LAARP, revealed by magnetic resonance imaging.[6] When compared to Georgeson's concepts, our series had modifications in the form of transcutaneous bladder hitch stitch, division of fistula without ligation and dilatation of neoanal tract by railroading technique. These modifications were concordant with Bhandary *et al*. who revealed voluntary bowel movements in 25 out of 32 patients who had undergone LAARP.[3]

LAARP is also with complications, which can be immediate post-operative, in the form of ileus due to urinoma from fistulous stump as in one of our cases, and late complications such as RMP, anal stricture and urethral diverticulum.[7] RMP is the most common complication noted in many series including a systematic review of 124 LAARP cases in 17 articles and is consistent with our series (17.6%).[7,8] RMP has been attributed to extensive

mobilisation of the rectum in the intra-abdominal space, early closure of colostomy before the rectum gets attached to the pelvic floor structures by post-operative cicatrisation resulting in early mobility of the rectum causing prolapse and inherent weakness of the pelvic musculature which is almost a norm in high ARM.[7] Anchoring the rectum with pre-sacral fascia is believed to prevent RMP in addition to lengthening of cutaneous anal canal by providing cephalad retraction, although some studies did not perceive that benefit.[3,7] In our initial three cases, we did not do presacral fixation and there was higher incidence of mucosal prolapse. Then, we believed in rectal fixation in all the remaining cases. All our patients have undergone delayed colostomy closure as Stage 3. RMP and anal stenosis in our series were managed with mucosal trimming and posterior triangular anoplasty, respectively. Urethral diverticulum has been reported in some series and as explained by difficult and inadequate mobilisation at the fistulous site in cases of recto-bulbar urethral fistulae.[3,7] We did not come across this complication since our series excluded the cases of intermediate ARM. Post-operative adhesive obstruction due to intra-operative spillage of contents from rectal stump (barium) has been reported.[3] This can be avoided by proper distal loop wash before LAARP.

The adoption of LAARP with above-mentioned modifications in our series improved the outcome of high ARM with less post-operative morbidity.

CONCLUSIONS

LAARP is feasible and effective approach to male children with high ARM with better visualisation of the operative field, minimal interference of pelvic floor anatomy, excellent post-operative cosmetic and functional results. Long-term follow-up studies are essential for wide acceptance.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Georgeson KE, Inge TH, Albanese CT. Laparoscopically assisted anorectal pull-through for high imperforate anus – A new technique. J Pediatr Surg 2000;35:927-30.
2. Tsuji H, Okada A, Nakai H, Azuma T, Yagi M, Kubota A. Follow-up studies of anorectal malformations after posterior sagittal anorectoplasty. J Pediatr Surg 2002;37:1529-33.
3. Bhandary KS, Kumaran V, Rajamani G, Kannan S, Mohan NV, Rangarajan R, *et al*. Laparoscopic assisted anorectal pull through: Reformed techniques. J Indian Assoc Pediatr Surg 2009;14:210-4.
4. Ichijo C, Kaneyama K, Hayashi Y, Koga H, Okazaki T, Lane GJ, *et al*. Midterm postoperative clinic radiologic analysis of surgery for high/intermediate-type imperforate anus: Prospective comparative study between laparoscopy-assisted and posterior sagittal anorectoplasty. J Pediatr Surg 2008;43:158-62.
5. Lin CL, Wong KK, Lan LC, Chen CC, Tam PK. Earlier appearance and higher incidence of the rectoanal relaxation reflex in patients with imperforate anus repaired with laparoscopically assisted anorectoplasty. Surg Endosc 2003;17:1646-9.
6. Wong KK, Khong PL, Lin SC, Lam WW, Lan LC, Tam PK. Post-operative magnetic resonance evaluation of children after laparoscopic anorectoplasty for imperforate anus. Int J Colorectal Dis 2005;20:33-7.
7. Jung SM, Lee SK, Seo JM. Experience with laparoscopic-assisted anorectal pull-through in 25 males with anorectal malformation and rectourethral or rectovesical fistulae: Postoperative complications and functional results. J Pediatr Surg 2013;48:591-6.
8. Al-Hozaim O, Al-Maary J, AlQahtani A, Zamakhshary M. Laparoscopic-assisted anorectal pull-through for anorectal malformations: A systematic review and the need for standardization of outcome reporting. J Pediatr Surg 2010;45:1500-4.