Review Article

Laparoscopic anorectoplasty for anorectal malformations

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Abstract: Laparoscopic approach for anorectoplasty has been developed for since early 2000s. In this review article, the current status of laparoscopic anorectoplasty (LARP) will be discussed with emphasis on the clinical outcomes.

Keywords: Anorectal malformation (ARM); laparoscopy; anorectoplasty

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Introduction

Anorectal malformation (ARM) is a rare congenital disease affecting the newborn with an estimated incidence of 1 in 5,000 live-born babies (1). Since 2005, the Krickenbeck classification has been widely adopted to describe the severity of this condition based on anatomical description (2). While low-type imperforate anus in most cases, low-typed malformation could be corrected by one-staged anoplasty but a temporary defunctioning colostomy usually required in intermediate or high-type malformation before the definitive repair. The operation put forward by Pena has become a popular surgical approach since 1980s (3). While the operative technique is standardized and easy to learn, a major limitation is the major scar due to perineal dissection. In 2000, Georgeson *et al.* has introduced the laparoscopic anorectoplasty (LARP) and has gained much popularity (4). Apart from being minimally invasive, LARP also possesses an advantage in the management of high-type malformation such recto-vesical fistula that would require laparotomy. The magnification property of laparoscopy also allows the accurate placement of the pull-through rectum. The operative technique is summarized in the following paragraph.

Operative technique

Under general anesthesia, the baby is placed in a supine position with the buttock cushioned up at the edge of the table. The legs are abducted in order to expose the perineal region. A 5-mm camera port is placed via a supra-umbilical incision. Two to three instrument ports (3 or 5 mm) are placed at right and left lower quadrants of the abdomen. The peritoneum covering the rectum is opened up and dissected circumferentially towards the distal fistula. During the dissection, care should be exercised to avoid damaging the blood supply to the rectum. The surgeons should also check if the length of the rectum mobilized is adequate for pull-through into the perineal opening. When the most distal end of the fistula where it inserts into the genitourinary tract is exposed, it can be transfixed and divided using suturing or clips. After the division of the fistula, perineal dissection can be started. The mid-point of the anal sphincter complex is identified with a muscle stimulator. A cruciate incision is made at the sphincter centre and a 10-mm laparoscopic trocar could be inserted into the pelvic cavity. Under direct visualization, the distal rectum is retrieved via the trocar and suture to the anal skin opening. At the end of the procedure, a laparoscope should be inserted via the supra-umbilical camera port to make sure there is no twisting of the pull-through segment and an anchoring suture could be placed to secure the rectum to the pre-sacral fascia in order to avoid rectal prolapse.

Potential complications

Despite the significant advancement in paediatric minimal invasive surgery and many complex procedures can be

performed laparoscopically, complication still occur. Al-Hozaim *et al.* reported an overall complication rate of around 0.8% to 7.2% in a systematic review (5). Another review by Bischoff *et al.* also reported a high incidence of complication up to approximately 23% based on her review of 47 studies (6). The complications range from minor ones such as rectal prolapse, stenosis and infection to life-threatening complications such as bowel perforation and obstruction. Residual diverticulum at the bladder or urethra require special attention and occasional re-operation to correct.

Clinical outcomes

During the early period of LARP, Lin *et al.* has reported the defecation status of 9 patients with intermediate-/high-type malformations receiving LARP and 13 patients with receiving the Pena operation [posterior sagittal anorectoplasty (PSARP)] (7). It was found out that 77.8% LARP patients had acceptable bowel frequency in contrast to 58.3% PSARP patients at one year after the operation. Few years later, Tong and Kudou *et al.* (8,9) reported the midterm outcome of the two operations using Kelly's score. Both studies reported a satisfactory continence in LARP patients. A further prospective study by Ichijo *et al.* (10) compared the defecation status after the two operations with continence evaluation questionnaire (CEQ). In this study, patients with LARP were found to have a higher CEQ scores than PSARP patients, in particular in the assessment of frequency of motions, staining/soiling and incidence of erosion. More recently, Wong *et al.* (11) carried out a retrospective review to compare the mid-term result at 5-year interval. A total of 89% LARP patients had voluntary bowel movements as compared to 80% PSARP patients. 44% LARP patients had soiling as compared to 55% PSARP patients. LARP has the additional benefit of shorter hospital stay and creating less surgical trauma.

Anorectomanometry is a non-invasive measurement of the anorectal physiology and is commonly used to study various anorectal diseases such as Hirschsprung's disease and other forms of constipations. The application of anorectomanometry after anorectoplasty provides objective data about the anorectal physiology after the operation and could be used as a reference for bowel training. In the study by Lin *et al.* in 2003, manometric assessment was also carried out in addition to clinical assessment (7). Patients with LARP have an earlier return of the anorectal inhibitory reflex which is important for normal defecation. This study also revealed a lower resting rectal pressure in patients after LARP suggesting less perirectal scarring after LARP. Kudou *et al.* also reported a more favourable resting anal pressure after LARP as compared to PSARP (9). A similar finding regarding the earlier return of anorecto-inhibitory reflex as the study by Lin et al was also demonstrated in this study. Most recently, the author of this article conducted a manometric study long term manometric outcomes between LARP and PSARP. With a median follow-up period of 15.5 years, the majority of the patients with previous LARP could retain a normal sphincteric resting pressure during long term follow up (12).

Using radiological studies to follow up patients after anorectoplasty provide an anatomical assessment. Among the various imaging modalities, magnetic resonance imaging (MRI) is the most popular choice not only because of its non-radiation property but also its superior image in soft tissue assessment. Wong et al has reported MRI findings of the pelvis after LARP and PSARP. More symmetrical sphincter was observed in patients after LARP and this finding further supported the belief of less perirectal fibrosis and more accurate placement of the rectum in the neo-anus in LARP (13). Tong *et al.* also reported a lower mal-position rate of the rectum after LARP based on MRI (8). Ichijo *et al.* measured the difference in thickness of external sphincter and puborectalis using anal endosonography and concluded that LARP offered a more accurate placement of the neo-anus (10).

Conclusions

In conclusion, the current evidence comparing LARP and PSARP do not suggest an inferior result of the former approach. However, data about the long-term outcome is still lacking as LARP was only developed since early 2000s and only few patients have reached adulthood. Nonetheless, based on short and mid-term data, LARP should be considered as an option of surgical approach for intermediate- and high-type ARM provided the expertise and equipment of laparoscopic surgery are available. However, it must be emphasized that surgeons performing LARP need to pay attention to the potential complications.

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