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Evaluation of defecative function 5 years or longer after laparoscopic-assisted pull-through for imperforate anus

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Abstract

BACKGROUND: Laparoscopic anorectoplasty was introduced in 2000 but the procedure has not yet gained universal acceptance. Previous studies including ours reported satisfactory early postoperative outcome as compared to posterior sagittal anorectoplasty (PSARP), but mid-to-long term results are not available. Here, we aim to evaluate the mid to long term defecative function in these patients.

MATERIALS AND METHODS: A retrospective study was carried and included all patients who received laparoscopic-assisted anorectoplasty for high/intermediate type imperforate anus between 2001 and 2005. Their degree of continence was graded according to the Krickenbeck classification and compared with historical controls who underwent PSARP. The results were compared using chi-square test and $p<0.05$ was taken to be statistically significant.

RESULTS: There were a total of 18 patients who received LAR in the study period. They were compared to 20 historical PSARP patients. For defecation sensation, 16 of the 18 LAR patients were positive whilst there were 16 of 20 PSARP patients. 8 LAR patients were clean without any attacks of fecal soiling or incontinence (11/20 PSARP). Only 3 of 18 LAR had constipation as compared to 7 of 20 PSARP. The need for rectal enema for evacuation was seen in 1 of 20 LAR patients and 2 of 20 PSARP patients (for all categories: $p>0.05$).

CONCLUSIONS: Mid to long-term follow-up study revealed satisfactory defecative function for patients with high/intermediate-type imperforate anus after LAR. The outcome is at least as good as PSARP. Longer term follow-up with larger sample size is necessary to demonstrate the benefits of LAARP over PSARP.

Keywords: Anorectal malformation; laparoscopic; function; posterior sagittal anorectoplasty

Introduction

Anorectal malformations including imperforate anus affect approximately 1 in 5000 live births. The introduction of posterior sagittal anorectoplasty (PSARP) by Pena and deVries has made this the gold standard in most paediatric centres (1). Despite the popularity of this technique, poor functional outcome is still a major problem for many post-operative patients (2,3). The advent of laparoscopic anorectoplasty (LAR) by Georgeson has provided a new way to manage patients with imperforate anus, especially those suffering from high or intermediate types (4). We previously reported findings of our laparoscopic technique in treating high/intermediate type imperforate anus and showed that the rectoanal inhibitory reflex in patients treated by LAR returned earlier than those treated by PSARP (5). Moreover, significantly more patients in the LAR group had better defecative function during post-early operative follow up. Using magnetic resonance imaging (MRI), we also showed that post-operative scarring and fibrosis were less in LAR patients (6).

For many years, the Wingspread and Pena classification, based on the relationship of the terminal rectum to the levator ani and the absence or presence of fistula respectively, have formed the basis of classification for patients with anorectal malformations (1,7,8). As there is still variation in the follow-up criteria used, this has perpetuated the difficulties in comparing reports of functional outcome in many centers worldwide. The Krickenbeck group rationalized and published their findings in 2005 (9), and incorporated criteria from the Wingspread and Pena classification. As there exists very sparse data on the medium to long term functional outcome of patients who underwent LAR, we undertook this current study to evaluate high/intermediate type imperforate anus patients who had been monitored for at least 5 years after surgical treatment and compared with patients who received PSARP

using the Krickenberg classification.

Materials and methods

Since May 2001, all babies born with high/intermediate type imperforate anus have been treated by laparoscopic anorectoplasty in our unit. For this study, we performed a retrospective review on all patients who underwent LAR up to October 2005, with the approval of the Institutional Review Board. This time period chosen would ensure that the follow up would be medium term (a minimum of 5 years post-operatively). Defecation status of these patients was also recorded and the Krickenbeck classification was used for assessing functional outcome, which was divided into four categories: continence; soiling; constipation; the need for Malone antegrade continence enema (MACE) (Table 1).

Table 1

Historical patients who had undergone PSARP prior to 2001 served as control group. Statistical analysis was performed using Fischer's exact test and Chi-square test. A p value of < 0.05 was taken to be statistically significant.

For LAR, the technique has already been described (4). Briefly, a 5-mm laparoscope was introduced through the umbilical port, and two to three additional 3-mm working ports were inserted. The rectum was dissected circumferentially and distally using hook cautery. The recto-vesical or recto-urethral fistula was transfixed and divided. The centre of external sphincter complex was determined using muscle stimulator and a Veress needle was advanced through the center of the external sphincter complex, followed by STEP trocar (Ethicon, USA). The rectum was pulled through and anoplasty was fashioned accordingly. PSARP was carried out as described (1). Briefly, the patient was placed prone and a midline incision was made through all posterior musculature. If a fistula connecting the rectum and urogenital tract was

present, the dissection was performed downwards along the fistula, which was subsequently divided at the very end on the posterior surface of the urogenital tract. The end of the fistula was brought down and placed in the center of the external sphincteric complex. All procedures in this study were performed by the same team of surgeons.

Results

In the study period, there were 18 patients who had intermediate/high type imperforate anus who underwent LAR were identified. They were compared with 20 historical patients who had PSARP. Both the mean age at operation and the classification of anorectal anomaly were similar for LAR and PSARP (p = ns) (Table 2).

Table 2

Overall, 16 out of 18 patients (89%) who had LAR had voluntary bowel movements, as compared to 16 out of 20 PSARP patients (80%) ($p>0.05$). For the soiling category, 8 out of 18 LAR patients (44%) had some degree of soiling. 11 out of 20 PSARP patients (55%) had soiling ($p>0.05$).

3 out of 18 LAR patients (16.6%) had constipation as compared to 6 out of 20 PSARP patients (30%) ($p>0.05$). Only 1 patient needed the creation of MACE after LAR while 2 patients needed MACE after PSARP ($p>0.05$) (Table 3).

Table 3

The number of patients in each in-depth grading for the four categories is shown in Table 2.

Discussion

Although the use of laparoscopic approach in treating imperforate anus was first described more than 10 years ago, the technique has not been taken up universally by

centers worldwide. One of the reasons may be due to a relatively lack of medium to long-term data on the post-operative outcomes of these patients. Our center was one of the first to undertake laparoscopic anorectoplasty and have previously published our findings showing better functional outcome in patients who had undergone LAR, in the early post-operative period (5,6). The purpose of this study was to adopt the Krickenbeck classification for the assessment of medium-term outcome.

The Krickenbeck group undertook a review of the Wingspread and Pena classification systems and made emphasis of the presence and position of the fistula. The inclusion of the use of techniques other than PSARP allows direct comparison of post-operative functional outcomes (LAR vs. PSARP in this case).

The ability to pass a voluntary bowel movement is an important finding in patients after surgical correction of ARM and forms the basis for the first of 3 outcome criteria in the Krickenbeck classification. In patients born with ARM, anatomical and functional elements may be disrupted because of the innate problem of ARM anatomy itself, or as a consequence of operation due to tissue scarring (6). The Krickenberg criteria are based on a simple grading classification with strictly defined outcome variables, such as constipation and soiling. As we can now compare different surgical techniques directly, the relation of functional outcome to operative technique should identify any potential differences between techniques. Indeed the use of this simple system has already been validated in previous studies for patients who received PSARP (10).

In our study, we specifically chose patients who had intermediate/high imperforate anus. This was done because LAR was the technique of choice for patients with intermediate/high type imperforate anus in our center, and this would also allow us to compare LAR and PSARP more accurately with fewer other variables. In the four

categories of the Krickenberg classification compared, although we could not demonstrate any significant difference between the use of LAR or PSARP, the overall trend would appear that more patients who underwent LAR had a better functional outcome. This issue would hopefully be resolved with more patients enrolled in future studies and with longer follow up period. Furthermore, other investigations like anorectal manometry can add quantitative data into the mid to long-term outcome of patients who had either LAR or PSARP. This study is currently underway.

For the moment, we can conclude that the mid-term functional results for patients who had LAR are at least as good as those who had PSARP. However, taking into account that the laparoscopic surgery results in less surgical trauma and shorter hospital stay, as well as better intra-operative visualization, we would still recommend this technique for patients with intermediate/high type imperforate anus.

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Legends

Table 1 – Krickenberg classification for post-operative results

Table 2 – Demographics of patients with anorectal malformations

Table 3 - Mid-term functional outcomes of LAR patients and PSARP patients according to the Krickenberg classification

Table 1

Voluntary bowel movements	Yes/No
Soiling *Grade 1* *Grade 2* *Grade 3*	Yes/No *Occasioanlly* *Everyday, no social problem* *Constant, social problem*
Constipation *Grade 1* *Grade 2* *Grade 3*	Yes/No *Diet management* *Laxative needed* *Resistent to laxatives*
Need of MACE	Yes/No

Table 2

	LAR (n=18)	**PSARP (n=20)**
Male:Female	11:7	14:6
Mean age at operation (months)	5.4 (range 2m to 10m)	10.1 (range 1m to 36m)
ARM type *Intermediate* *High*	 *13* *5*	 *14* *6*

Table 3

	LAR (n=18) [%]	**PSARP (n=20) [%]**	***p-value***
Voluntary bowel movements	**16 [89%]**	**16 [80%]**	*p>0.05*
Soiling	**8 [44%]**	**11 [55%]**	*p>0.05*
Grade 1	*6*	*7*	
Grade 2	*1*	*3*	
Grade 3	*1*	*1*	
Constipation	**3 [16.6%]**	**7 [35%]**	*p>0.05*
Grade 1	*2*	*4*	
Grade 2	*0*	*1*	
Grade 3	*1*	*2*	
MACE	**1 [5.6%]**	**2 [10%]**	*p>0.05*