



## Long term outcomes of laparoscopic-assisted anorectoplasty: A comparison study with posterior sagittal anorectoplasty

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### ABSTRACT

**Purpose:** The aim of this study is to compare the long term outcomes between laparoscopic-assisted anorectoplasty (LAARP) and posterior sagittal anorectoplasty (PSARP) for children with rectobladderneck and rectoprostatic fistula anorectal malformations (ARM).

**Methods:** Thirty-two ARM children with rectobladderneck and rectoprostatic fistula who underwent LAARP between October 2001 and March 2012 were reviewed. The outcomes were compared with those of 34 ARM children who underwent PSARP between August 1992 and September 2001. The sacral ratio (SR), age at operation, operative time, postoperative hospital stay and complications were evaluated. Bowel functions were assessed using the Krickenbeck classification.

**Results:** The mean operative time of the LAARP was significantly shorter than that of PSARP group ( $1.62 \pm 0.40$  vs  $2.13 \pm 0.30$  h). The postoperative hospital stay was significantly shorter in the LAARP group ( $5.8 \pm 0.65$  vs  $8.4 \pm 0.67$  h). The wound infections (11.8% vs 0%) and recurrent fistula (11.8% vs 0%) were more common in PSARP patients. The overall morbidity rate of PSARP group was significantly higher than that of the LAARP group (35.3% vs 12.5%,  $p < 0.05$ ). However, 7.5% of the LAARP patients developed rectal prolapse. Twenty-four of 32 patients were followed up for more than 3 years in LAARP group. The median follow up period was 7.5 years (range 4–11) in LAARP patients and 15.5 years (range 11–20) in PSARP patients. The rates of voluntary bowel movement, soiling (grade 1, 2 & 3) were similar in both groups. More patients from PSARP group developed grade 2 or 3 constipation (22.5% vs 0%,  $P < 0.01$ ).

**Conclusions:** Compared to PSARP, LAARP is a less invasive procedure. The long term functional outcomes after LAARP were equivalent if not better than those of PSARP.

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Anorectal malformation with recto-bladderneck and recto-prostatic fistula represents a challenge for pediatric surgeons. Posterior sagittal anorectoplasty (PSARP) is commonly employed as a treatment for high anorectal malformations. However, laparoscopic assisted anorectoplasty (LAARP) is becoming increasingly adopted in the management of patients with high/intermediate ARM [1,2]. The functional benefit of LAARP remains unclear. The purpose of this study is to assess the long term outcomes of laparoscopic-assisted anorectoplasty (LAARP) for children with rectobladderneck and rectoprostatic fistula anorectal malformations.

### 1. Materials and method

#### 1.1. Patient demographics

Thirty-two ARM children with recto-bladderneck and rectoprostatic fistula who successfully underwent LAARP between October 2001 and March 2012 were reviewed. The outcomes were compared with those of 34 children who underwent PSARP between August 1992 and September 2001 in our institution. Operations in the both groups were performed by the same surgeon. The median follow up periods for LAARP and PSARP groups were 6.3 (range: 0.5–11) years and 15.5 (range: 11–20) years, respectively. Anorectal anomalies were categorized according to the Krickenbeck classification [3]. Colostograms were conducted to identify the type of malformations (Fig. 1). In the LAARP group, there were 18 recto-prostatic fistulae and 14 recto-bladderneck fistulae. In the PSARP group, there were 17 recto-prostatic fistulae and 17 recto-bladderneck fistulae.

Patients were reviewed retrospectively. Sacral ratio (SR), age at operation, operative time, postoperative hospital stay and complications were compared.

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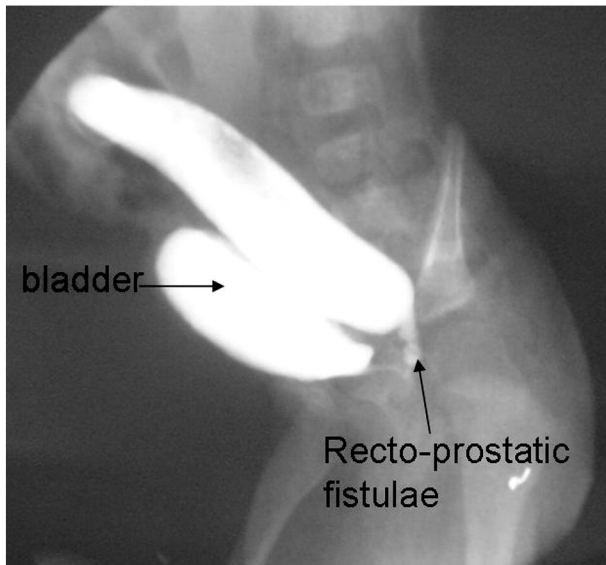


Fig. 1. Colostogram of recto-prostatic fistulae.



Fig. 2. MRI shows a centrally placed rectum.

1.2. Complications

The post-operative complications of the two groups were compared. We looked into wound infections, rectal retraction, recurrent fistula, urethral diverticulum, anal stenosis and rectal prolapse. Urethral diverticulum was evaluated by retrograde cystography and MRI. Imaging of the position of the colon within the muscle complex was also assessed by MRI. Abnormality was defined as an incomplete muscle ring on any side, inequality of the muscle along the circumference, or a misplaced rectum outside the muscle along any length of the tunnel [4].

1.3. Functional results

Functional results of patients older than 3 years were analyzed. Bowel functions including presence of voluntary bowel movements, soiling and constipation, were assessed according to the Krick-enbeck classification [3]. We considered it a good outcome when the patients were free from soiling or suffer from grade 1 soiling only and a poor outcome for those presenting with grade 2 or 3 soiling [5].

1.4. Statistical analysis

Data were entered into an SPSS (Chicago, IL) 13.0 system. Student t test was used to compare the mean age at operation, operative time, postoperative hospital stay and sacral ratio between the groups. Chi-square tests were applied to compare the morbidities of postoperative complications and clinical results between the two groups.  $p < 0.05$  was considered being statistically significant.

Table 1 Demographic features of ARM children undergone LAARP versus PSARP.

	LAARP(n = 32)	PSARP(n = 34)	P
Age at operation	6.5 (3–9) months	6.9 (3–12) months	0.84
Classification	Recto-prostatic 18 (56.3%)	17 (50%)	0.82
	Recto-vesical 14 (43.7%)	17 (50%)	0.49
Sacral Ratio	0.56 ± 0.14	0.60 ± 0.16	0.43
Operative time (h)	1.62 ± 0.40	2.13 ± 0.30	<0.01
Postop hospital stay (days)	5.8 ± 0.65	8.4 ± 0.67	<0.01

2. Results

The demographic features of the two groups were summarized in Table 1. There was no statistically significant difference in the age at the time of operation, classification of anomaly types and sacral ratio between the two groups.

The mean operative time in the LAARP group was significantly shorter than that of the PSARP group ( $P < 0.01$ ). The postoperative hospital stay in the LAARP group was significantly shorter than that in the PSARP group ( $P < 0.01$ ) (Table 1).

MRI showed a centrally placed rectum within the muscle complex in all patients of the two groups (Fig. 2).

Complications were more common in PSARP group, including wound infections and dehiscence (11.8% vs 0%), rectal retraction (5.9% vs 0%), recurrent fistula (11.8% vs 0%) and anal stenosis (5.9% vs 3.1%) (Table 2). No patient experienced urethral diverticulum in either group according to voiding cystourethrogram and MRI (Fig. 3). The appearance of neo-anus after LAARP is adequate (Fig. 4). Rectal prolapses were found in 3 (9.4%) of 32 after LAARP and none of the patients after PSARP.

In the LAARP group, 24 patients were followed up more than 3 years, the median follow up period is 7.5 years (range 4–11). Thirty-four patients were successfully followed up in the PSARP group. The median followed up period is 15.5 years (range 11–20).

There were eleven patients (45.8%) with SR below 0.6 (range, 0.31–0.58) in the LAARP group and 13 patients (38.2%) in the PSARP group (range, 0.28–0.57). There was no significant difference of the distribution between the two groups. The rates of voluntary bowel movement, soiling (grades 1, 2 & 3) and grade 1 constipation were similar in both groups. However, grade 2 or 3 constipation was more frequent in PSARP group for patients with recto-prostatic fistula (35.3% vs 0%,  $P < 0.01$ ) while there was no significant difference for patients with recto-vesical fistula (Tables 3, 4).

When the outcomes according to SR were compared, there was no significant difference between LAARP and PSARP groups in both recto-prostatic fistula and Recto-vesical fistula patients (Table 5).

Table 2 Postoperative complications in LAARP and PSARP patients.

	LAARP (n = 32)	PSARP (n = 34)	P
Wound infections/dehiscence	0	4 (11.8%)	0.04
Rectal retraction	0	2 (5.9%)	0.15
Recurrent fistula	0	4 (11.8%)	0.04
Urethral diverticulum	0	0	–
Anal stenosis	1 (3.1%)	2 (5.9%)	0.56
Rectal prolapse	3 (9.4%)	0	0.08
Overall	4 (12.5%)	12 (35.3%)	0.04

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