



Laparoscopic-assisted PSARP — the advantages of combining both techniques for the treatment of anorectal malformations with recto-bladderneck or high prostatic fistulas

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Abstract

Aim: The aim of this study was to present an alternative way to use both the posterior sagittal approach combined with laparoscopy for the repair of select cases of anorectal malformation (ARM).

Methods: The laparoscopic approach was used for rectal dissection, ligation of the fistula, and division of vessels to pull the rectum down in cases of ARM with recto-bladderneck or high prostatic fistula. The posterior sagittal incision we believe made the perineal portion safer, allowing for rectal tapering when necessary, and for accurate placement of the rectum, anchored in the center of the sphincter.

Results: There were 15 children (recto-bladderneck fistula, n=13 and recto-prostatic fistula, n=2) in this series. There were no urethral injuries, posterior urethral diverticula, or rectal strictures. A laparotomy was needed in two children in order to mobilize a very high rectum. Follow-up ranged from 3 months to 10 years. Clinical results were consistent with our published series for male patients with these types of defects: 5 are fecally incontinent (3 are clean with a bowel management program), 1 is fecally continent, and 9 are too young to assess. Four children suffered rectal mucosal prolapse.

Conclusion: The combination of laparoscopy and PSARP represents a useful technical alternative that allows for a safe reconstruction in cases of ARM with recto-bladderneck and in selected high prostatic fistulas.

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Recent publications about the laparoscopic repair of anorectal malformations have focused on the comparison between laparoscopy and the posterior sagittal approach [1–7].

The laparoscopic portion of the procedure is an excellent option to replace a laparotomy, necessary in about 10% of boys with anorectal malformation in which the rectum is too high to be reached safely from a perineal approach [8]. Our goal is to present a surgical alternative that takes advantage of both approaches — the laparoscopic and the posterior sagittal. We feel that this facilitates the procedure and may avoid complications that have been reported following the

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laparoscopic approach such as prolapse, posterior urethral diverticulum and urethral injuries [7]. We believe that the addition of laparoscopy should not mean that the perineal portion of the procedure is no longer important.

The initial descriptions of the laparoscopic approach to ARM involved a small perineal incision that was only the length of the future anoplasty [9]. We chose to perform a posterior sagittal incision during a laparoscopic assisted repair of selected types of ARM, taking advantage of both surgical approaches, essentially doing a laparoscopic-assisted PSARP.

Repair of an anorectal malformation involves: dissection of the distal rectum, without injuring surrounding structures (e.g. vas deferens, ureter and nerves); ligation of the fistula without injury to the urinary tract or too much residual rectal diverticulum and mobilization of the rectum so it reaches the perineum without tension and with a good blood supply. These conditions can be fulfilled with the laparoscopic approach. In addition, the repair must include anchoring of the rectum to the sphincter mechanism to try to minimize the risk of prolapse; and properly placing the rectum in the center of the sphincters, tapering the rectum when indicated. We believe that these goals are easier to achieve through a posterior sagittal approach.

We did not expect to have better functional results with the use of the two approaches combined since all patients belong to the category of malformation with poor functional prognosis (recto-bladderneck fistula) [8].

1. Methods

1.1. Details of operative technique

A total body preparation was performed to have access to both the abdomen and the perineum. A Foley catheter was inserted after the preparation. Trocars (5 mm) were inserted in the umbilicus and in the right upper quadrant; 3 mm trocars were inserted in the left upper and in the right lower quadrants (Fig. 1). The distal rectum was identified near the peritoneal reflection, and the peritoneum around it was divided, using the hook cautery, remaining as close as possible to the rectal wall in order to avoid injuries to important structures such as vas deferens, ureters, and nerves. The dissection continued circumferentially and distally to the point where it narrowed down at the bladderneck. Our criterion for a narrow enough distal fistula was if a 3 mm Maryland could clamp across it. Bladderneck fistulas are the only type of anorectal malformation in which the rectum joins the urinary tract almost in a T fashion (Fig. 2) (without a common wall), which allows the surgeon to perform a relatively easy fistula ligation, without injuring the urinary tract. Once the rectum has been circumferentially dissected, a Maryland clamp is passed through an endoloop previously inserted (Fig. 3A). The fistula is divided with hot

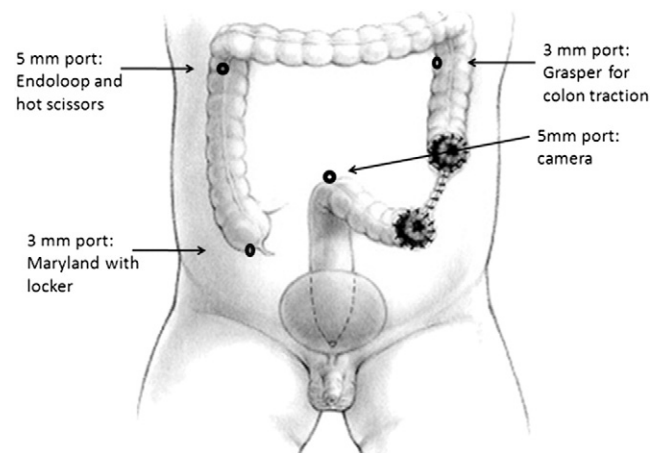


Fig. 1 Position of the trocars and position of each instrument during the fistula ligation.

scissors above the clamp (Fig. 3B) and the endoloop is tightened closing the fistula (Fig. 3C). All the avascular attachments of the rectum are cauterized and divided to gain length. Sometimes, particularly with high prostatic fistulas, this is enough for the rectum to reach the perineum. However, it is more common for the rectum to require further mobilization. Traction to the rectum helps to identify the vessels that are holding it, and this can be applied from below through a posterior sagittal incision. For that, the legs are elevated, the center of the sphincter is determined with the use of an electric stimulator and a minimal posterior

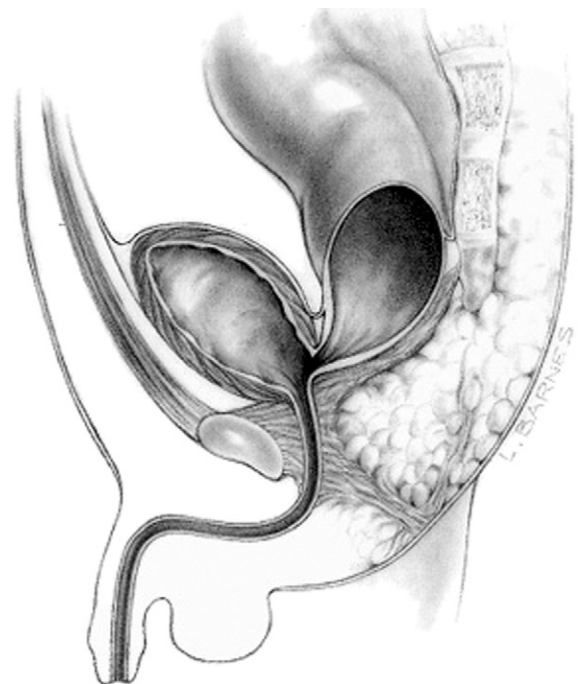


Fig. 2 Diagram of a recto-bladderneck fistula showing the junction of the rectum to the urinary tract in a “T fashion”, without a common wall.

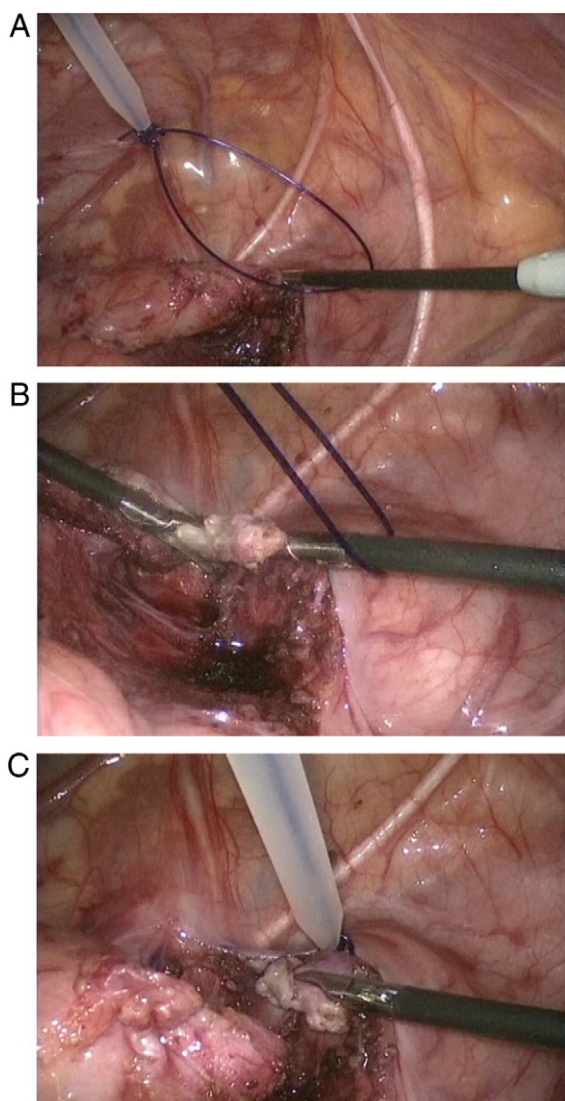


Fig. 3 Ligation of the fistula. (A) Insertion of the endoloop, passage of Maryland clamp through the endoloop, clamping of the fistula. (B) Section of the fistula above the Maryland clamp. (C) Tightening of the endoloop underneath the Maryland clamp.

sagittal incision is made (Fig. 4). With this incision it is quite safe to pass a clamp through the perineum under direct vision, creating a plane of dissection and a space in front of

the sacrum, immediately behind the urethra, into the peritoneal cavity. As the perineal clamp progresses, a laparoscopic dissection is carried out behind the bladder to meet the clamp. The distal rectum is grasped and pulled down, assuring the correct orientation. If the rectum does not reach the perineum, further dissection is required. In order to gain length, peripheral branches of the inferior mesenteric vessels are selectively cauterized, as close as possible to the bowel wall, preserving the main inferior mesenteric artery branch and depending upon the excellent intramural blood supply of the rectum. The bowel wall must be meticulously respected to avoid damage to this intramural blood supply. The rectum then reaches without tension. The limits of the sphincter are then determined. When the rectum is too large to fit adequately within the limits of the sphincter, tapering can be safely performed through the posterior sagittal incision. The posterior edges of the muscle complex are tacked to the posterior rectal wall which helps to avoid prolapse [10]. The posterior sagittal incision is closed in layers and the anoplasty is performed.

2. Results

We identified 1097 male patients with anorectal malformation in our database, of those 269 had recto-urethral prostatic fistula and 136 had recto-bladderneck fistula. Fifteen children [recto-bladderneck fistula (n=13) (Fig. 5) and high rectoprostatic fistula (n=2) (Fig. 6)] underwent laparoscopic-assisted PSARP repair during the period October 2002–February 2012. All children had had a high pressure distal colostogram showing the fistula site (Figs. 5 and 6).

The mean age at the time of surgery was 8.6 (range 3–19) months (Table 1).

The sacral ratio was <0.4 (n=2), $0.4–0.7$ (n=6), >0.7 (n=6) and unknown in one boy. The status of the spinal cord was normal (n=8), tethered (n=5), or unknown (n=2) (Table 1).

Fistula ligation was performed in all 15 patients laparoscopically. A laparotomy was needed in two boys in order to mobilize a very high rectum with selective vessel ligation. The mucous fistula had to be repositioned in three

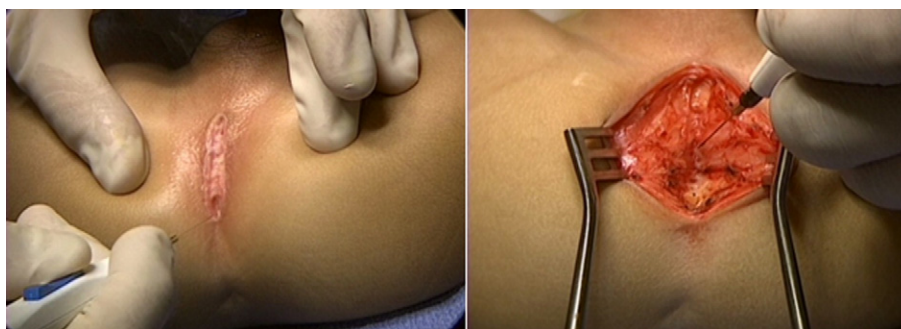


Fig. 4 Minimal posterior sagittal incision performed with the legs elevated.



Fig. 5 High pressure distal colostogram in a case of recto-bladderneck fistula.

boys to allow the rectum to reach the perineum. Two required tapering of the rectum in order for it to fit within the limits of the sphincters.

Follow-up ranged from 3 months to 10 years and it was performed by personal visit. Five boys are fecally incontinent (3 are clean with our bowel management program [12–14] and 2 have not started bowel management yet), 1 boy is fecally continent, and 9 boys are under 3 years of age. Four subsequently underwent surgical repair of a rectal mucosal prolapse [10]. There were no urethral injuries, posterior urethral diverticula, or rectal strictures.



Fig. 6 High pressure distal colostogram in a case of high recto-urethra prostatic fistula.

3. Discussion

We are increasingly using the combined laparoscopic/posterior sagittal approach since our last review on the use of laparoscopy in the repair of anorectal malformation [7].

The series is still small as we only apply this combined technique for those with recto-bladderneck fistulas and for some cases of high recto-prostatic fistulas. These are selected by distal colostogram appearance and where we believe it will be difficult to approach the rectum through a conventional posterior sagittal incision. The rectum is positioned above the coccyx and the junction between the rectum and the urinary tract is usually narrow and may be difficult to find. We believe that only selected patients will benefit from laparoscopy, and most of the recto-prostatic fistulas are repaired using the posterior sagittal approach without the need of laparotomy or laparoscopy. The high pressure distal colostogram is the key to define anatomy and we cannot overemphasize the importance of doing it in all male patients with ARM. From this contrast study the surgeon can find out how much distal bowel is available for the pullthrough. The most common error in the creation of a colostomy is leaving too short a length of colon distal to the mucous fistula [11]. We had to revise the mucous fistula in three of our patients.

The relatively advanced age at time of operation reflects the age that our patients were presented to us and ideally we perform the procedure around 3 months of age.

Tapering was required in two of our patients, one was early in our series and this was performed through the abdomen (laparotomy), but later we realized that this can be easily done through the posterior sagittal incision.

Those with bladderneck fistulae have rather poor functional prognosis [8] and we were not surprised to find that a proportion have no or poor bowel control. Still most are still under 3 years of age and therefore cannot be evaluated for bowel control yet. Subsequent bowel control in those with ARM depends on the type of malformation as well as the quality of the sacrum and spine. Data on type of malformation, quality of the sacrum and characteristics of the spine (presence of tethered cord) are important in any comparison of surgical technique.

We did not expect that the combined approach would result in better functional results, due to the nature of the ARM. Rather, we feel that the combination of both approaches facilitates the repair and may avoid unnecessary complications. The big advantage of combining both techniques is to avoid the semi-blind introduction of the trocar through the perineum with its potential of injury to the urinary tract and vas deferens, and a more precise placement of the rectum in the center of the sphincter complex [7]. Certainly we avoided such complications.

Opponents of the posterior sagittal approach refer to the potential damage that is induced by the division of the sphincter mechanism [1,15–18]. Our experience, both experimental [19] and clinical [20] indicates that the

Table 1 Patient's details (n = 15).

Patient	Site of Fistula	Sacral Ratio	Tethered Cord	Age at operation (months)	Continence status	Prolapse repair
1	Bladder neck	<0.4	Yes	8	Fecallyinc (BM)	No
2	Bladder neck	>0.7	No	7	VBM	Yes
3	Bladder neck	0.4–0.7	Yes	4	Fecallyinc	Yes
4	Bladder neck	0.4–0.7	Yes	7	Fecallyinc (BM)	Yes
5	Bladder neck	>0.7	No	19	Fecallyinc (BM)	No
6	Bladder neck	<0.4	Yes	3	<3 yo	No
7	Bladder neck	>0.7	No	7	<3 yo	No
8	Bladder neck	>0.7	No	3	Fecallyinc	Yes
9	Bladder neck	>0.7	No	5	<3 yr	No
10	Bladder neck	0.4–0.7	Inconclusive US	8	<3 yr	No
11	Bladder neck	No info	No info	9	<3 yr	No
12	Prostatic	0.4–0.7	No	6	<3 yr	No
13	Prostatic	0.4–0.7	No	17	<3 yr	No
14	Bladder neck	0.4–0.7	No	17	<3 yr	No
15	Bladder neck	>0.7	Yes	10	<3 yr	No

Notes: Fecallyinc=incontinent to feces; BM=bowel management; US=ultrasound.

complete division of the sphincter mechanism, followed by a meticulous reconstruction does not produce negative effects. Therefore, a posterior sagittal incision only offers advantages when added to the laparoscopic technique.

In conclusion, the combination of laparoscopy and PSARP allows for a safer reconstruction in those ARMs with recto-bladderneck and in selected high prostatic fistulas.

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