

ORIGINAL RESEARCH

Open Access



# Simple division of rectourethral fistula as an alternative to ligation during laparoscopic repair of anorectal malformation

Zahra Al Matar , Sabreen Maqbool, Habib Zakaria and Ali Alassiri

## Abstract

**Background:** Various techniques are described to manage the rectourethral fistula during laparoscopic repair of anorectal malformation (LAARP). The fistula can be ligated with sutures, clips, staplers, or simply divided flushed with the urethra.

**Objective:** The aim of our study is to share our experience of simply dividing the rectourethral fistula during LAARP without ligation.

**Patients and methods:** A retrospective chart review conducted between January 2005 and April 2020 including male children with rectourethral fistula. The fistula was managed by laparoscopic simple division without ligation along with temporary urinary diversion.

**Results:** Twenty-six patients were included. None of the patients had short- or long-term urinary complications due to the technique used. All patients had a regular follow-up for a minimum of 1 year.

**Conclusion:** Simple division of rectobulbar or rectoprostatic fistula is a safe, easier alternative to ligation of the fistula during laparoscopic repair of ARM.

**Keywords:** Anorectal malformation, Rectourethral fistula, Laparoscopy

## Background

Anorectal malformations (ARM) are rare congenital anomalies in newborns, occurring in approximately 1 out of 4000–5000 infants [1]. In 2000, laparoscopic-assisted anorectal pull-through (LAARP) for high anorectal malformation was first reported by Georgeson et al. Laparoscopic-assisted anorectoplasty holds the advantage of better visualization of the fistula and the ability to place the rectum within the sphincter complex with minimal dissection and a smaller perineal incision [2]. Patients who had undergone LAARP had shorter hospital stays, less wound infection/dehiscence, higher anal canal resting pressure, and a lower incidence of constipation

compared to the ones in the posterior sagittal anorectoplasty group.

During laparoscopic anorectoplasty, the fistula is ligated using different techniques including clips and suture [3].

In this paper, we describe the technique of dividing the rectourethral fistula flushed with the urethra without any ligation. Moreover, the eventual urological complications is reviewed.

## Methods

### Design and population

A retrospective chart review was performed on male patients who underwent LAARP for imperforate anus with rectourethral fistula between January 2005 and April 2020.

\*Correspondence: z.r.m@hotmail.com

Department of Pediatric Surgery, King Faisal Specialist Hospital and Research center, Riyadh, Saudi Arabia

Data collection included the age, weight, type of fistula, length of stay, operative time, and method of division of the fistula as well as post-operative complications.

All patients underwent a distal colostogram confirming the presence of rectoprostatic or rectobulbar fistula. We excluded patients with rectovesical fistula as high intravesical pressure might interfere with the healing of the fistula stump.

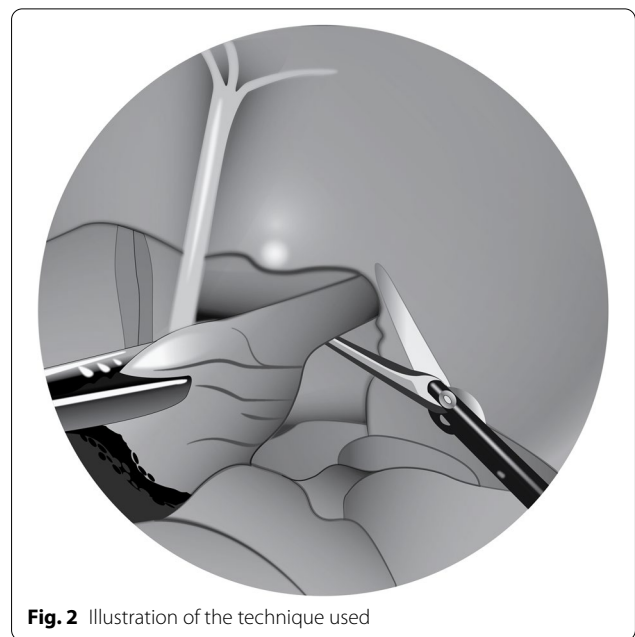
All the 26 patients had colostomy performed outside our center. Bowel preparation was provided for patients prior to the pull through.

Laparoscopic rectal dissection was first performed at the peritoneal reflection using ligasure. The distal mesorectum was divided, and the dissection was continued circumferentially on the rectal wall. As the rectum was dissected distally, the fistula to the urethra was identified with its narrow-tapered end. The fistula was divided flush with the urethra using a scissor or hook without ligation (Figs. 1 and 2). A Veress needle was introduced at the point of maximum muscle contraction defined by Pena stimulator (proposed anal site) under a direct view by the scope. The muscular complex was dilated using a step trocar. Then, the rectum was pulled through and anastomosed to the skin.

All the patients had a Foley catheter for postoperative diversion. The parents were advised to remove the catheter after 10 days in any local health care center.

**Results**

Twenty-six cases were collected in this series. The mean age at operation was 5 months. Forty-two percent had urological anomalies diagnosed preoperatively; those included six patients with hypospadias, four with cryptorchidism, two with dysplastic kidney, one with



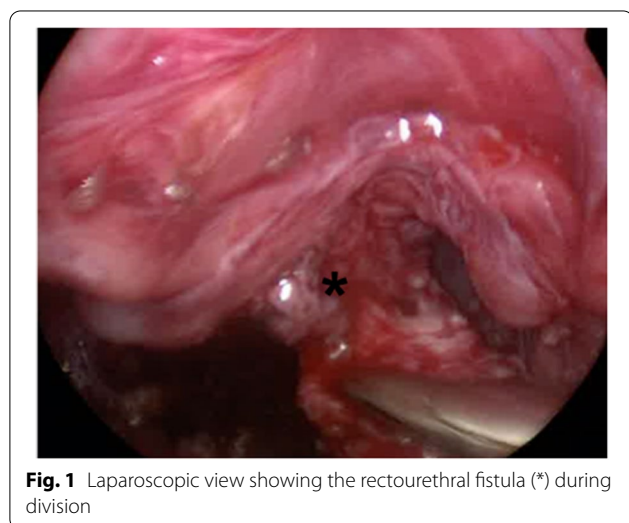
**Fig. 2** Illustration of the technique used

posterior urethral valves (PUV), two with vesicoureteral reflux (VUR), and three patients had a solitary kidney.

Cardiac and spinal anomalies were documented for 20% of the patients (Table 1). Twenty-six patients underwent laparoscopic-assisted anorectoplasty (LAARP). The average operative time was 2.5 (2–4) h. Feeding was started once stoma resumed its function. The majority of the patients were discharged before the 5th post-operative day. The average foleys catheter indwell time was 10 days.

Median time to stoma closure was 2.5 months following the pull through. All patients went through regular follow-ups every 3 months in the first 2 years and every 6 months thereafter. All patients had a minimum of 3 years follow-up, with 4 of them completed 10 years by the time of the study.

None of the patients experienced short- or long-term urinary complications in terms of urinary dribbling, leak, abnormal stream, urinary tract infections, or recurrent rectourethral fistula.



**Fig. 1** Laparoscopic view showing the rectourethral fistula (\*) during division

**Table 1** VACTRAL associations among the study cohorts

Anomalies	Frequency	Percentage
Cardiac	5	19.2
Urological	11	42.3
Esophageal atresia	1	3.9
Spine and vertebral	5	19.2
Limb anomalies	3	11.5
Others	4	15.4

However, one of the patients continued to face recurrent urinary tract infections. This patient is a known case of megaurethra which was repaired prior to the pull through. His condition was complicated by urethral stricture and diverticulum distal to the site of rectourethral fistula.

## Discussion

Laparoscopic-assisted anorectoplasty allows accurate placement of the rectum within the muscle complex through its radially dilated tract, thereby decreasing the risk of perineal scarring and disruption of external sphincter fibers [4].

Fistula ligation using clips, suture, or endoloop has been the standard technique during PSARP and LAARP [3, 5]. The technique of simple division of the rectourethral fistula has been adapted recently by several pediatric surgeons [5–9].

In majority of the males with rectourethral fistula, the distal rectum lies below the peritoneal reflection. A long common wall between the rectum and urethra usually makes the surgical dissection technically more challenging through the abdominal approach.

The traction applied at the end of the rectum to visualize the fistula causes tenting of the urethra with a potential risk of transfixion of urethra with a stitch [10]. It has been postulated that simple division of the fistula without ligation has a lower risk of injury to the urethra [6].

Urological complications following repair of anorectal malformations include urethral stricture, recurrent fistula, and posterior urethral diverticulum (PUD). Frequency of urological complication is reported to be higher with laparoscopy assisted anorectal pull-through (LAARP), especially with cases of rectobulbar fistula [11, 12]. PUD in particular, occurred more often in cases where the fistula was ligated through a transabdominal approach [8].

Posterior urethral diverticulum develops from a retained portion of the rectourethral fistula, which inflates as urine is collected in the pouch-like structure [8]. It can also form if the fistula is not divided flush, which can be technically challenging with the use of laparoscopic instruments in case of a bulky rectum, a wide base of a rectourethral fistula, and awkward angles during the placement of sutures [13].

In 2008, Rollins et al. [6] described his experience with five patients who underwent LAARP with simple division of the fistula. Although he reported one patient with PUD, this was attributed to not dividing the fistula flushed with the urethra as confirmed with intraoperative photographs.

In a series of 68 patients reported by Sudhakar et al., he compared the outcome of 34 patients wherein the fistulas

were ligated during PSARP, and 34 patients without closure of fistulas. Closure of rectourethral fistulas resulted in urological complications in 11.8%. Those complications included urethral stenosis, urethral diverticulum, and neurogenic dysfunction.

On the other hand, the non-closure group had an uneventful recovery with their post-operative micturating cystourethrogram (MCUG) and urethroscopy showed normal urethra, without stenosis or stricture, urethro-ejaculatory duct/vasal reflux, or diverticulum in any of the cases [7].

Another series of 24 cases of males having ARM that were managed with simple division of the fistula during PSARP (22) and LAARP (2) showed no evidence of post-operative urine leak and showed normal MCUG during the 1-year follow-up. The author suggested that this technique might decrease the risk of urethral diverticulum formation [8].

In our institution, the laparoscopic approach for ARM has been widely used for the past 15 years. All patients in this series had the fistula divided with a simple scissor or hook without ligation, which made the operation technically quicker and less demanding.

Most patients have completed 2 years of follow-ups, while some follow-ups extended up to 10 years with no immediate or long-term urological complications.

Our protocol is to request an MCUG only if the patient develops active urinary complaints. Among them, one patient developed a urethral diverticulum. However, this patient is a known case of megaurethra and distal hypospadias with complicated postoperative course including urethral stricture. The stricture was identified during the pull through procedure. A diverticulum was detected from the MCUG performed after repeated urinary tract infections. We believe that the cause of diverticulum in this case is related to his pre-existing urological complications.

## Conclusion

Simply dividing the rectourethral fistula during LAARP without having to consider ligation is technically less demanding and can be safely performed with a low risk of urethral injuries. We postulate that the distal stump of the fistula will slough with time and epithelization over the urinary catheter will occur.

The study is limited by its retrospective look and lack of control group, in addition, not all the patients were investigated by MCUG to detect the incidence of asymptomatic diverticulum.

Further studies are required to compare the frequency of urological complications among those who had the fistula simply divided against those with ligation of the fistula.

**Abbreviations**

PSARP: Posterior sagittal anorectoplasty; ARM: Anorectal malformations; LAARP: Laparoscopic-assisted anorectoplasty; PUV: Posterior urethral valves; VUR: Vesicoureteral reflux; MCUG: Micturating cystourethrogram.

**Acknowledgements**

Not applicable.

**Authors' contributions**

AZ reviewed the literature, collected the data, and drafted the manuscript. MS collected the data and reviewed the manuscript. ZH and AA performed the surgery and reviewed the manuscript. All authors read and approved the final manuscript.

**Funding**

No funding from any source supported the publication of this study.

**Availability of data and materials**

Data sharing is available upon request.

**Declarations****Ethics approval and consent to participate**

The need for ethics approval was waived by our local ethics committee, as this is a retrospective study, and information was retrieved from medical record retrospectively.

**Consent for publication**

The parents (legal guardians) of the patient described in this study provided written informed consent.

**Competing interests**

The authors declare that they have no competing interests.

Received: 1 May 2022 Accepted: 9 November 2022

Published online: 14 December 2022

**References**

- Levitt MA, Peña A. Outcomes from the correction of anorectal malformations. *Curr Opin Pediatr*. 2005;17(3):394–401. <https://doi.org/10.1097/01.mop.0000163665.36798.ac> PMID: 15891433.
- Georgeson KE, Inge TH, Albanese CT. Laparoscopically assisted anorectal pull-through for high imperforate anus—a new technique. *J Pediatr Surg*. 2000;35(6):927–30; discussion 930–1. <https://doi.org/10.1053/jpsu.2000.6925>.
- Han Y, Xia Z, Guo S, Yu X, Li Z. Laparoscopically assisted anorectal pull-through versus posterior sagittal anorectoplasty for high and intermediate anorectal malformations: a systematic review and meta-analysis. *PLoS One*. 2017;12(1):e0170421. <https://doi.org/10.1371/journal.pone.0170421>.
- Yang J, Zhang W, Feng J, Guo X, Wang G, Weng Y, et al. Comparison of clinical outcomes and anorectal manometry in patients with congenital anorectal malformations treated with posterior sagittal anorectoplasty and laparoscopically assisted anorectal pull through. *J Pediatr Surg*. 2009;44(12):2380–3. <https://doi.org/10.1016/j.jpedsurg.2009.07.064> PMID: 20006031.
- England RJ, Warren SL, Bezuidenhout L, Numanoglu A, Millar AJ. Laparoscopic repair of anorectal malformations at the Red Cross War Memorial Children's Hospital: taking stock. *J Pediatr Surg*. 2012;47(3):565–70. <https://doi.org/10.1016/j.jpedsurg.2011.08.006> PMID: 22424354.
- Rollins MD, Downey EC, Meyers RL, Scaife ER. Division of the fistula in laparoscopic-assisted repair of anorectal malformations—are clips or ties necessary? *J Pediatr Surg*. 2009;44(1):298–301. <https://doi.org/10.1016/j.jpedsurg.2008.10.032> PMID: 19159761.
- Jadhav S, Raut A, Mandke J, Patil S, Vora R, Kittur D. Nonclosure of rectourethral fistula during posterior sagittal anorectoplasty: our experience. *J Indian Assoc Pediatr Surg*. 2013;18(1):5–6. <https://doi.org/10.4103/0971-9261.107004>.
- Pandey V, Gangopadhyay AN, Gupta DK, Sharma SP, Kumar V. Management of anorectal malformation without ligation of fistula: an approach preventing posterior urethral diverticula. *J Pediatr Urol*. 2014;10(6):1149–52. <https://doi.org/10.1016/j.jpuro.2014.04.016> Epub 2014 Jun 5.
- Podevin G, Petit T, Mure PY, Gelas T, Demarche M, Allal H, et al. Minimally invasive surgery for anorectal malformation in boys: a multicenter study. *J Laparoendosc Adv Surg Tech A*. 2009;19(Suppl 1):S233–5. <https://doi.org/10.1089/lap.2008.0137.supp> PMID: 18973467.
- Partridge JP, Gough MH. Congenital abnormalities of the anus and rectum. *Br J Surg*. 1961;49:37–50. <https://doi.org/10.1002/bjs.18004921310> PMID: 14484114.
- Sydorak RM, Albanese CT. Laparoscopic repair of high imperforate anus. *Semin Pediatr Surg*. 2002;11:217–25.
- Alam S, Lawal TA, Peña A, Sheldon C, Levitt MA. Acquired posterior urethral diverticulum following surgery for anorectal malformations. *J Pediatr Surg*. 2011;46(6):1231–5. <https://doi.org/10.1016/j.jpedsurg.2011.03.061> PMID: 21683228.
- Srimurthy KR, Ramesh S, Shankar G, Narendra BM. Technical modifications of laparoscopically assisted anorectal pull-through for anorectal malformations. *J Laparoendosc Adv Surg Tech A*. 2008;18(2):340–3. <https://doi.org/10.1089/lap.2006.0247> PMID: 18373473.

**Publisher's Note**

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Submit your manuscript to a SpringerOpen® journal and benefit from:**

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)