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Operative Techniques

Transanal rectal mucosectomy and muscular plication: A new technique for rectal prolapse in patients with an anorectal malformation

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ABSTRACT

Background: Rectal prolapse after repair of an anorectal malformation (ARM) occurs at a frequency of 3.8% to 60.0%. Different techniques have been described for repair, with a recurrence rate of up to 33%. We aimed to describe a new technique for rectal prolapse and present its results.

Methods: A retrospective review of our database identified 14 patients with rectal prolapse after posterior sagittal anorectoplasty (PSARP) for an ARM. The study was performed from January 2014 until March 2020. All patients underwent transanal rectal mucosectomy and muscular plication (TRMMP).

Results: All but one patient had PSARP, and the remaining patient had laparoscopic-assisted PSARP. The mean age at repair was 4 years and 8 months (range, 1–12 years). One patient had three previous repair attempts, and another five had only one attempt. The mean follow-up was 2 years and 5 months (range, 3 months to 5 years and 7 months). None of the patients experienced prolapse recurrence or postoperative complications.

Conclusion: This preliminary report showed that TRMMP can be used for rectal prolapse, without the risk of recurrence or complications. Pediatric surgeons may consider this technique as another option for the treatment of rectal prolapse in patients with an ARM.

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Rectal prolapse after repair of an anorectal malformation (ARM) occurs at a frequency of 3.8% to 60.0% [1–6], and it can be considered a postoperative complication or an expected sequel in some types of imperforate anus, particularly those with poor prognosis for bowel control. This condition could produce bleeding, pain, excessive mucus production, ulceration, interference with daily life activities, and an unpleasant esthetic appearance. Different techniques have been described for repair [1,6,7], resulting in different incidences of recurrence and/or complications. The present study aimed to describe a new method to treat rectal prolapse and present the promising results of this approach.

1. Material and methods

A retrospective review of our database identified 14 patients with rectal prolapse after posterior sagittal anorectoplasty (PSARP) for an ARM. The rectal prolapse was complete. It was present in all the circumference of the anoplasty. All patients underwent transanal rectal mucosectomy and muscular plication (TRMMP). The study was performed from January 2014 until March 2020.

We analyzed demographic data, ARM type, perineum quality, sacral ratio, history of prior repair attempts, age at definitive repair, follow-up length, outcome, and complications. The statistical analysis was performed using SPSS Statistics, version 21.

Institutional review board approval was obtained for this study (number: 20-0287).

1.1. Surgical technique

1.1.1. Preoperative management

Patients without colostomy received bowel preparation the day before the operation with GoLYTELY® (polyethylene glycol 3350 and electrolytes oral solution). In the operating room, intravenous antibiotics were administered and continued for 24 h. A peripherally inserted central catheter was used.

Patients with colostomy did not receive bowel preparation the day before. In the operating room, the rectum was prepared with irrigations using a warm saline solution. Intravenous antibiotics were administered and continued for 24 h.

1.1.2. TRMMP technique

The patient was placed in the prone position with the pelvis elevated and all pressure points carefully cushioned. With gentle traction, the hooks of the Lone-Star® retractor (Cooper Surgical, Inc., Trumbull, CT) were positioned on the perianal skin, 5 mm peripheral to the

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mucocutaneous junction. Multiple traction 5-0 silk sutures were placed at the rectal mucosa circumferentially, 5 mm proximal to the mucocutaneous junction. A circumferential incision was made distal to the traction sutures, including only the mucosa (Fig. 1). This incision was made with a fine electrocautery Olsen® needle (Symmetry Surgical Inc., Nashville, TN). The incision created a submucosal plane of dissection, separating the mucosa from the muscular layer. During this step, it is essential to identify the circular fibers of the rectum, confirming the proper surgical plane (Fig. 2). This submucosal dissection was continued up to 8 cm using blunt dissection (Fig. 3). The next step was a maneuver aimed to achieve tension-free anastomosis after resection of the dissected mucosa. This maneuver involved plication of the muscular wall. In order to create this plication, 8 to 12 symmetric longitudinal nonabsorbable stitches of Prolene® (Ethicon, Johnson & Johnson, New Brunswick, NJ) were used (Fig. 4). Four initial stitches were placed at the 3, 6, 9, and 12 o'clock positions, followed by another set of sutures in between them. When these sutures were tied, the muscular wall was plicated (Fig. 5). As a result, the proximal mucosa and distal mucosa were placed very close to each other (Fig. 6). The dissected mucosa was removed, and a mucosa-mucosa anastomosis was performed with 5-0 interrupted long-term absorbable sutures (Fig. 7). Owing to the muscular plication, this anastomosis had no tension. The bulk of the plicated muscular wall pulls the anastomosis and the mucocutaneous line, producing a unique positive esthetic effect, and the anus appears closed (Fig. 8). The hooks were then removed from the skin.

1.1.3. Postoperative management

Patients without colostomy remained nil per os and received parenteral nutrition for 7 days. On postoperative day 8, patients were started on a regular diet and were discharged. All patients received oral polyethylene glycol 3350 for 4 weeks to produce soft stools and avoid straining during defecation.

Patients with a colostomy began regular diet on the same day and were discharged the next day.

We did not perform postoperative dilations.

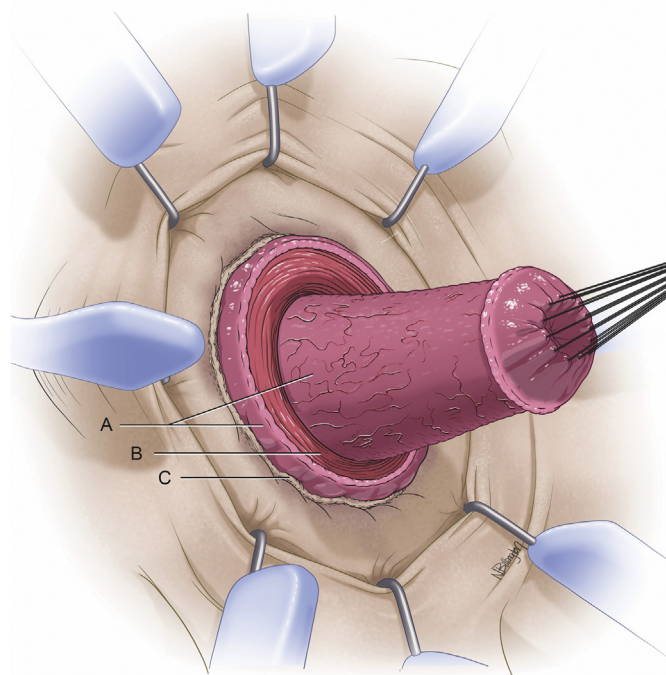


Fig. 2. Rectal mucosectomy identifying two planes: (A) The highly vascular mucosa, and (B) the circular fibers of the muscular cuff. (C) Mucocutaneous line.

2. Results

All but one patient had PSARP, and the remaining patient had laparoscopic-assisted PSARP. Of the 14 patients, 11 were referred after the colostomy was closed and three had their initial colostomy. After TRMMP, the bowel function in the 11 patients without a colostomy did not change. Eight patients had fecal incontinence, and three had

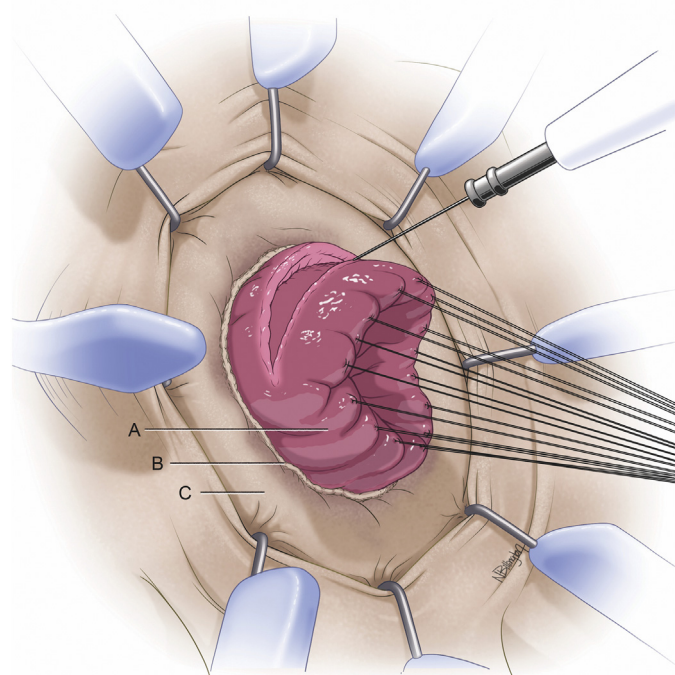


Fig. 1. Partial thickness circumferential incision using fine electrocautery. (A) Traction sutures are placed in the mucosa. (B) The mucocutaneous line from the previous anoplasty. (C) Skin. Note the lack of a pectinate line in the distal rectum.

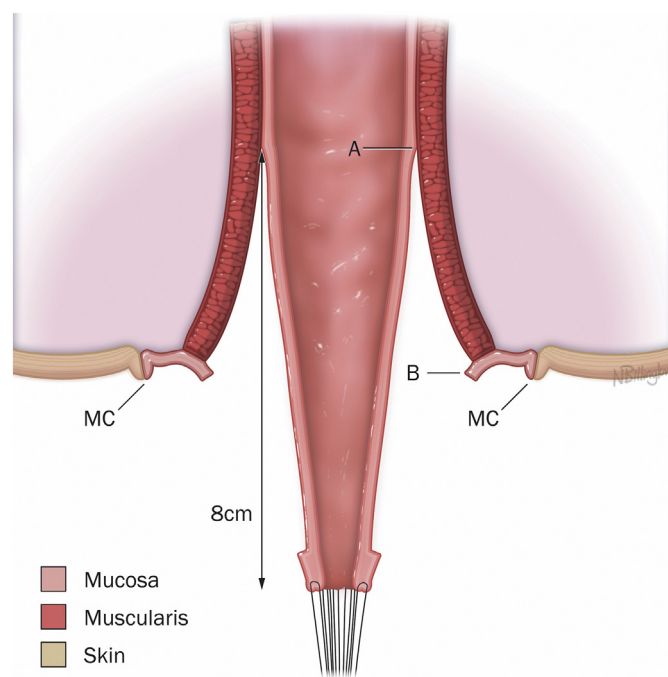


Fig. 3. Coronal view at the end of the dissection of the rectal mucosa. The length of the dissection is 8 cm. (MC) Mucocutaneous line. (A) Proximal mucosa. (B) Distal mucosa located where the circumferential incision began. The distance between the distal mucosa (B) and the mucocutaneous line (MC) is 5 mm.

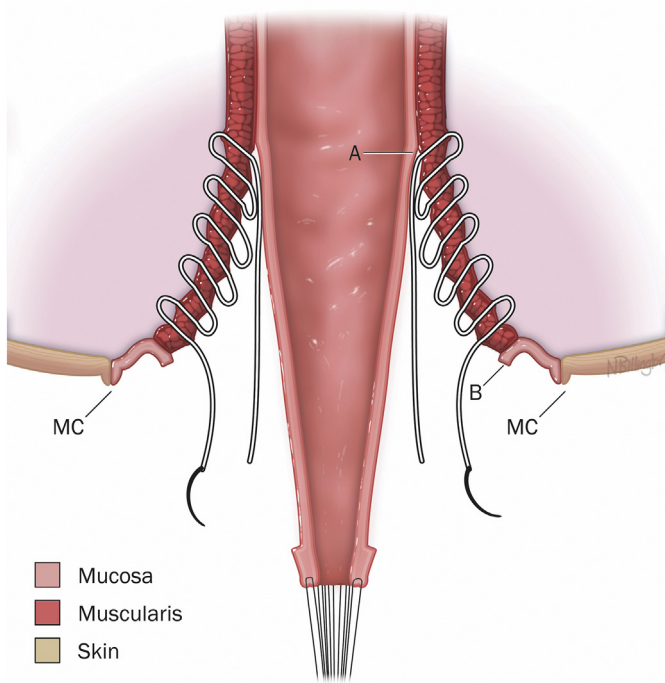


Fig. 4. Coronal view showing the longitudinal imbricating sutures in the muscular cuff. (MC) Mucocutaneous line. (A) Proximal mucosa. (B) Distal mucosa.

fecal control. The location of the anus was within the limits of the sphincters in the 14 patients. The mean age at repair was 4 years and 8 months (range, 1–12 years). Table 1 shows the descriptive data of the study population. The sacral ratio was not calculated in two patients. Of these patients, one had myelomeningocele and the other had a hemisacrum. The latter patient had a rectoperineal fistula and a

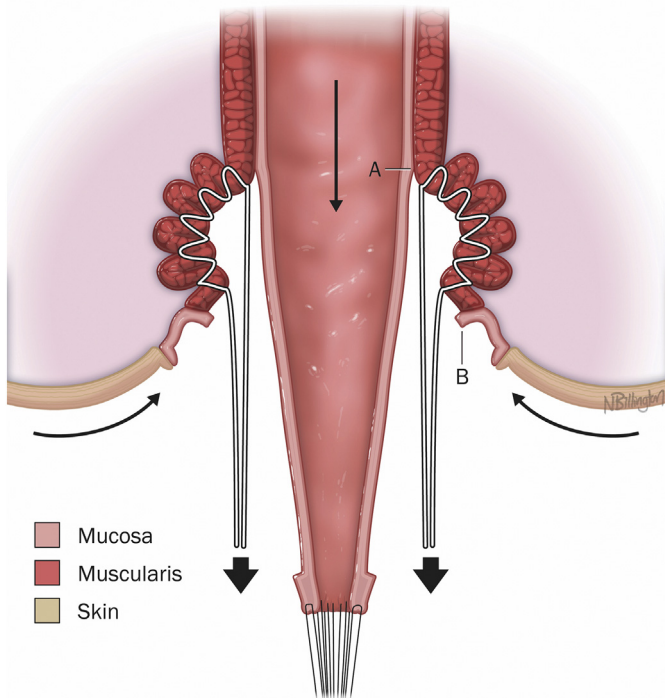


Fig. 5. The longitudinal imbricating sutures are placed and partially tied. Note the partial plication of the muscular cuff; the proximal mucosa (A) and the distal mucosa (B) are getting closer.

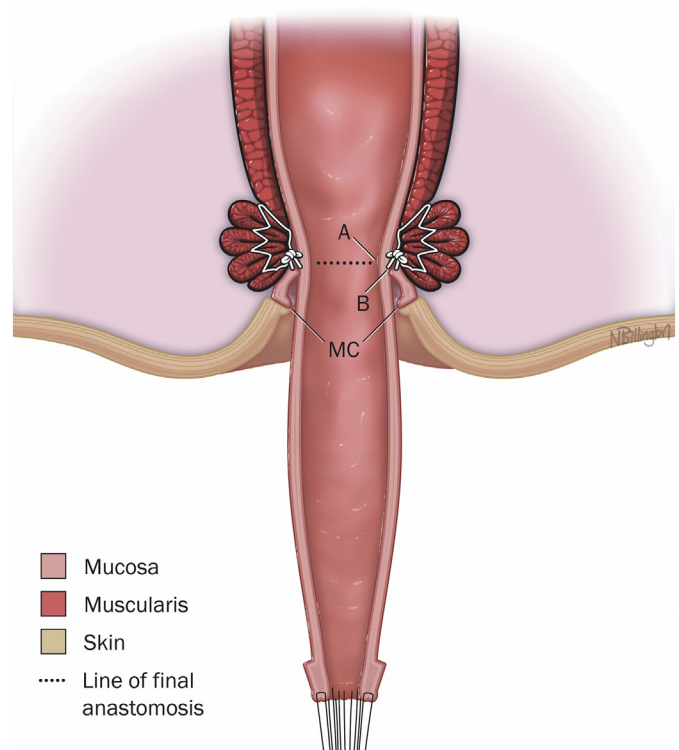


Fig. 6. The longitudinal imbricating sutures are completely tied. Plication is complete. The proximal mucosa (A) reaches the distal mucosa (B). The proximal (A) and distal mucosae (B) are together. (MC) Mucocutaneous line. The dotted line indicates the site of the mucosectomy and anastomosis.

presacral mass. In four patients, the intergluteal cleft was well-formed (good), and in the remaining patients, it was underdeveloped (flat). Six patients had a history of previous attempts to repair the prolapse in other hospital. All these patients were operated on with the same

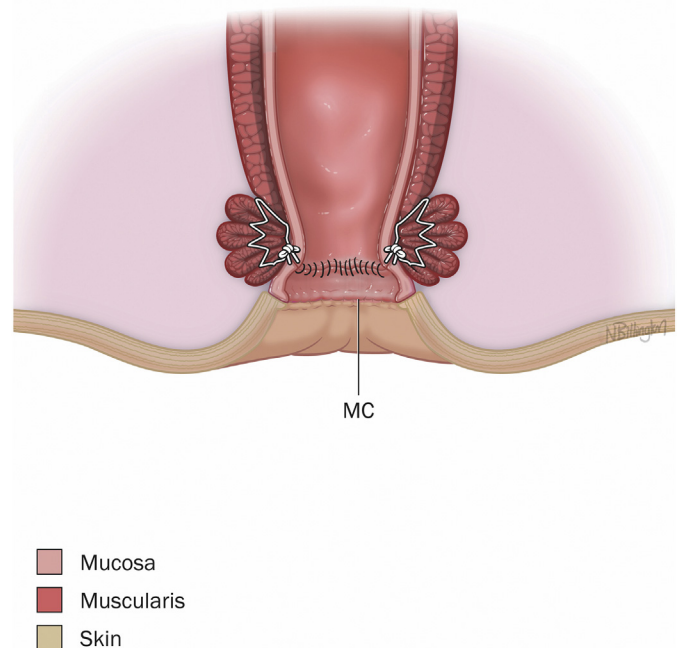


Fig. 7. The mucosa was resected on the dotted line illustrated in Fig. 6. The anastomosis (mucosa-mucosa) is completed. Note that the mucocutaneous line (MC) from the original anoplasty remains intact.

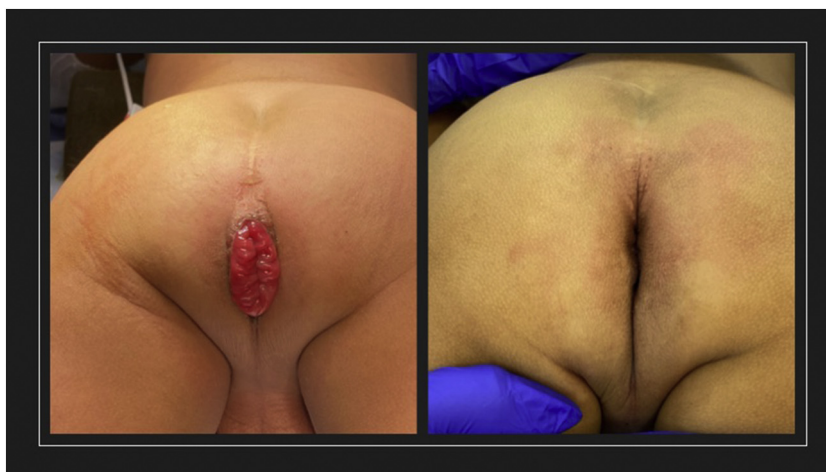


Fig. 8. Clinical picture. Before and after transanal rectal mucosectomy with muscular plication. The bulk of the plicated muscular wall pulls the anastomosis and the mucocutaneous line, producing a unique esthetic effect, and the anus appears closed.

technique: resection of the prolapse and a new anoplasty published by Belizon [1]. One patient had three previous repair attempts, and another five had only one attempt. The mean follow-up period was 2 years and 5 months (range, 3 months to 5 years and 7 months). None of the patients experienced recurrence or complications.

3. Discussion

Rectal prolapse after repair of an ARM is treated surgically with resection of the prolapse and a new anoplasty [1], or with flaps techniques [6,7]. The rate of prolapse recurrence is up to 33% [1–4,6,7]. Anal stenosis, wound dehiscence or infection, perianal fistula, abscess, creation of colostomy owing to a complication, and unsatisfactory esthetic results have been described up to 36% (Table 2).

Transanal rectal mucosectomy with anastomosis of the rectal mucosa to the skin has been described in adults as a surgical technique to

repair idiopathic rectal prolapse [8]. As the dissection starts at the skin level and the resection includes the anal canal, patients experience fecal incontinence. The use of longitudinal imbricating sutures in the denuded muscle coat of the rectum has been added to the original technique [9]. Nowadays, adult surgeons start the mucosectomy above the anal canal to avoid fecal incontinence, and the recurrence rate of rectal prolapse in adults is low with this technique [10–19]. In children with idiopathic rectal prolapse, this operation appears to be associated with no recurrence [20–23]. Based on this positive experience, we began using this operation in children with idiopathic rectal prolapse in 2013, observing favorable results [23].

Since 2014, we have been using TRMMP to treat rectal prolapse after PSARP in patients with an ARM. These unique patients do not have an anal canal, allowing the dissection to be started a few millimeters from the skin and the creation of mucosa–mucosa anastomosis, instead of a new anoplasty. It is assumed that this type of anastomosis reduces the risk of stricture. Additionally, plication of the muscle brings together the distal and proximal ends of the dissection, allowing for tension-free anastomosis (Fig. 7).

TRMMP has two fundamental steps. The first step is transanal resection of the prolapsed mucosa. The dissection requires developing and maintaining a submucosal plane until enough muscular cuff length is obtained. The second step is plication of the muscular cuff. Adequate plication is achieved by placing symmetric longitudinal sutures, so when these sutures are tied, the muscular cuff length is shortened.

It is beneficial to perform this operation before the colostomy closure. It avoids the bowel preparation, protects the anastomosis, and allows early feeding and discharge, reducing the costs of the procedure. However, the rectal prolapse emerges after the colostomy closure in some patients. In patients without colostomy, the dehiscence of the anastomosis would result in a significant complication. This is the

Table 1

Data of 14 patients with rectal prolapse after posterior sagittal anorectoplasty, which was repaired with transanal rectal mucosectomy and muscular plication.

Characteristic	Value
Gender	
Male	10
Female	4
Anorectal malformation type	
Prostatic	4
Bulbar	3
Cloaca	3
Vestibular	1
Perineal	1
Bladder neck	1
Unknown	1
Sacral ratio	
≤0.4	6
0.5	2
0.6	2
≥0.7	2
Myelomeningocele (ratio unavailable)	1
Hemisacrum (ratio unavailable)	1
Age at repair	
Maximum	12 years 4 months
Minimum	1 year
Mean	4 years 8 months
Median	6 years
Follow-up time	
Maximum	5 years 7 months
Minimum	3 months
Mean	2 years 5 months
Median	2 years 5 months

Table 2

Rate of recurrence and complications according with other techniques to repair rectal prolapse after PSARP.

Technique/Author	Recurrence (%)	Complications (%)	Patients (n)
Skin flaps			
Millard [7]	0	33	6
Caouette [6]	0	36	11
Sato [2]	0	35	14
Anoplasty			
Belizon [1]	9	0	32
Sato [2]	33	0	6
Zornoza [3]	15	0	26
Brisighelli [4]	22	11	9

rationale of our conservative postoperative management and we have not had complications. We are aware of other groups performing primary operations with different protocols. The decision to do a primary or staged TRMMP, the use of TPN, early feeding, and prompt discharge should be based on the experience and the local circumstances of each surgical group.

All our patients had complete prolapse that includes the entire circumference, and the anus was within the limits of the anal sphincters. We have not attempted TRMMP in partial, incomplete, or unilateral prolapse. However, we can hypothesize that this technique could be suitable for this group of patients. Sometimes the rectal prolapse coexists with an anus outside of the anal sphincters. In this situation, surgeons need to evaluate the indication of another PSARP to improve fecal control. The new PSARP will reposition the anus and repair the prolapse. Otherwise, if a new PSARP will not offer any benefit, the prolapse could be fixed with a TRMMP.

4. Conclusions

This preliminary report in a small cohort showed that TRMMP can be used in patients with severe or recurrent rectal prolapse after PSARP for an ARM without the risk of recurrence, complications or change in bowel function. Additionally, it improves the esthetic appearance of the anus. Pediatric surgeons may consider this technique as another option for the treatment of rectal prolapse in patients with an ARM.

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