Original Article

Management of Complete Persistent Rectal Prolapse in Children: A Comparative Study Between Mesh Repair Versus Suturing Rectopexy

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Abstract

Background: Rectal prolapse is a relatively common, usually self-limiting illness in children. Peak incidence is between 1 and 3 years. The primary treatment of rectal prolapse is non-operative. Surgical intervention is needed in long-standing intractable cases of rectal prolapse, rectal pain/bleeding/ulceration and prolapse that needs frequent manual or difficult reduction. The aim of this study was to compare the efficacy and outcome of laparoscopic ventral mesh rectopexy versus laparoscopic suture rectopexy in the management of persistent rectal prolapse in children not responding to conservative management and/or recurrent after sclerotherapy or anal encirclement. **Materials and Methods:** Twenty-four cases were randomised into two groups at the ratio of 1:1, Group 1 patients were managed by laparoscopic ventral mesh rectopexy, whereas Group 2 cases were managed by laparoscopic suture rectopexy. Patients with primary surgical conditions such as anorectal malformations, Hirschsprung's disease, rectal polyps or masses and Ectopia Vesicae were excluded from the study. Inclusion criteria were complete rectal prolapse cases with failed medical treatment for at least 6 months and/or recurrent after injection sclerotherapy or anal encirclement. **Results:** In the mesh rectopexy group, one case had recurrence in the form of partial prolapse 3 weeks postoperatively which improved 2 months postoperatively with conservative management, one case had bleeding per rectum 2 months postoperatively, stool analysis was done revealing parasitic infestation which was treated medically. In the suture rectopexy group, one case had one attack of bleeding per rectum on the 2nd day postoperatively which resolved spontaneously and one case was readmitted on the 5th day postoperatively for non-bilious vomiting which improved by medical treatment. No recurrent cases of complete rectal prolapse were reported in both groups. **Conclusion:** Laparoscopic rectopexy can be an effective modality for the treatment of refractory complete rectal prolapse in children. It is effective, safe and easy. Although the current study has shown that laparoscopic suture rectopexy and mesh rectopexy have nearly the same results, a larger number of patients are needed to compare more deeply between the two groups.

Keywords: Laparoscopy, mesh rectopexy, rectal prolapse, suture rectopexy

Introduction

Rectal prolapse is relatively common, usually self-limiting illness in children. Peak incidence is between 1 and 3 years. It can be partial (protrusion of only mucosa from the anal verge) or complete (involves the full thickness of the rectum).[1]

Children are more prone to have rectal prolapse due to the absence of valves of Houston, vertical course of the rectum, great mobility of the sigmoid colon, loose attachment of rectal mucosa to its muscle coat, flat coccyx with poor levator support and with conditions that promote tenesmuses such as parasitic infestations, rectal polyps, proctitis, ulcerative colitis and cystic fibrosis also may have rectal prolapse.[2]

The primary treatment of rectal prolapse is non-operative through encouraging a high-fibre diet, stool softeners, minimising straining and treatment of parasitic infestation if present.[3] Sclerotherapy is another treatment option being less

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invasive and cheap, the main goal is to induce adhesions that will help stabilising the rectum position. Repeated sessions may be required to achieve complete resolution.[4]

Surgical intervention is needed in long-standing intractable cases of rectal prolapse, rectal pain/bleeding/ulceration and prolapse that needs frequent manual or difficult reduction. No specific method of surgical treatment has proven its superiority in the paediatric population due to limited patient numbers.[5]

In this study, we aim to compare the efficacy and outcome of laparoscopic ventral mesh rectopexy versus laparoscopic suture rectopexy in the management of persistent rectal prolapse in children not responding to conservative management and/or recurrent cases after sclerotherapy or anal encirclement.

Materials and Methods

This prospective study included patients diagnosed with rectal prolapse, presented to the outpatient department of a tertiary referral university-based childrens' hospital from January 2019 to September 2019. All cases were operated by the same surgeon. Informed consent was obtained from all the candidates' parents before enrolment in the study, and the study was approved by the institute's research ethics and scientific committee.

Conservative management is started in children who have non-complicated and non-recurrent rectal prolapse. This management aimed at treating the cause and reducing straining. It often works well in children younger than 4 years and prevents recurrence. In children older than 4 years, conservative management should be attempted before surgical management is chosen and is continued for at least 6 months to 1 year. Constipation should be treated with dietary modification and stool softeners to reduce straining. Infectious diarrhoea or parasitic infestation should be appropriately treated. A change in bowel habits, such as switching from a 'potty' chair to an adult commode or vice versa, may help prevent recurrence.

In this study, the patients were divided into two groups. The first group (Group A) includes 12 patients diagnosed with complete rectal prolapse and managed by laparoscopic ventral mesh rectopexy. The second group (Group B) includes 12 patients diagnosed with complete rectal prolapse and will be managed by laparoscopic suture rectopexy.

Inclusion criteria included: complete rectal prolapse, failed medical management for at least 6 months and recurrence after local treatment as cerclage or sclerotherapy. We excluded, patients with primary surgical conditions, for example, anorectal malformations, Hirschsprung's disease and after previous pull-through surgery, patients with rectal polyps or masses, patients with ectopia vesicae and patients with spinal anomalies, for example, spina bifida or musculoskeletal anomalies, for example, Ehler–Danlos or Marfan syndrome.

All the patients were subjected to the full clinical assessment, laboratory investigations and bowel preparation both mechanical (all patients received clear fluids only on the day before surgery and all patients received two rectal enemas the day before surgery and 1 on the morning of surgery) and chemical (all patients received 1 dose of ceftriaxone [50 mg/kg] and metronidazole IV [15 mg/kg] the day before surgery).

Operative procedures

Laparoscopic ventral mesh rectopexy

Procedure is carried out under general anaesthesia; the patient is placed in the supine position with the surgeon, camera and assistant at the patient's head and monitor at the patient's foot. Patient is sterilised with povidone iodine and draped and a urinary catheter is placed to empty the urinary bladder to avoid masking the field if the bladder is full.

In our study, we use one 5 mm' port for the telescope (30°) which is placed transumbilical with the open Hasson's technique, pneumoperitoneum is created with 12 mmHg pressure and 3 L/min flow and three 5 mm' working ports: two for the surgeon placed in the right and left iliac regions below the level of the umbilicus, and at the midclavicular line, one port for the assistant in the right midclavicular line above the level of the umbilicus [Figure 1].

We start the procedure on the right side of the sigmoid colon and rectum by identifying the sacral promontory right ureter, right iliac vessels, vas deferens (male) and ovaries tubes (female). In female patients, a percutaneous suture is placed into the fundus of the uterus for traction against the anterior abdominal wall [Figure 2].

Dissection is started on the right side of the pelvis when the assistant grabs the peritoneum covering the sacral promontory with a Maryland forceps against the surgeon taking care not go to medial as to not injure median sacral artery as is becomes a major source of bleeding and taking care not to injure the hypogastric plexus nerves on promontory. We use sharp dissection with an energy device (LigaSure or Harmonic) or electrocautery using hook.

After opening the peritoneum, we continue dissection anteriorly around the rectum in avascular plane taking care to always visualise the ureter as not injure it, not to injure the lateral ligament of the rectum and dissect down in the Douglas pouch which is usually deep in these patients. As we get closer to the urinary bladder in male patients, identification and avoidance of the vas deferens become tricky, and in female patients, anteriorly the uterine artery becomes the problem.

Dissection is finished after exposing the anterior surface of the rectum, then a strip of ULTRAPRO® Partially Absorbable Mesh is placed on the anterior surface of the rectum. Inferiorly mesh is fixed with 4–6 interrupted seromuscular Ethibond 2/0 sutures on the anterior surface of the rectum below the level of dissected peritoneum of the Douglas pouch with the aid of the assistant gently elevating the bladder (in male patients) away to correctly visualise the rectum (in female patients, the uterus is

already retracted by the percutaneous suture). Superiorly mesh is fixed with two interrupted Ethibond sutures to the presacral fascia on the sacral promontory.

Finally, the peritoneum is closed over the mesh with a running Vicryl 3/0 to avoid exposure of the mesh to bowel which may cause bowel injury port sites are closed with interrupted Vicryl 3/0 and skin is closed with Vicryl 5/0 subcuticular sutures.

Laparoscopic suture rectopexy

Same as mesh rectopexy, procedure is done with same setting and same port sites. However, in suture rectopexy after starting dissection from the right as mesh rectopexy in the same avascular plane, it is not ended by exposing the anterior surface of the rectum, dissection is performed again from the left side of the colon and rectum starting from the sacral promontory going anteriorly again taking care not to injure the ureter, vas deferens or mesentery of colon.

Dissection from the left side is usually harder than the right side because the promontory is not as prominent as the right side, and the retraction of sigmoid is more difficult.

After having mobilised the rectum circumferentially, the rectum is fixed to the presacral fascia of sacral promontory with 3–4 interrupted Ethibond sutures. Each suture is started with taking the fascia on the promontory in the first bite then the rectum is pulled cranially relatively tautly and the second bite takes the seromuscular layer of the lateral rectal wall and then the suture is tied [Figure 3].

We usually take two sutures on the right side and 1–2 sutures on the left side. We usually closed the peritoneum with a running Vicryl 3/0 suture even with the absence of mesh; however, it is not necessary [Figure 4].

Post-operative follow-up

- All patients were kept on intravenous (IV) fluids postoperatively
- All patients continued on IV antibiotics (ceftriaxone and metronidazole), IV paracetamol
- Oral fluids were started as soon as bowel sounds were heard
- Patients were discharged after resuming normal oral feeding, passing stools and making sure there is no recurrence
- Patients were followed up 1 week, 1 month, 3 months and 6 months postoperatively.

Statistical analysis

Descriptive analysis tools will be used for single variables such as range, mean and standard deviation. Analytical tests that will be used are Fisher's exact test, ANOVA tests and *t*-test to compare and correlate different variables with the outcome. Significance was accorded at a $P < 0.05$.

Results

Our study involved 24 patients with age ranged from 2.5 to 14 years with average of 7 years old. We had 18 males and six females.



Figure 1: Port sites with camera port place transumbilical and three working ports

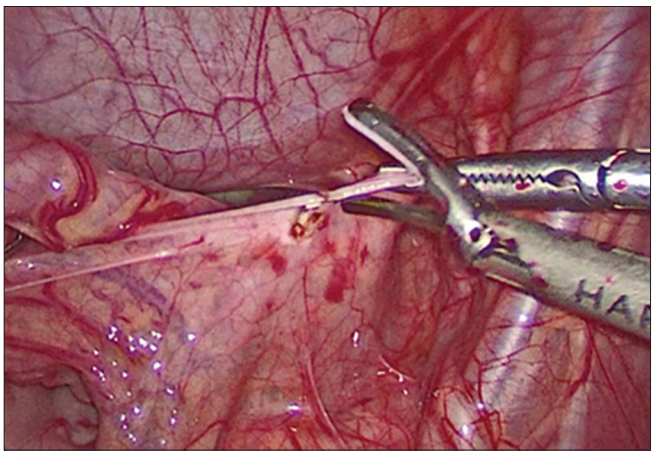


Figure 2: Dissection is started on the right side over the sacral promontory

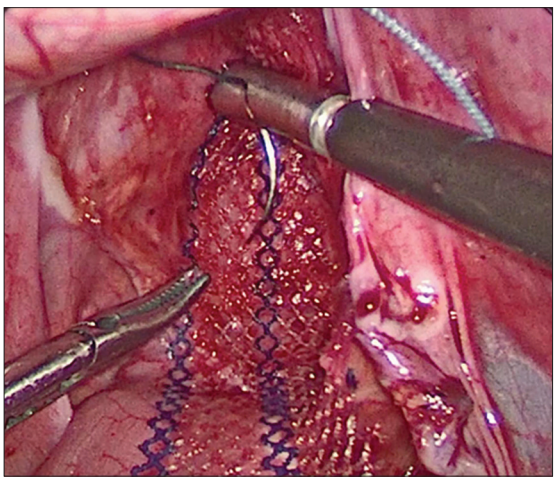


Figure 3: Suturing of the mesh to the rectum below the level of the peritoneum

Five of our patients presented with rectal prolapse at neonatal age, four of these patients had cystic fibrosis with proven with positive sweat chloride test and one had myelomeningocele, whereas the other 19 patients presented after the age of 1 year.

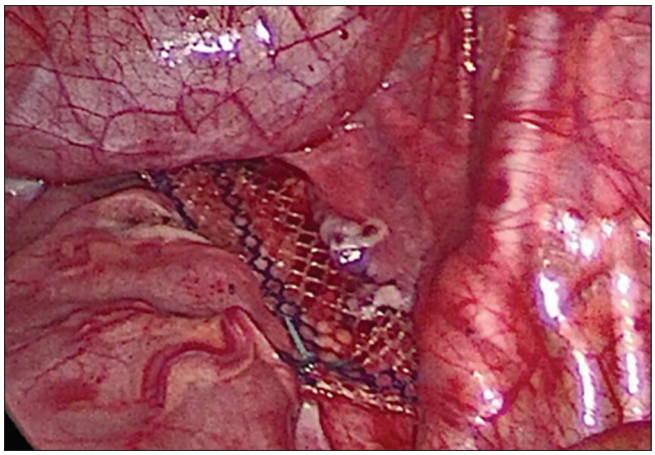


Figure 4: After fixation of mesh to the rectum and to the sacral promontory

Two patients of the 24 patients had myelomeningocele, one patient had delayed mental milestones and one patient failure to thrive (due to repeated parasitic infestation).

The average duration of prolapse was 4.5 years ranging from 1 to 12 years. All 24 patients presented with rectal mass during defecation, 10 of them prolapse was reduced spontaneously, 10 of them needed manual reduction after every prolapse and four sometimes needed manual reduction.

Of the 24 patients, four of them were associated with pain during defecation, and 14 were associated with rectal bleeding during defecation, seven were associated with constipation and five were associated with diarrhoea.

Eleven patients had history of parasitic infestation which was treated preoperatively. Six patients had positive family history of rectal prolapse, four of which were the cystic fibrosis cases.

Conservative management was adopted for most of our patients (22 patients) in the form of laxatives, diet management and toilet training and avoidance of straining during defecation. Thirteen patients had conservative management for a period between 6 and 12 months and nine patients over 12 months; however, no improvement was seen with conservative management in these patients.

Twelve patients had undergone previous interventions, 10 patients had anal encirclement, whereas two patients had multiple sessions of injection sclerotherapy outside our facility.

No intraoperative complications reported except in one case of the suture rectopexy group where intraoperative bleeding happened due to injury of median sacral vessel which was controlled with energy device laparoscopically.

It should be noted that one case of the suture rectopexy group, placing a suture on the left side colon was not feasible as left common iliac vein was covering the sacral promontory on the left side so three sutures were taken on the right side of rectum. Average post-operative stay for both groups was 3 days.

In the mesh rectopexy group, one case had recurrence in the form of partial rectal prolapse 3 weeks postoperatively, stool analysis was done to exclude parasitic infestation, laxatives were prescribed and prolapse improved 2 months postoperatively, one case had bleeding per rectum 2 months postoperatively, colonoscopy was done to exclude mesh erosion and stools analysis revealed parasitic infestation which was treated medically and patient improved.

In the suture rectopexy group, one case had one attack bleeding per rectum on the 2nd day postoperatively which was resolved spontaneously and one case was readmitted on day 5 post-operative for non-bilious vomiting which improved on antiemetics and IV PPI and discharged 2 days after admission.

No recurrent cases of complete rectal prolapse were reported in any of the two groups.

There was no statistical difference between the two groups regarding intraoperative or post-operative complication rate or efficacy of the technique used in each of the groups; however, a large sample size is needed to accurately compare between the two groups.

Discussion

In children, rectal prolapse usually presents as a self-limiting disorder with a peak incidence around the time of toilet training. The condition is usually diagnosed by the age of 3 years, with an equal gender distribution.[6] Male preponderance has been noted by Shalaby *et al*. and Ibrahim *et al*. which simulates the age gender distribution in our study.[1-7]

The exact aetiology of rectal prolapse in children is unknown. However, it has been associated with many underlying diseases and the incidence varies with geographic and socioeconomic factors being much more common in underdeveloped countries, where parasitic disease, malnutrition and diarrheal illness are common in addition to other contributing factors including constipation, pertussis, cystic fibrosis and polyps. Variable risk factors are detected amongst our low-socioeconomic patients parasitic infestation, cystic fibrosis and meningomyelocele.[8]

Despite that the literature does not clarify a predominant symptom associated with rectal prolapse, we found that most of our patients suffered from bleeding per rectum followed by constipation and diarrhoea and the least was pain during defecation.

Literature is full of various procedures for this condition which is a testimony to the lack of consensus over an ideal procedure. The surgical approaches for years, either perineal or abdominal were the commonly indicated following failure of conservative management options such as pharmacological therapy for constipation and injection sclerotherapy.

Hintz *et al*. reported that sclerotherapy regardless the type of sclerosing agent may provide success rate of 77% after the first injection.[4] In our study, we decided to proceed with a more radical treatment option.

Twenty-two of our patients had conservative management for variable time periods of time and 12 patients' local interventions, 10 had anal encirclement and two had repeated injections; however, no improvement was witnessed.

Surgery is indicated in rare cases with intractable rectal prolapse and may be considered in patients who are not spontaneously cured in 12–18 months of follow-up. Patients older than 4 years require surgery more often than younger children which is consistent with our study. The infrequency of surgical management and a multitude of operative options make the surgical management of RP difficult to study. Operative therapy is thought to be guided by surgeon training and experience. Given the spectrum of options, lack of evidence and potential for defining best practice and paediatric RP warrants further study. Currently, there are no descriptions of practice patterns in paediatric RP.[8,9]

Several methods have been used to successfully treat recurrent rectal prolapse. Recently, there have been many reports addressing the success of different laparoscopic approaches for complete rectal prolapse, namely suture rectopexy, posterior mesh rectopexy and resection of the sigmoid colon, with or without rectopexy and levatorplasty.

We adopted two different laparoscopic techniques in our study: the laparoscopic suture rectopexy and the laparoscopic ventral mesh rectopexy. There was no significant difference between the groups in the short-term outcome apart from a case that experienced recurrence in form of a partial rectal prolapse in the mesh group and two cases of bleeding per rectum post-operative one in each group.

Saxena *et al*. used laparoscopic suture rectopexy without using a mesh to treat a 22-month-old girl with recurring rectum prolapse.[10] While Bonnard *et al*. treated a 12-year-old boy with solitary rectal ulcer syndrome by laparoscopic rectopexy with the application of a mesh.[3] Both of these two patients were free of symptoms after a follow-up of 18 and 24 months.

In addition, Okuyama *et al*. reported three case reports and concluded that laparoscopic suture rectopexy is feasible and less invasive in children and they had one recurrence after 5 months in their follow-up, resection rectopexy was done.[11]

Our study involved 24 patients with average of 7 years old. We had 18 males and six females. Most of our patients came from Giza. The average duration of prolapse was 4.5 years.

All 24 patients presented with rectal mass during defecation, 10 of them prolapse was reduced spontaneously, 10 of them needed manual reduction after every prolapse and foursometimes needed manual reduction.

Eleven patients had history of parasitic infestation which was treated preoperatively. Five of our patients presented with rectal prolapse at the neonatal period, four of these patients had cystic fibrosis and one patient with myelomeningocele. Two patients had myelomeningocele, one patient had delayed mental mile stones and one patient failure to thrive.

Conservative management was adopted for most of our patients (22 patients).Thirteen patients had conservative management for a period between 6 and 12 months and nine patients over 12 months; however, no improvement was seen with conservative management in these patients.

Twelve patients had undergone previous interventions, 10 patients had anal encirclement, whereas two patients had multiple sessions of injection sclerotherapy outside our facility.

Of the 12 patients treated with mesh rectopexy no intraoperative complications were reported, one patient had partial recurrence 3 weeks postoperatively which improved after 2 months with laxatives and one patient had bleeding per rectum 2 months post operatively colonoscopy was done to exclude mesh erosion, stool analysis was done revealing parasitic infection which was treated medically. Of the 12 patients treated with suture rectopexy, one patient had intraoperative bleeding which was controlled with an energy device, postoperatively one patient had one attack of bleeding per rectum on the 2nd day which stopped spontaneously, and one patient had non-bilious vomiting on day 5 and admitted for 2 days on medical treatment and then discharged. There was no statistical difference between the two groups regarding intraoperative or postoperative complication rate ($P = 1$); however, a larger sample size is needed for accurate evaluation.

Furthermore, Awad *et al*. reported laparoscopic suture rectopexy with fixation of the mobilised rectum to the sacral promontory with multiple non-absorbable sutures in 20 patients out of 74 that presented with RP over a period of 4 (27%) years. Only one patient had full-thickness recurrence that required redo surgery, and another had mucosal prolapse, which spontaneously resolved.[2]

Puri applied laparoscopic suture rectopexy for 19 patients with RP who did not respond to conservative management over 1 year or recurrent prolapse. Puri reported recurrence in one case with cystic fibrosis. This was partial prolapse of rectal mucosa which was dealt with three sittings of sclerotherapy using polidocanol. One child complained of post-operative constipation which improved with dietary manipulation and stool softeners.[12]

Randall *et al*.[13] studied the results of laparoscopic rectopexy, using either sutures or mesh, for external prolapse in eleven children who have failed conservative measures with 18 procedures performed. Complete resolution was seen in seven cases and partial resolution with some continuing symptoms was seen in one patient.

All suture rectopexy cases ultimately failed and required a redo rectopexy procedure. Three patients had persistent failure with recurrence of prolapse during the study period despite repeated procedures. There were no serious complications. They concluded that laparoscopic rectopexy can be effective in childhood for rectal prolapse, although there is a cohort for whom, it fails despite repeated procedures. They also stated that where rectopexy is indicated, they would recommend against

suture rectopexy but it is not clear if a synthetic or biologic mesh should be the first-line procedure.[13]

Ismail *et al*. used laparoscopy to treat 45 children having complete rectal prolapse. They used the laparoscopy for rectopexy in eight cases, mesh rectopexy in 22, resection rectopexy in 10 and levatorplasty with additional to mesh rectopexy in five cases and reported that the only complications were post-operative constipation and external colonic fistula.[14]

Shalaby *et al*. applied laparoscopic mesh rectopexy with fixation of the rectosigmoid to the left lateral parietal peritoneum to treat complete rectal prolapse in 52 children and reported that the only complication was post-operative constipation in one case which responded well to conservative measurement with no recurrences.[7]

Ibrahim *et al*. applied also mesh rectopexy in 14 children. No intraoperative complications were reported; only one case got constipation and was managed conservatively and no recurrence.[1]

Gomes-Ferreira *et al*. applied the laparoscopic modified Orr-Loygue mesh rectopexy for eight children with recurrent rectal prolapse, four patients presented with associated pathological conditions: one neurological impairment, one severe malnutrition, one solitary rectal ulcer with frequent bleeding and one syringomyelic cavity in the spinal cord. No post-operative constipation or recurrence was reported during the study.

They stated that any excessive tension on the fixation might be responsible for a significant modification of the motility of the colon and the rectum and lead to slow transit constipation. Changes in the viscoelasticity of the parietal wall of the rectum put under tension might lead to obstructed defecation. Thus, in the laparoscopic suture rectopexy where the rectum is pulled tight and straight to the promontory, any excessive tension on the rectal wall might induce or worsen constipation. In their series, no post-operative constipation was reported postoperatively despite the low-fibre diet and the absence of any laxatives prescription. It is worth mentioning that in our study none of our patients experienced post-operative constipation.[5]

Limitations of our study included small number of patients and this is attributed to the limited number of cases presented with rectal prolapse and they failed conservative management, another limitation is the lack of long-term follow-up which we will consider in further studies.

Conclusion

Laparoscopic rectopexy can be an effective modality for the treatment of refractory complete rectal prolapse in children. It is effective, safe and easy. Although the current study has shown that laparoscopic suture rectopexy and mesh rectopexy have nearly the same results, a larger number of patients are needed to compare more deeply between the two groups.

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Conflicts of interest

There are no conflicts of interest.

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