Evaluation of laparoscopic suture rectopexy for the treatment of complete rectal prolapse in children

Original Article

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ABSTRACT

Background: Rectal prolapse is a common condition in children aged 1–3. Complete rectal prolapse affects the full thickness of the rectum and protrudes 5 cm or more, which is distinguished by circular mucosal folds.

Aim: Evaluation of the effectiveness and safety of laparoscopic suture rectopexy for the treatment of complete rectal prolapse in children.

Patients and Methods: This prospective study included 20 children with complete rectal prolapse who had laparoscopic suture rectopexy for the treatment of complete rectal prolapse in children at Menoufia University Hospital, Al Galaa Teaching Hospital, and Ministry of Health Hospitals during the period from January 2023 until January 2024.

Results: There were no patients who had experienced a recurrence of external rectal prolapse, all patients had smooth recovery postoperatively without complications or any recurrence during the postoperative follow-up period, and all patients had experienced an improvement in their bowel function. Regarding their prolapse history, 11 (55%) patients had bleeding per rectum, four (20%) patients had pain, five (25%) patients had constipation, and two (10%) patients had fecal soiling. The mean prolapse length (cm) was 9.35±1.56 with a range 7–12 cm and all children had complete rectal prolapse (100%).

Conclusion: Laparoscopic suture rectopexy is a safe and effective technique for managing complete rectal prolapse, avoiding injury to autonomic nerve supply, lateral ligaments, and pelvic floor muscles support with low recurrence rates and significant improvement in constipation and fecal incontinence.

Key Words: Anorectal malformation, bowel function, laparoscopic suture rectopexy, rectal prolapse.

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INTRODUCTION

In children, rectal prolapse is a frequent problem with peak incidence between the ages of 1–3 years. Prolapse can be either partial or complete. The circular mucosal folds are a distinguishing feature of complete rectal prolapse, which involves the whole thickness of the rectum and protrudes 5 cm or more[1].

In many situations, conservative management is the first line; nevertheless, in persistent cases, surgical intervention may be necessary. The success rate of conservative measures in these cases was 76.9%[2].

Surgical options for complete rectal prolapse in children range from outpatient procedures to major abdominal operations, including colectomy. More invasive surgical options can be divided into perineal or abdominal approaches and broadly include resection, fixation or a combination of both[3].

Suture rectopexy can be performed laparoscopically or via a laparotomy. Suture rectopexy involves mobilization and fixation of the rectum with a nonabsorbable suture. The act of mobilization, sutures, and fibrosis keeps the rectum fixed to the presacral fascia due to formed adhesions[4].

Attaching the perirectal tissues to the presacral region via laparoscopic suture rectopexy ensures proper anatomical placement and tissue adhesion. Using sutures, mesh, talc, resection, or levatorplasty. Laparoscopic management of complete rectal prolapse is a safe, efficient procedure that improves functional result. The laparoscopic technique has several benefits, such as a quick restoration of intestinal function, a short hospital stay, better cosmetic outcomes, reduced morbidity, and a low recurrence rate[5].

The aim of this work was the assessment of effectiveness and safety of laparoscopic suture rectopexy for the treatment of complete rectal prolapse in children.

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PATIENTS AND METHODS:

This prospective study included 20 children with complete rectal prolapse who had laparoscopic suture rectopexy for the treatment of complete rectal prolapse in children at Menoufia University Hospital, Al Galaa Teaching Hospital, and Ministry of Health Hospitals during the period from January 2023 until January 2024.

Inclusion criteria: sex: both, patients with complete rectal prolapse, age: above 4 years, till 15 years, age: below 4 years if complicated and failed with conservative measures.

Exclusion criteria: patients with anorectal malformation (imperforate anus, Hirschsprung disease, etc.), patients below 4 years without complication, patients above 15 years, patients with a major disease, for example, diabetes mellitus, tuberculosis, and hepatitis, patients' parents who refuse to continue in this study and patients who lost follow-up.

Ethical consideration: the information collected from participants is private. Names of the study participants were disclosed and were not mentioned in study report or publication. The aim, design, and risk–benefit analysis of the research were presented to the participants prior to their admittance. Consent was acquired in an informed manner.

Methods

All patients were subjected to: complete history taking, physical examinations, and routine laboratory investigations.

Procedures of laparoscopic suture rectopexy

Patients were informed about the procedure, any possible side effects, and the possibility of conversion to open surgery. Before surgery, each patient had a warm saline enema twice (one the night before and one the morning before the procedure), as well as a single dosage of 50 mg/kg of cefotaxime and 7.5 mg/kg of metronidazole. After induction of endotracheal tube for general anesthesia. The patient was placed supine in the Trendelenburg position following the insertion of an appropriate Foley catheter to empty the bladder. Using an open technique, a 5 mm trocar was positioned above the umbilicus. Next, the pneumoperitoneum was created at a pressure of 8–12 mmHg, and a 5 mm 30^{o} scope was inserted via the umbilical port to see the pelvis and abdomen. Two stab incisions were done under direct vision for the insertion of two 3-mm accessory trocars (one at each lateral quadrant at or below the level of the umbilicus according to the child's age and body build). Laparoscopic exploration was initiated, and the rectosigmoid redundancy was assessed and manipulated from the pelvis using an atraumatic grasper. The peritoneum over the sacral promontory on the right side of the rectum was carefully incised using hook electrocautery or scissors to save the mesorectum, the ureter, and external iliac vessels from entering the retrorectal space with preservation of the lateral rectal ligament.

The right-side approach was chosen because it was easier to manipulate, provided clear visualization, and allowed for proper exposure of the retrorectal space. It also allowed for safe and quick dissection of an adequate plane between the posterior wall of the rectum and the pelvic floor, which is located 3-4 cm above the dentate line from the level of the sacral promontory. On the right side of the rectum, two seromuscular nonabsorbable 2/0 sutures were used to suspend the rectum to the presacral fascia of the sacral promontory. The abdomen was deflated, absorbable sutures (4/0) were used to seal the port sites.

Early oral intake was encouraged within a few hours postoperatively as most improved recovery programs advised. Patients were sent home around the second postoperative day, prescribed acetaminophen and/or NSAID for pain or discomfort, and instructed to maintain a high-fiber diet, plenty of fluids, and laxatives such as lactulose to prevent straining and constipation. The surgical duration, average duration of hospital stay, complications during and after the procedure, and any recurrence were recorded.

Follow-up

Every patient was followed up in the outpatient clinic, where they were checked in a sitting position 1 week after surgery for a clinical assessment of the degree of constipation, recurrence, and continence, then after 1, 3, and 6 months after operation, and then annually.

Statistical analysis

The statistical package for social sciences (Statistical analysis was done using IBM SPSS statistics for windows, Version 28.0. Armonk, NY: IBM Corp) was used to analyze the data. For qualitative variables, the data were reported as numbers and percentages, and for quantitative variables, as mean±SD. Level of significance: results that are not significant are indicated by a *P value* of more than 0.05. Significance is indicated by a *P value* less than 0.05.

RESULTS:

The number of male patients was 19 (95%), while the number of female patients was one (5%), the mean age was 6.1±2.8 years with range 2.5–12 years and the mean weight was 20.1±8.6 kg regarding demographic data (Table 1).

Regarding prolapse history, 11 (55%) patients had bleeding per rectum, four (20%) patients had pain, five (25%) patients had constipation, and two (10%) patients

had fecal soiling. The mean prolapse length (cm) was 9.35±1.56 with range 7–12 cm and all children had complete prolapse (100%) (Table 2).

Regarding laboratory investigation, the mean red blood cells (million/µl) was 4.57±0.6, the mean white blood cells (million/µl) was 6.16±1.83, the mean hemoglobin (g/dl) was 13.22±0.85, the mean platelet 103/ml was 217.85±73.58, the mean serum creatinine (mg/dl) was 0.58±0.17, the mean estimated glomerular filtration rate (ml/min) was 114.9±32.28, the mean blood urea nitrogen (mg/dl) was 12.31±3.98, the mean alanine aminotransferase (U/l) was 15.6±8.36, the mean aspartate aminotransferase (U/l) was 10.85±3.26, the mean was 10.85±3.26, the mean alkaline phosphatase (U/l was 569.4±156.7, the mean total albumin was 0.55±0.26, the mean international normalized ratio was 0.9±0.07, the mean activated partial thromboplastin time (s) was 34.5±5.14, the mean fibrinogen was 2.87±2.87 (Table 3).

The mean operative time in the first operation was 87.5±1.25 and ranged from 85 to 90 min, while the mean operative time in the last operation was 42.5±1.25 and ranged from 40 to 45 min (Table 4).

There were no patients who had experienced a recurrence of external rectal prolapse; all patients had smooth recovery postoperatively without complications or any recurrence during the postoperative follow-up period, and it was observed that all patients had experienced an improvement in their bowel function (Table 5).

Table 1: Demographic data distribution in the studied group

	Studied group (*N*=20)
Demographic data	*n* (%)
Sex	
Male	19 (95)
Female	1 (5)
Age (years)	
Mean±SD	6.1±2.8
Range (minimum–maximum)	2.5–12
Weight (kg)	
Mean±SD	20.1±8.6

Table 2: Prolapse history distribution in the studied group

	Studied group (*N*=20)
Prolapse history	*n* (%)
Associated symptoms	
Bleeding per rectum	11 (55)
Pain	4 (20)
Constipation	5 (25)
Fecal soiling	2 (10)
Prolapse length (cm)	
Mean±SD	9.35±1.56
Range (minimum–maximum)	7–12
Degree of prolapse	2.5–12
Complete prolapse	20 (100)

Table 3: Distribution laboratory investigation in the studied group

	Studied group (*N*=20)	
	Mean	SD
RBCs (million/µl)	4.57	0.6
WBCs (million/µl)	6.16	1.83
Hemoglobin (g/dl)	13.22	0.85
Platelet 10^3/ml	217.85	73.58
Serum creatinine (mg/dl)	0.58	0.17
eGFR (ml/min)	114.9	32.28
BUN (mg/dl)	12.31	3.98
ALT (U/l)	15.6	8.36
AST (U/l)	10.85	3.26
ALP (U/l)	569.4	156.7
Total albumin	0.55	0.26
INR	0.9	0.07
APTT (s)	34.5	5.14
Fibrinogen	2.87	0.21

ALP, alkaline phosphatase; ALT, alanine aminotransferase; APTT, activated partial thromboplastin time; AST, aspartate aminotransferase; BUN, blood urea nitrogen; eGFR, estimated glomerular filtration rate; INR, international normalized ratio; RBC, red blood cell; WBC, white blood cell.

Table 4: Operative time in the studied group

	Studied group (*N*=20)
Operative time in the first operation (min)	
Mean±SD	87.5±1.25
Range	85–90
Operative time in the last operation (min)	
Mean±SD	42.5±1.25
Range	40–45

Table 5: Postoperative follow-up in the studied group

	Studied group (*N*=20)
Elimination of the external prolapse	
Yes	20 (100)
No	0
Postoperative complication	
Yes	0
No	20 (100)

Improve bowel function according to associated history	
Yes	20 (100)
No	0
Recurrence	
Yes	0
No	20 (100)

DISCUSSION

Abdominal rectopexy is more effective than perineal procedures for controlling prolapse. It also provides the advantage of proper exposure not only to the rectum but also to other pelvic organs. Therefore, it is recommended to use abdominal rectopexy whenever possible. However, perineal procedures continue to be an acceptable option for a majority of elderly patients with multiple comorbidities who are unable to undergo major abdominal surgery[6]. The history of abdominal procedures has been full of twists and turns, and a lot of different surgical techniques have been described in the literature. All of these aim to solve the problem by reinstating the anatomy and regulating the function of the continence mechanism. However, some approaches have worsened the functional outcome. Particularly after posterior and resectional rectopexies, poor functional outcomes can be explained by nerve injuries, loss of rectal compliance, or constipation with a slow transit time[6]. Minimal invasive surgery is considered the standard treatment for rectal prolapse given its advantages, including less postoperative pain, earlier restoration of bladder and bowel function, faster recovery, lower incidence of adhesions and incisional hernia, and smaller scars. Moreover, laparoscopic rectal mobilization is believed to reduce blood loss when compared with traditional open-suture rectopexy[7]. Presacral rectopexy has become one of the successful approaches to the treatment of rectal prolapse. This technique has many modifications in addition to the use of different types of mesh. However, all involved mobilization and upward fixation of the rectum to the presacral fascia and was done by open or laparoscopic approach. Laparoscopy is gaining wide acceptance in the management of rectal prolapse in children. Laparoscopic rectopexy and sigmoidopexy by three-point fixation is a new concept for the management of complete persistent rectal prolapse[8]. One to two seromuscular 2/0 Ethibond sutures were used to suspend the rectum to the presacral fascia of the sacral promontory. Another suture was used percutaneously to fix the seromuscular wall of the sigmoid colon to the anterior abdominal wall 2 inches above and medial to the left anterior superior iliac spine suture with the knot buried under the skin[8]. The laparoscopic technique included a retrorectal dissection starting from the peritoneal reflection on the right side of the rectum, extending from the sacral promontory to the pelvic muscular floor in the rectosacral bloodless plain. In the absence of pelvic floor laxity, suture rectopexy to the sacral promontory and suture sigmoidopexy to the left lateral peritoneum were done without mesh. In cases with laxity and weakness of the pelvic floor and patients with neuropathic conditions (spina bifida and meningomyelocele), additional retrorectal Prolene mesh was applied, whereas laparoscopic rectosigmoidectomy was applied in cases with idiopathic rectal prolapse with chronic constipation. The mesh was tailored to fit the retrorectal space, where it was snuggly placed and fixed to the rectum by two to four Prolene stitches. Then, the mesh and the rectum were dragged up and fixed to the sacral promontory with the closure of the peritoneal defect. In five cases with rectosacral hernia, additional laparoscopic levatorplasty was done. Pelvic floor laxity was assessed by grasping the distal rectum, dragging it upward, and measuring the length (cm) of how much it could be dragged[9]. Laparoscopic full posterior rectal mobilization and fixation to the sacrum alone, without mesh or sigmoid resection, is the cornerstone for the success of those operations. It gives results close to those observed after more extensive operations and may be the major component of success. In addition, it has a high rate of success with low mortality and morbidity and has a lower risk of sepsis as well. The use of the harmonic scalpel and a laparoscopic suturing device for laparoscopic suture rectopexy shortened and simplified the operation and improved the outcome[10]. The rectosigmoid was grasped and mobilized after dividing the peritoneum circumferentially. Both the ureters were identified and safeguarded. The rectum was mobilized from the sacral promontory up to the lateral ligaments until the surface of the sacrum was clearly felt with an instrument. The rectum was then pulled up and fixed with the presacral fascia on either side with three to five seromuscular sutures of braided silk size 3/0 using intracorporeal knotting. The rectum was reperitonealized after ensuring a satisfactory fixation[11]. Laparoscopic colorectal resection with rectopexy is preferable in patients with a history of intractable constipation and prolonged total colonic transit time because it is unwise to the rectum by any means against chronic straining in those cases. Laparoscopic full posterior rectal mobilization and fixation to the sacrum alone has a high success rate, lower mortality and morbidity, and a lower risk of sepsis and recurrence[12]. Recurrence rates of prolapse after suture rectopexy are generally low. A recent systematic review and meta-analysis were conducted to assess the recurrence rates of rectal prolapse after suture rectopexy. A recurrence rate of 8.6% was recorded in 22 studies involving 976 patients who underwent suture rectopexy[13]. Laparoscopic rectopexy involves retrorectal dissection and fixation of the rectum to the sacrum, leading to fibrosis, which provides additional support. This

technique effectively decreases the recurrence rate of the prolapse without exerting excessive pressure on the bowel, which could potentially impede its movement and lead to postoperative constipation. Laparoscopic suture rectopexy is preferable to mesh fixation due to its simpler technique, shorter operation time, better cost-effectiveness, and there are no complications associated with the use of mesh, such as pelvic abscess and rectal kink over the edge of the mesh causing constipation[14].

The study's drawbacks included a small number of patients. However this could be related to the nature of the condition in children and the fact that a large number of patients resolve spontaneously, which is a disadvantage in most studies dealing with rectopexy. The other issue is the very short follow-up time. Longer follow-up studies could improve understanding of the laparoscopic suture rectopexy's success rate.

CONCLUSION

Laparoscopic suture rectopexy is a highly effective, safe, and reliable technique for the management of complete rectal prolapse, which is performed through a minimally invasive technique, avoiding injury of rectal autonomic nerve supply, lateral ligaments and pelvic floor muscle support with minimum morbidity and good functional outcomes in terms of elimination of rectal prolapse, low recurrence rate, and significant improvement in bowel functions.

CONFLICT OF INTEREST

None declared.

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