North Clin Istanb 2024;11(1):66–71
doi: 10.14744/nci.2023.25874

Original Article Pediatric Surgery

An innovative surgical treatment method in persistent rectal prolapse: Ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy

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ABSTRACT

OBJECTIVE: Herein, the results of the cases, who underwent surgical repair with or without ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy due to recurrent rectal prolapse, were discussed.

METHODS: The demographic characteristics, surgical technique, and results of children who were operated in the department of Pediatric Surgery for rectal prolapse between 2004 and 2022 were retrospectively analyzed.

RESULTS: In 18 years, six pediatric cases (2 females [33%] and 4 males [67%]) were operated for persistent rectal prolapse. The mean operative age of the patients was 7.5 years (2.1–17), and all had severe rectal prolapse. Some of these patients were followed up in other centers and their rectal prolapse continued despite diet changes, toilet behavior training, and the treatment of sclerosing agents. Rectal trimming was applied to one of the first two patients who were operated for anal atresia and recurrence did not occur. In the second case who underwent laparoscopic colon pull-through, Ekehorn rectopexy was performed alone and no recurrence was observed also in this case. Considering that rectosigmoid colon adhesions formed on the anterior abdominal wall due to colostomy opening-closing may provide ventral sigmoidopexy, it was decided to offer the option of applying both methods together. Three of the next four cases were diagnosed with cystic fibrosis. All four underwent ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy. Ekehorn's butterfly sutures were removed on 15th day and Foley catheters on 21st day. Three cases with cystic fibrosis were uneventful. However, a 14-year-old girl with a history of sexual abuse relapsed 6 months later.

CONCLUSION: Ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy is a successful and unique method in terms of providing intestinal fixation. It may be the primary option for definitive surgical treatment of persistent rectal prolapse.

Keywords: Child; Ekehorn's rectopexy; procidentia; rectal prolapse; surgical treatment; ventral abdomino-rectosigmoidopexy.

Cite this article as: *Cansaran S, Gul C, Ayvaz OD, Polat Y, Celayir A. An innovative surgical treatment method in persistent rectal prolapse: Ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy. North Clin Istanb 2024;11(1):66–71.*

Multiple possible surgical interventions are used for recurrent prolapse that does not respond to non-operative management [1, 2]. These interventions include local therapy (submucosal injections of sclerosing agents or anal cerclage) [3] and surgical repair (Ekehorn's rectopexy, laparoscopic suture rectopexy, and posterior sagittal rectopexy) [4, 5]. The choice of procedure is determined by multiple factors including the degree of prolapse, severity

Received: November 21, 2022 *Revised:* December 05, 2022 *Accepted:* January 29, 2023 *Online:* January 29, 2024

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of symptoms, associated disorders, underlying conditions, and the treating physician's area of expertise.

Classical treatment methods are not always successful in children with severe rectal prolapse. An innovative surgical treatment method is described in this study and the results of the patients who underwent ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy due to recurrent rectal prolapse despite the application of sclerosing agents in other centers were discussed.

Highlight key points

- Surgical treatment may be required in pediatric rectal prolapses unresponsive to medical treatment and conservative approaches.
- Different techniques have been described in the surgical treatment of rectal prolapse in children.
- Which surgical technique can be preferred is determined by the experience and preference of the surgeon, as well as the clinical condition of the patient.
- Ventral abdomino-rectosigmoidopexy via tube sigmoidostomy combined with Ekehorn's rectopexy is a unique method which may be the first choice for definitive surgery in children with recurrent rectal prolapse and also a good alternative to laparoscopic techniques because it is less invasive than classical open surgery.

MATERIALS AND METHODS

Patient Population

From 2004 to 2022, pediatric cases were retrospectively analyzed who underwent surgery due to rectal prolapse in a tertiary center. The study was approved by the clinical research ethics committee of Zeynep Kamil Maternity and Children's Diseases Training and Research Hospital with the number 08, on January 19, 2022. During hospitalization, consent for further clinical studies was obtained from parents. Collected data included patient demographics, surgical technique, and results of the children with rectal prolapse.

Inclusion and Exclusion Criteria

All patients who could be managed with a conservative approach (such as fiber diet, stool softeners, pancreatic enzyme supplement, and antiparasitic agents) and cured by elimination of predisposing factors (such as constipation, cystic fibrosis, and parasitic infection) were excluded from the study. In contrast, cases that did not respond to nonoperative methods and had persistent prolapse despite local interventions were included in the study.

Surgical Technique

The basic principle of this innovative technique is the fixation of the posterior wall of the rectum to the sacrum with Ekehorn's rectopexy, followed by fixation of the rectosigmoid colon to the anterior abdominal wall through a Foley catheter.

In the first step of the surgical procedure known as Ekehorn's rectopexy, with the patient in the right lateral position, the posterior rectal wall is sutured transanally to the sacrum with non-absorbable suture material (No. 0 or 1) with a large curved needle. At the beginning of the procedure, the rectal mucosa is pushed cranially with the index finger of the left hand to keep the rectum at its highest level. Then, the suture needle is passed at the level of the distal part of the sacrum, approximately 1–1.5 cm lateral to the midline and from the skin to the rectal mucosa. In the same way, but this time from the rectal mucosa towards the skin, the suture needle is brought out from the opposite side of the first entry site (equal distance from the midline). The threads are tightly tied by placing a small piece of gauze both under the "U" loop on the rectal mucosa and under the skin side suture. The key point here is to keep at least 2–2.5 cm distance between sutures at the same horizontal level, so that gauze can be placed comfortably in between (Fig. 1). Usually, a single suture is sufficient [5, 6]. For the second step of the operation, the patient is placed in the supine position. The sigmoid colon is found through a small 2–3 cm incision from the left lower quadrant near the inguinal region. At the level of the rectosigmoid junction, a No. 22 Foley catheter is advanced into the lumen of the colon and two fixation sutures are placed between the colon and the anterior abdominal wall (Fig. 2). The Foley catheter balloon is inflated to a maximum diameter of 1.5 cm in order not to narrow the intestinal lumen.

The sutures of Ekehorn's technique are removed together with the gauze pads on the 14th post-operative day. The Foley catheter is removed on the 21st post-operative day and the fistula covered with a tight dressing. The lateral sigmoid fistula caused by the catheter closes spontaneously within 1–2 months.

Statistics

Due to the small sample size, no analysis was performed with any statistical program in this study.

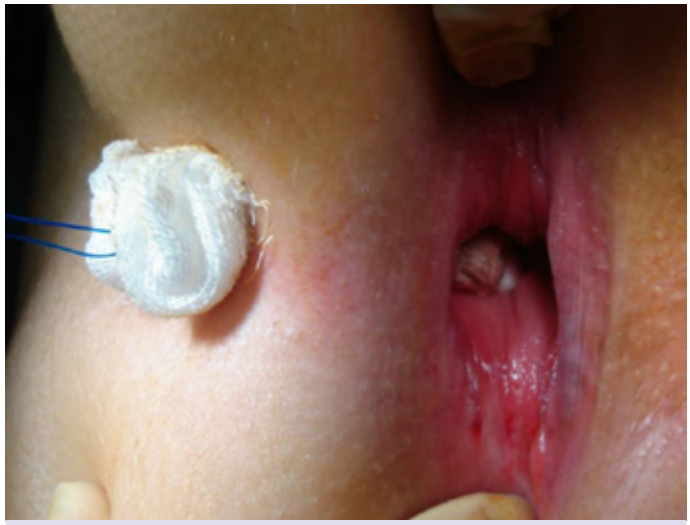

Figure 1. Tightly tied sutures after gauze is placed on the skin and rectal mucosa side.

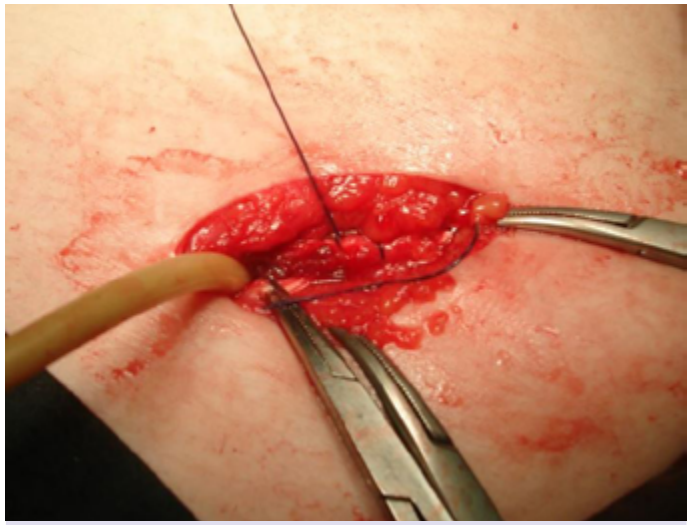

Figure 2. Left lower quadrant incision (2–3 cm) after tube sigmoidostomy.

Table 1. Demographic and surgical features of the patients

Patient no	Age (year) at diagnosis /operation	Sex	Additional pathology	Pre-surgical procedures	ER	Sig.	LOHS (day)	Duration of postop. follow-up (year)	Postop. complication	Recurrence
1	12.9/13.6	F	–	SA	+	+	7	0.5	–	+
2	3.1/4.3	M	CF	SA	+	+	9	11.8	ECF	–
3	4.2/5.4	M	CF	SA	+	+	2	4.8	–	–
4	16.9/17	F	CF+DM	SA	+	+	3	1	–	–
5	2/2.1	M	AA+RA (left)+VUR (right)	–	+	–	1	13.3	Sacral abscess+MP	–
6	2.3/2.4	M	AA	–	RT	RT	6	9.8	–	–

AA: Anal atresia; CF: Cystic fibrosis; DM: Diabetes mellitus; ECF: Enterocutaneous fistula; ER: Ekehorn's rectopexy; M: Male; MP: Mucosal prolapse; F: Female; LOHS: Length of hospital stay; RA: Renal agenesis; RT: Rectal trimming; SA: Sclerosing agent; VUR: Vesicoureteral reflux; Sig: Sigmoidostomy; Postop: Postoperative.

RESULTS

During the period of 18 years, six patients who met the inclusion criteria were operated for persistent rectal prolapse. Four of the six patients were male and two were female. The mean age at diagnosis and surgery were 6.9 (2–16.9) and 7.5 (2.1–17) years, respectively (Table 1).

Comorbidity was present in all cases except for one female patient. Two of the five cases had cystic fibrosis, one had cystic fibrosis with diabetes mellitus, and they were receiving medical treatment for these internal diseases. The remaining two had a colostomy in the neonatal period due to anal atresia, followed by a laparoscopic colon pull-through at 4 months of age in one, and a colon pull-through with sacroperineal approach at 13 months of age in the other (Patient No. 6). The patient who underwent laparoscopic pull-through also had left renal agenesis and Cohen ureteroneocystostomy was performed at the age of 1 due to vesicoureteral reflux on the right side (Table 1).

Among two patients followed up with anal atresia, Ekehorn rectopexy was performed alone at the age of 25 months in the patient who underwent laparoscopic pull-through, while only rectal trimming was performed

on the other at 29 months of age. No post-operative complication was observed in the patient who underwent rectal trimming. However, sacral abscess was seen in the other patient who underwent Ekehorn rectopexy alone, as early post-operative complication. The rectal abscess responded well to intravenous antibiotic therapy. In the same patient, mucosal prolapse that developed in the later period was treated with anoplasty. Abdomino-rectosigmoidopexy (with Foley catheter) combined with Ekehorn rectopexy technique was performed in the remaining four patients. All of these four patients had previously been treated locally with a sclerosing agent in an external center. Enterocutaneous fistula developing from the posterior wall of the rectum was treated with primary repair in one patient (Table 1).

The mean hospital stay was 4.7 (1–9) days in all patients. This value was calculated as 5.2 (2–9) days in 4 patients who underwent combined surgery and 3.5 (1–6) days in the other two patients. The lateral fistulas of the patients who underwent sigmoidostomy closed spontaneously within 1–2 months after the removal of the catheters. During the mean follow-up period of 6.9 (0.5–13.3) years, no recurrence was observed except for one patient. It was observed that a 14-year-old female patient who relapsed 6 months later had a history of sexual abuse that started approximately 2 years ago and continued. After this event, the patient did not come for further follow-up (Table 1).

DISCUSSION

The Ekehorn's technique is an old and simple operative technique for the treatment of rectal prolapse in children, first described by Ekehorn in 1909 [5, 6]. In Ekehorn rectopexy, at the level of the sacrococcygeal junction, a multifilament and non-absorbable suture material that is advanced by the skin to the rectal ampulla is pulled out in the opposite direction. After placing a piece of gauze under the suture on both the rectal mucosa and skin side, the threads are tightly tied. The suture material, which is left in place for about 2 weeks, allows the posterior wall of the rectum to adhere tightly to the perirectal tissue with local inflammation and thus provides rectopexy. No major morbidity related to the technique has been reported [6].

Sclerotherapy is the first choice method in children with recurrent and uncomplicated rectal prolapse. The treatment success rate is around 85%. Anal cerclage is not generally used in children [7, 8]. Surgical treatment is mostly used in patients who do not benefit from local therapy. Rectopexy, which can be performed with different techniques, is mostly preferred in complicated recurrent prolapses and has a 95% success rate [9]. In this study, there were four cases that relapsed after submucosal sclerosing agent injection. Ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy technique was preferred in these patients. In more severe cases, redundant sigmoid colon resection is among the treatment options [8].

The starting point of our combined treatment was the patient who had previously been operated for anal atresia in an external center. Laparoscopic pull-through was performed after a colostomy was created and his stoma was closed after definitive surgery. The successful outcome of this patient, for whom the Ekehorn's rectopexy was performed alone due to rectal prolapse, brought idea to mind that intestinal adhesions created by the stoma surgery may have provided sigmoidopexy. Thus, combined therapy was recommended in the other four patients and the unique method ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy was applied.

Possible post-operative complications after all fixation procedures include severe fecal obstruction, constipation, fecal soiling, urinary retention, enuresis, infection, residual mucosal prolapse, discomfort at defecation, and recurrence. It has been reported that mental retardation and behavioral disorders increase the risk of postoperative fecal obstruction and constipation. After rectal prolapse surgery, readmission is required in approximately 41% and reoperation, endoscopy, or other surgical procedure in 33% [10]. In this study, post-operative complications were observed in two of the patients. One of them was a male patient who underwent laparoscopic pull-through due to anal atresia in an external center and whom the Ekehorn's rectopexy was performed alone when he was 2 years old. After surgery, the mucosal prolapse that developed in the patient was treated with simple anoplasty. The second was the patient who developed enterocutaneous fistula in the sacrococcygeal region in the early postoperative period. Primary fistula repair was performed in this patient who also had cystic fibrosis and whom the combined method was performed initially at the age of 4 years. Complication rates (33%) in the study were similar to the literature.

Although new surgical techniques and instruments with better results have emerged with technological de-

velopments, the benefits of the combined treatment applied to the patients in this study cannot be ignored. This approach may be an appropriate surgical treatment option for rectal prolapse, especially in young children, due to its good cosmetic results and ease of application. In addition, since antegrade enema can be performed from tube sigmoidostomy, it can provide comfort to patients in the early post-operative period in terms of preventing constipation. Ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy procedure can be considered an appropriate surgical treatment method for patients who do not respond to repeated injections of sclerosing agents and who have recurrent prolapse after other surgical treatments.

This study has some limitations, the first of which is the small sample size of the study. This may be related to the fact that the center where the study was conducted was not a multidisciplinary center and therefore, the number of cases was limited. The small sample size of the study creates difficulties in terms of making biostatistical measurements. The fact that non-operated patients were not included in the study may also create a limitation. Although the sample is small, important conclusions can still be drawn. Therefore, a study including patients treated with non-surgical methods can make a scientific difference and more meaningful results can be obtained. Furthermore, further studies are required to assess the efficacy of this technique. It should also be kept in mind that the technique can be performed by laparoscopy-assisted or rectoscopy without abdominal incision.

The combined therapy in this study can show better results with appropriate patient selection. Compared to classical open surgery, it is certain that the pexy procedure performed with an abdominal mini-incision is a good alternative, especially for elderly or frail pediatric patients who cannot tolerate major procedures. This also applies to patients with cardiovascular problems who cannot tolerate laparoscopic interventions. Abdominal wall fixation of rectosigmoid colon from a 2 tp3 cm skin incision has the advantages of less pain, shorter hospital stay, early recovery, and early return to school or work as compared with classical laparotomy. This argument is also supported by some studies, and the mean hospital stay for the laparoscopy group in one article was reported as 3.5 days [11, 12]. In this study, the mean hospital stay of 5.2 days in patients treated with the combined therapy may lead to the result that this technique not too far from laparoscopic methods.

Conclusion

Ventral abdomino-rectosigmoidopexy through tube sigmoidostomy combined with Ekehorn's rectopexy is a unique method that provides effective fixation of the rectum and sigmoid colon, and its results in the treatment of rectal prolapse are satisfactory. In appropriate indications, this combined technique may be the first choice for definitive surgery in children with recurrent rectal prolapse. It can be also a good alternative to laparoscopic techniques because it is less invasive than classical open surgery.

Ethics Committee Approval: The Zeynep Kamil Maternity and Children's Diseases Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 19.01.2022, number: 08).

Authorship Contributions: Concept – AC, SC, CG, ODA, YP; Design – SC, AC; Supervision – AC, SC; Materials – AC, SC, CG, ODA, YP; Data collection and/or processing – AC, SC, CG, ODA, YP; Analysis and/or interpretation – SC; Literature review – SC, AC; Writing – SC, AC; Critical review – AC, SC, CG, ODA, YP.

Conflict of Interest: No conflict of interest was declared by the authors.

Use of AI for Writing Assistance: Not declared.

Financial Disclosure: The authors declared that this study has received no financial support.

Peer-review: Externally peer-reviewed.

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