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RESEARCH

Laparoscopic ileopexy for afferent loop syndrome after restorative proctocolectomy—a retrospective case series

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Abstract

Background To study the effect of laparoscopic ileopexy in patients with afferent-loop syndrome (ALS) after restorative proctocolectomy (RP).

Method Ileopexy has been the treatment of choice in patients with ALS for the last 5 years at our department. All patients who had undergone ileopexy for ALS between January 2019 and August 2023 were identified. Data were extracted from the medical records. All patients were contacted and asked standardized questions regarding symptoms of ALS. A symptom score was calculated and compared before surgery and at the last follow-up.

Results Ten patients, who had undergone ileopexy for ALS, were identified. Eight of these (80%) had been admitted with small bowel obstruction due to ALS. The remaining 2 patients had other symptoms indicative of ALS. In all patients, ileopexy was immediately effective in reducing symptoms. Symptoms recurred after 16.5 weeks (2–80) in 8 patients. Repeat laparoscopy showed that the ileopexy had slipped in 6 of these. Six had a new ileopexy with mesh. Later, one of these developed recurrent symptoms and had a new mesh ileopexy performed. No mesh complications were seen. Symptom score was reduced from 6.5 (1–9) to 2 (0–7) ($p = 0.02$) at the last follow-up.

Conclusions In this study, ileopexy is effective in reducing symptoms of ALS after RP. In a high proportion of patients, it is necessary to use mesh to ensure long-term fixation of the ileum.

Keywords Afferent loop syndrome · Ileopexy · Small bowel obstruction · Restorative proctocolectomy · Laparoscopic ileopexy

Introduction

Restorative proctocolectomy (RP) with ileal pouch-anal anastomosis (IPAA) is a well-established surgical treatment for patients with ulcerative colitis and familial adenomatous polyposis (FAP) [1]. The RP aims to remove the colon and rectum while maintaining as normal physiological function as possible. After RP, several structural, functional, or inflammatory disorders or complications can occur [2]. Afferent loop syndrome (ALS) is a cause of small bowel obstruction (SBO) in RP patients and should be suspected in patients with recurrent obstruction after RP [1]. Khan et al. define ALS as small bowel obstruction caused by acute angulation, intussusception, or prolapse of the afferent limb at the junction of the pouch and the absence of intrinsic strictures. Kirat et al. find an incidence of ALS of 1.9% after RP [1].

Most commonly, ALS is associated with a redundant loop of the bowel or an elongated mesentery [2].

The symptoms of ALS are recurrent intermittent abdominal pain, bloating, nausea or vomiting, dyschezia, or no passage of gas or stools [1, 3]. There is no consensus on the exact means of diagnosing ALS. Contrast small bowel enemas have been used in several cases and show narrowing of the small bowel oral to the pouch [1, 4]. Endoscopy of the pouch is often described with difficulty in intubating the afferent limb, due to sharp angulation, but this is not consistent and in other cases, these difficulties are not described [1, 5, 6]. Computed tomography (CT) scans are reported to show twisting of the afferent limb, while other

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studies report signs of SBO without precise identification of the mechanism [4, 5].

Previous studies are mainly anecdotal and present different methods for treating ALS. Only one case report describes the successful use of laparoscopic ileopexy.

This study aims to present a single-center experience with laparoscopic ileopexy in the management of patients with symptoms of afferent loop syndrome after RP.

Methods

Patient identification

All patients, who have undergone laparoscopic ileopexy at an IBD Tertiary Referral Center, were identified by reviewing the list of all surgical procedures performed between January 1, 2019, and August 31, 2023. All patients over the age of 18, who underwent laparoscopic ileopexy at Aarhus University Hospital due to afferent loop syndrome after RP, were included. The criteria for diagnosing afferent loop syndrome were CT scans, endoscopy of the pouch, laparoscopy, and small bowel follow-through. All patients had an endoscopy of the pouch and the afferent ileal loop prior to laparoscopic ileopexy.

Data extraction

Permission to obtain information from the medical records was given and approved by local hospital authorities. Once the patients were identified, data was extracted from the medical records, according to a predefined form with all the relevant information, including symptoms prior to surgery. The last follow-up was a telephone interview, focusing on possible symptoms of afferent loop syndrome since the last ileopexy.

Conversions of symptom frequency to symptom score

To make a better comparison of symptoms of afferent loop syndrome prior to ileopexy and at the last follow-up, a symptom score was developed. We converted the frequency of the listed symptoms, to a numerical value (Table 1). The score is a non-validated, pragmatic attempt to convert symptoms to a score reflecting the severity of symptoms, such that daily symptoms score 2, while episodic symptoms score 1. Bowel obstruction gives the highest score of 3 because bowel obstruction is the ultimate sign and most severe symptom of ALS.

Table 1 Afferent loop syndrome symptom score

		Score
Colicky pain	Episodic	1
	Daily	2
	No	0
	Unknown	0
Constant pain	Episodic	1
	Daily	2
	No	0
Bloating	During episodes of pain	1
	No	0
	Unknown	0
Vomiting	During episodes of pain	1
	No	0
	Unknown	0
Stop in pouch function	During episodes of pain	1
	No	0
	Unknown	0
Admissions with bowel obstruction	Yes	3
	No	0
	Maximal total score	10

Operative technique

A diagnostic laparoscopy was made initially. Three 5/12-mm ports were inserted on the left side of the abdomen. If no overt cause for bowel obstruction close to the pouch inlet was identified, and it seemed likely based on preoperative symptoms and investigations that the patient was suffering from afferent loop syndrome, an ileopexy was created. First, the peritoneum was incised over a 6–7 cm long part of the lower abdominal wall on the right side approximately at the level of the iliac crest. The terminal ileum was identified, and a pexy was made with non-absorbable suture (V-Loc, Ti-Cron, or Nylon 2–0) over a 5 to 6-cm long segment of the ileum, approximately 15–20 cm above the inlet into the pouch. In patients with recurrent symptoms, where a repeat laparoscopy showed that the pexy had slipped, a 3 × 6–7 cm large polypropylene mesh was fixed to the abdominal wall at the same location as the previous ileopexy. The peritoneum covering the area was excised before fixation. The fixation of the mesh was achieved with non-absorbable suture or fixation tacs. Next step was to fix the same segment of the ileum to the mesh using a running, non-absorbable suture.

Statistical considerations

Results of the symptom scores were compared by using a paired Wilcoxon test and calculated using GraphPad

Prism. Continuous variables are reported as medians with range. Categorical data are reported as percentages in frequency tables.

This manuscript adheres to the STROBE guidelines where it is applicable [7]. The STROBE checklist is found under supplementary material.

Results

Patient characteristics

We identified 10 patients with a J-pouch, who have undergone laparoscopic ileopexy. The demographics of the patients undergoing ileopexy are shown in Table 2. Most patients (70%) were female and the median age at the time of the establishment of ileoanal J-pouch was 33.4 years (14–56). Nine patients had colectomy due to ulcerative colitis, and one patient had undergone RP due to Hirschprung's disease. At the time of the establishment of J-pouch, the median BMI was 19.9 (17.2–28.4). The operative approach is shown in Table 2. Only 1 patient did not get a temporary ileostomy after the establishment of a J-pouch. Four patients (40%) had post-operative complications after J-pouch surgery. One patient had compartment syndrome in the lower extremity; two patients had high outputs from the ileostomy causing dehydration and needing further admission to treat this. The last patient required revision of the stoma and excision of a small section of the small bowel due to stenosis.

Symptoms of afferent loop syndrome

The first symptoms suggesting the presence of afferent loop syndrome were reported after a median of 30 months (10–70) after RP. Table 3 summarizes the reported symptoms of afferent loop syndrome before and after laparoscopic ileopexy. Prior to laparoscopic ileopexy, 80% were admitted to the hospital with bowel obstruction, and the median number of admissions was 2 (0–5). Median time to the first admission with small bowel obstruction was 51 months (27–87).

Table 2 Demographics of patients undergoing ileopexy for afferent loop syndrome

	Total number (%)
Number of patients	$N = 10$ (100%)
Female	70%
Age at restorative proctocolectomy (median years, range)	33.4 years (33.6–41.9)
BMI at restorative proctocolectomy (median BMI, range)	19.9 (17.2–28.4)
Technique used	
Open	30%
Laparoscopy	10%
Robot-assisted	20%
TAMIS	40%
Temporary ileostomy	90%
Post-operative complications	40%

Abbreviations: *TAMIS* transanal minimally invasive surgery

Preoperative investigations

Nine patients had an abdominal CT scan before ileopexy. The CT scans showed signs of small bowel obstruction or dilatation, and several of the patients had signs of twisting of the ileum and mesentery oral to the pouch, with a whirlpool sign. One patient had both a CT scan and endoscopy of the pouch without pathologic findings, and yet the patient was operated on based on symptomatology being consistent with afferent loop syndrome. One patient had an acute laparotomy due to a small bowel obstruction, and the laparotomy showed a twisting of the afferent limb.

First laparoscopic ileopexy and recurrence of symptoms

Median age at the time of the first laparoscopic ileopexy was 38.0 years (31–64). Median time from RP to first laparoscopic ileopexy was 85.7 months (35–225). Median duration of surgery was 44 min (31–96). No patients suffered post-operative complications.

After the first ileopexy, 80% developed symptoms of afferent loop syndrome again. Symptoms varied from colicky pain, bloating, and decreased production in the pouch to admissions to the hospital with a recurrence of small bowel obstruction. Return of symptoms appeared at a median time of 16.5 weeks (2–80) after the first laparoscopic ileopexy.

Second ileopexy

Eight patients had a renewed laparoscopy due to symptom recurrence, and in 6 of these, laparoscopy revealed that the pexy had slipped. In the remaining 2 patients, the pexy was found to be in situ. One of the patients with a slipped ileopexy had a narrow adhesive band from the site of the pexy to the small bowel, presumably causing small bowel obstruction. The band was divided, but the patient continued to have episodes of small bowel obstruction verified by CT scans. He has just undergone a mesh ileopexy.

Six patients with a slipped ileopexy all eventually had a new ileopexy performed. For the second laparoscopic ileopexy, the median duration of surgery was 55 min (37–95). Five of the patients had mesh inserted, while the last had a repeat suture pexy. No postoperative complications were reported. Recurrence of symptoms was reported

Table 3 Symptoms reported by patients

		Prior to laparoscopic ileopexy	At last follow-up
Colicky pain	Episodic	80%	50%
	Daily	10%	20%
	No	0%	30%
	Unknown	10%	0%
Constant pain	Episodic	50%	30%
	Daily	10%	10%
	No	40%	60%
Bloating	During episodes of pain	70%	40%
	No	0%	60%
	Unknown	30%	0%
Vomiting	During episodes of pain	50%	10%
	No	20%	90%
	Unknown	30%	0%
Stop in pouch function	During episodes of pain	70%	20%
	No	20%	80%
	Unknown	10%	0%
Admission with bowel obstruction	Yes	80%	20%
	No	20%	80%
	Median number of admissions with bowel obstruction (median, range)	2 (0–5)	0

in two patients after the second ileopexy. One patient had a minor episode of small bowel obstruction, which resolved with conservative therapy. The other patient had a total of 5 ileopexies of which three were done with a mesh. After the last pexy, he stopped having symptoms of intermittent obstruction. He developed severe diarrhea after a cholecystectomy, but he recovered after treatment with ciprofloxacine.

Symptom score comparison

Table 4 summarizes the symptom scores and the change in score from before the first ileopexy to the last telephone follow-up. Median follow-up time was 37.6 (11.5 - 59.8) months from the first laparoscopic ileopexy to the last follow-up. Median score before the first ileopexy was 6.5 (1–9), while the median score at the last follow-up was 2 (0–7) ($p = 0.02$).

Table 4 Symptom score prior to ileopexy and at last follow-up

Patient	Before ileopexy	At last follow-up
1	8	1
2	8	3
3	8	4
4	1	0
5	7	1
6	5	5
7	2	6
8	6	0
9	6	0
10	9	7
Median	6.5	2

Discussion

In our study, 80% of patients with ALS were admitted, once or more, to the hospital with small bowel obstruction due to ALS. SBO was diagnosed predominantly by CT scans. Some showed signs of twisting of the afferent limb and whirlpool sign consistent with ALS, while others were less specific. This is in line with findings from previous studies [4, 5]. We found that symptoms of ALS are colicky abdominal pain, constant abdominal pain, bloating, vomiting, and the lack or absence of gas or stool, which matches findings in previous studies of ALS [1, 3]. The combination of relevant symptoms and signs of ALS and SBO on CT scans lead to the diagnosis of ALS in 9 of our patients, while one underwent surgery solely due to relevant symptomatology.

Existing literature on the treatment of ALS is sparse and mostly consists of case reports and small studies. Older studies describe the treatment of ALS with laparotomy and bypassing the obstruction with a side-to-side anastomosis

in 5 of 6 patients with ALS, while another study suggests trying endoscopic balloon dilatation of the afferent limb before surgery [1, 8]. In more recent years, case reports describe treatment of ALS with ileopexy. Ogawa et al. describe 3 cases of ALS successfully treated with laparotomy and strictureplasty of the small bowel at the pouch inlet combined with ileopexy of the small bowel oral to the pouch [4]. Notably, Okita et al. conclude that laparotomy with ileopexy of the small intestine oral to the pouch is sufficient, and strictureplasty is not necessary, and Matsuda et al. describe one case of ALS treated successfully with ileopexy [3, 5]. To our knowledge, only one case report describing laparoscopic ileopexy exists. The patient had previously undergone laparotomy and ileopexy due to ALS but had recurrent symptoms. A laparoscopic ileopexy was successfully performed, with no relapse of symptoms. Hence, it was suggested that laparoscopic ileopexy should be the standard treatment for ALS caused by acute angulation [9].

Consistent with previous studies, we found that ileopexy can help eliminate symptoms of ALS after RP [3, 5, 9]. We found a significant reduction in the symptom score after laparoscopic ileopexy and, perhaps more noteworthy, a reduction in hospital admittance due to small bowel obstruction, as only 20% had been readmitted at the last follow-up. While surgery was initially successful in treating ALS, our study found that 80% of patients had recurrence of ALS symptoms at a median of 16.5 weeks after the first ileopexy and needed additional surgery. Recurrence of symptoms coincided with the finding of slipped pexies in 6 out of 8 patients. While the pexy and thereby fixation of the small intestine did relieve symptoms initially, our study findings suggest that suture pexies are not stable enough to relieve ALS permanently in all cases. Itabashi et al. describe a case of volvulus of the afferent limb, where suture pexy of the afferent limb was applied but symptoms reappeared after 2 months and renewed laparoscopy revealed no adhesion of the afferent limb to the pelvic wall [6]. Contrary to this, Okita et al. describe that only 1 in 4 patients had a recurrence of symptoms and needed additional surgery. Repeat surgery revealed the pexy had partly slipped [3].

In the past, suture pexy has been used to treat other conditions. Cecopexy has been used for preventing recurrent cecal volvulus. However, various studies found recurrence rates up to 20–30%, and the practice of cecopexy without resection is therefore not recommended anymore [10–13]. Suture pexy is also known for the treatment of rectal prolapse. Here, the posterior sutured rectopexy or the ventral mesh rectopexy can be used. In a Danish study from 2019, these two laparoscopic procedures were investigated, and after 6 years, a recurrence rate of 23% and 8% were seen, respectively. This is in line with our findings of a high recurrence rate after suture only pexy [14].

The 6 patients with a slipped pexy were offered additional ileopexy with mesh implantation. Most patients experienced a marked improvement in symptoms, and only 1 patient needed additional surgical treatment, with replacement of the mesh. After the last surgery, he stopped having symptoms of intermittent obstruction. This indicates that implanting a mesh makes ileopexy more efficient and may prevent the need for additional surgery. The mesh promotes adhesion of the small bowel to the wall of the abdomen and ensures long-term fixation of the afferent limb, which is the aim of the procedure.

The use of an intraabdominal mesh is not entirely without concerns. The aforementioned adhesive abilities of a mesh can lead to a number of complications. In a review on intraperitoneal onlay mesh repair (IPOM) for ventral hernia, Soare et al. describe SBO due to adhesions to the mesh in 1.1–3.7% of cases, while another study reports 17% of patients needing surgery within 1 year after IPOM due to adhesion between the intestine and mesh, causing obstructive issues [15, 16]. Other known complications affecting the viscera are infection, which can lead to abscesses and enterocutaneous fistula, or mesh migration [15, 17]. While the incidence rates might not be towering, mesh complications that warrant further surgery are often dreaded due to their complexity and difficult management [17].

The decision to implant a mesh for the treatment of ALS should take the advantages and disadvantages into account. When performing a mesh ileopexy, the adhesive properties of the mesh are desired, as it ensures proper fixation and seems to prevent the recurrence of ALS. We attached the small bowel to the mesh intentionally, and therefore, no mesh was left without coverage thereby preventing other inadvertent adhesions toward the mesh. As no mesh complications or additional postoperative complications are found in our study, and the mesh evidently leads to symptom reduction, it seems that the risks associated with mesh implantation are proportionate to the benefits. It also should be taken into consideration that the final alternative for ALS patients in cases where suture pexy slips could be pouch excision or permanent ileostomy. Accordingly, we recommend mesh pexy as the primary procedure in the treatment of ALS.

This study has some inherent shortcomings. Firstly, it is a small study with only 10 patients. The small sample size can produce less reliable results, as some of the findings may be coincidental. The symptom score is not based on any existing score or diagnostic criteria and is only applied to a small number of patients. Therefore, the system cannot be validated. Furthermore, it is based on frequency, such that more frequent symptoms lead to a higher score. It does not take the severity of the individual symptoms into account, and the comparison of the experienced severity across the different symptoms is therefore not possible.

The study is conducted as a retrospective study. Ideally, a randomized control trial, comparing suture pexy with mesh pexy, would be desirable to obtain strong scientific evidence. As the frequency of ALS that warrants surgery is low, this would probably necessitate a multi-center study with an inclusion period of several years.

To conclude, laparoscopic ileopexy is a safe and effective procedure to reduce symptoms of ALS and prevent small bowel obstruction after RP. In a high number of patients, we found it necessary to use a mesh to ensure long-term fixation of the ileum.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s00384-024-04758-w.

Author contribution All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by SHA, AT, and SH. The first draft of the manuscript was written by SHA, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval Study approval was waived by the local committee Aarhus University Hospital. In view of the retrospective nature of the study, all the procedures being performed were part of routine care. Permission to access medical journals was granted by local hospital authorities on October 10, 2023.

Conflict of interest The authors declare no competing interests.

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