

Evangelos Menenakos
Dieter Hahnloser
Konstantinos Nassiopoulos
Christian Chanson
Victoria Sinclair
Panayiotis Petropoulos

Laparoscopic surgery for fistulas that complicate diverticular disease

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E. Menenakos · D. Hahnloser
K. Nassiopoulos · C. Chanson
V. Sinclair · P. Petropoulos
Department of General Surgery,
Hôpital Cantonal de Fribourg,
Fribourg, Switzerland

E. Menenakos (✉)
Kithnou 10 Glifada,
16674 Athens, Greece
e-mail: evmenenakos@hotmail.com
Tel.: +30-1-08949659

Abstract *Background:* Diverticular disease is complicated by colovesical and colovaginal fistulas in 4–20% of patients. Laparoscopic surgery is usually reserved for selected cases of uncomplicated disease. The aim of this study was to assess the efficacy and effectiveness of laparoscopic surgery in the treatment of those patients.

Methods: Eighteen patients, 15 with colovesical fistulas and three with colovaginal fistulas, were operated on laparoscopically. Prospectively collected data, associated with technical feasibility, short-term outcome and effectiveness, were analysed.

Results: Twelve sigmoidectomies, four extended left colectomies and two segmentectomies were performed. Fistulas were treated with simple dissection or mechanical division, and the bladder wall was repaired in two patients. Mean operating

time was 237 min (range 165–330). There was one conversion (5.5%) and no post-operative death. Morbidity was 27.7% and included one major complication. Return of gastrointestinal function occurred 2.9 days post-operatively, and the mean hospital stay was 10 days after surgery. During the 5.1-year follow-up period there was one fistula recurrence (5.5%) and no recurrent diverticulitis. *Conclusions:* Laparoscopic one-stage surgery was technically feasible and safe, with low morbidity. Effectiveness appears favourable when compared with open surgery, but prospective randomized studies are necessary to support such a conclusion.

Keywords Laparoscopy · Diverticulitis · Colovesical fistulas · Colovaginal fistulas

Introduction

Historically, fistulas that complicated diverticular disease were treated with a preliminary colostomy, resection and final colostomy closure in a three-stage operation. In 1950, Charles W. Mayo already considered the one-stage resection as an emerging standard, and the adoption of a primary anastomosis approach in the present day seems to verify his hypothesis [1, 2, 3].

The issue of bladder treatment remains controversial. Some authors propose excision of diseased bladder tissue, while others simply rely on routine decompression with no other particular treatment [4, 5].

Laparoscopic surgery for complicated diverticular disease, including fistulas, has not yet been accepted as the treatment of choice and is usually reserved for elective cases [6, 7]. Internal fistulas that complicate diverticulitis are usually associated with high conversion rate and post-operative morbidity [8, 9].

Reports on laparoscopic treatment of patients with fistulas appear sporadically in the literature [10, 11, 12, 13, 14, 15]. The authors prospectively evaluated 18 patients with colonic fistulas (15 colovesical, three colovaginal) due to diverticular disease. Data collected concerned operative efficacy and effectiveness of a one-stage laparoscopic approach to their treatment.

Table 1 Laparoscopic operations performed for colovesical and colovaginal fistulas. The extent of dissection is assessed by pathology study

Colonic excision operation	No. of patients	Length of specimen after fixation (cm) ^a
Laparoscopic sigmoidectomy	11	18.2
Laparoscopic segmental colectomy	2	13.5
Laparoscopic extended left colectomy	4	31
Laparoscopic sigmoidectomy, left ovariectomy	1	17.5

^a Fixation specimen reduction: 25–30%

Table 2 Dissection of the fistula and closure of the bladder or vaginal defect

Simple dissection ^a	8
Suture placement	2
Stapling device	6
Resection of the vesical wall and two-layer closure of the defect	2

^a Includes the three patients with colovaginal fistulas

Patients and methods

Between October 1993 and June 2002 a consecutive series of 650 laparoscopic colectomies was performed by a single surgical group, 410 of them for diverticular disease and 220 for colon cancer. Among them, 19 patients with mean age 68.1, 12 men, presented with colonic fistulas (4.6%) due to diverticular disease. There were 15 colovesical and three colovaginal fistulas. A patient with a colo-cutaneous fistula was excluded because of inadequate long-term follow-up. The fistula was demonstrated in all patients by cystoscopy, barium enema and/or computed tomography. An elective laparoscopic procedure after standard bowel preparation and chemoprophylaxis was performed on all patients

Operating technique

After pneumoperitoneum establishment and trocar placement the colonic segment involved was identified. Any omentum and small bowel to the pelvis was dissected free. The colon was separated from the bladder by dissection of the adhesions and the inflammatory tissue around the fistulous track. In ten patients this resulted in a "pinching off of the sigmoid" from the bladder or the vagina, occasionally leaving a visible defect. In six patients the fistula length and diameter necessitated the use of a suturing device. The vaginal defect was left open. In two patients excision of the bladder wall was performed and the defect closed with two-layer interrupted sutures. In four patients removal of the affected segment necessitated an extended left colectomy to be performed. In those cases the proximal resection line reached the level of the right branch of the middle colic artery that was preserved. The omentum was divided from the transverse colon from right to left. The dissection of the splenic flexure was obtained by left-to-right division of the insertion of the transverse mesocolon proximal to the pancreatic tail and the division of the splenic ligaments. None of these patients required mobilization of the hepatic flexure. In all patients the laparoscopic colectomy included the rectosigmoidal junction. An intracorporeal anastomosis was performed by use of a circular stapler device with a diameter of at least 28 mm. A silicone drain was always placed close to the anastomosis.

The specific types of colonic resection and fistula dissection techniques are presented in Tables 1 and 2, respectively.

Table 3 Histopathology results and number of specimens

Histopathology	No. of specimens
Diverticulitis with peri-colic abscess formation (signs of perforation and localized peritonitis)	8
Chronic diverticulitis	9
Diverticulosis with chronic peri-diverticulitis	1
Histological evidence of fistulous track	5
Non-specific, non-malignant bladder-wall alterations	2

A supra-pubic catheter was left in place for 7–14 days (mean 9 days) post-operatively.

All patients were followed-up by both the referring physician and the surgical team every 6 months. At each visit a direct clinical examination was performed, which documented specifically the presence of hernia or stenosis. A detailed history on bowel function was obtained. The decision to perform further radiological or interventional examination was based on individualized clinical evidence. In those cases where fistula dissection was performed with a mechanical device, there was a high index of suspicion against the possible lithogenicity of the metallic clips in the bladder. Accordingly, one patient underwent cystoscopy to assess his post-operative symptoms. Only patients with a minimum of 6-months' follow-up were included in the current analysis.

Results

There were no significant anaesthetic complications or deaths from surgery. No intra-operative complication occurred, and operation was successfully completed in 17 patients. There was one conversion to laparoscopically assisted surgery in a patient with extensive adhesions and a 5-cm-diameter left ovarian cyst. One patient was conventionally re-operated upon on the third post-operative day, due to anastomotic leakage, presenting, thereafter, an uneventful course. The other complications included gastroparesis that necessitated gastric tube decompression, a simple abdominal wall haematoma that resolved spontaneously, and minor blood loss through the drain, which did not require any intervention. One patient presented an episode of gout–arthritis during an otherwise uncomplicated post-operative course. There was one recurrence, 3 months after the operation, in a

Table 4 Main outcome measures

Parameter	Outcome	
Duration of operation (min)	165–330	237 (mean)
Conversion	One (to laparoscopically assisted surgery)	5.5%
Mortality	0	0%
Post-operative morbidity	5	27.7%
Re-alimentation—liquid (post-operative days)	1–4	2 (mean)
Re-alimentation—solid (post-operative days)	2–5	3 (mean)
Passage of flatus (post-operative days)	2–4	2.9 (mean)
Hospitalization (post-operatively)	5–14	10 (mean)
Follow-up period (months)	8–99	61.7 (mean)
Recurrent diverticulitis	0	0%
Fistula recurrence	1	5.5%
Incisional hernia	0	0%
Anastomotic stenosis	0	0%

woman with a colovaginal fistula. The patient was re-operated on by a laparoscopically assisted approach and presented an uncomplicated course during the 21-month follow-up period. A patient presented with non-specific symptoms of dysuria 2 years after the operation. Cystoscopy results were negative, and the patient's course remains uneventful. None of the patients complained of constipation or diarrhoea, and there were no excisional hernias during the follow-up period.

Pathology results and main outcome measures are presented in Tables 3 and 4.

Discussion and conclusion

There was one conversion to laparoscopically assisted operation. The presence of a fistula has been associated with a high conversion rate. Nystrom and Kald do not advise laparoscopy for those patients [9], while, according to the results of a consensus development conference, laparoscopy is not to be considered as first choice treatment for fistulas [8]. Most authors associate the high conversion rate to the presence of dense adhesions, as well as to early experience [9, 13, 15]. However, in several series, conversion is limited to acceptable rates [12, 16], while Franklin et al. report successfully completed operations on six patients [11]. It seems that experience-acquired technical skills elevate the threshold to convert to open surgery.

The mean operating time was 237 min, which is comparable with that reported by others [12, 13, 15]. Several authors report a prolonged operation time for laparoscopy when compared with open surgery [17]. Other studies fail to demonstrate any statistical difference between laparoscopy and open surgery in terms of operation time [13, 18]. In this study operating time related to fistulas demonstrated a rather constant pattern during the 9-year study period. It is probable that the duration of the laparoscopic approach relates more to technical difficulties

arising from the primary disorder than to laparoscopy [13].

There were five patients with post-operative complications, including an anastomotic leak, but no specific laparoscopy-related complications. The overall results seem to be in accordance with the literature and comparable with those reported for open surgery in terms of post-operative complications. Liberman et al., for example, report 14% morbidity in a study group that included five patients with internal fistulas, which presents no statistical difference with the conventional laparotomy group [18]. In a comparative study between complication rates for laparotomy or laparoscopy for Hinchey IIa or IIb patients, no statistical differences were observed [13]. In another series of five Hinchey IIb patients, one case of urinary tract infection was reported [12].

Our data demonstrate early return of bowel function, as indicated by passage of flatus and re-alimentation as well as short hospital stay. It should be stressed that a patient's stay was prolonged only due to the presence of a supra-pubic catheter that was removed 9 days post-operatively. These issues seem associated with the well-described benefits arising from laparoscopic surgery [6, 19]. In nine patients the fistula presentation was accompanied by signs of colonic perforation and abscess formation, as identified intra-operatively and proven by the histopathology examination. Perforated diverticulitis is associated with higher morbidity and prolonged hospital stay [20, 21]. These patients, however, presented an uneventful recovery, despite the one-stage operation that was performed.

Resection of the vesical wall was considered necessary in two patients, due to suspected malignancy in the first case and presence of necrotic tissue in the second. In most patients no definite opening into the bladder or the vagina could be seen after the diseased colon had been detached. Simple dissection of the fistula was adequate in eight patients, and reinforcement of the area of colonic attachment with sutures in two. Closure of the fistulous

track with a suturing device was essential in six patients due to a substantial fistula length and lumen size. In all three women with colovaginal fistula no attempt to identify and close the defect was undertaken since most authors agree that this is not necessary [22, 23].

There was one fistula recurrence, 3 months after surgery, in a woman with colovaginal fistula. No other patient suffered a diverticulitis attack during the follow-up period. In a study presenting a 37-month follow up of 90 patients, Stevenson et al. reported no recurrence of diverticulitis [24]. Hewett and Stitz did not note any recurrence in seven patients after an 11-month follow-up [10]. Other authors conclude that the implication of laparoscopy is irrelevant to recurrence rates, as a colorectal rather than colosigmoid anastomosis seems to be the single predictor of recurrence [25, 26].

There were no incisional hernias during the 5-year follow-up period. The results are in accordance with the very low rates observed with laparoscopy [16, 27] and compare favourably with those reported for open surgery [28, 29].

No stenoses were detected during the observational period. However, the systematic use of stapling devices results in a rate of anastomotic stenosis ranging from 1–5%. This risk is minimized by the use of a stapler with a diameter of at least 28 mm. Bouillot et al., for example, report one anastomotic stricture in a multicentre study involving 179 patients [15]. Other authors consider these strictures as being of lesser importance, since they are accessible to instrumental dilatation [16].

Very few cases of laparoscopic treatment of diverticulitis fistulas are presented in the literature. It seems that,

despite the experience gained and the advances in instrumentation, most surgeons still consider fistulas as a contraindication to laparoscopic surgery. It should be emphasized that our study group consists of a consecutive series performed by a single surgical team experienced in advanced laparoscopic surgery. Several authors analyse the association between experience and surgical complications [30, 31]. Sher et al. clearly connect all intra-operative and all post-operative septic complications to early experience, as opposed to zero morbidity during their last ten patients [13]. It is clear that these operations should not be available to the occasional laparoscopist.

In conclusion, this study supports the hypothesis that laparoscopic one-stage treatment of these patients is safe and feasible. Efficacy, as defined by mortality, conversion rate, operating time and post-operative morbidity, is in accordance with the literature for laparoscopic surgery [10, 11, 12, 15, 18] and compares favourably with that reported for open surgery [11, 12, 13, 20, 32, 33]. Effectiveness in our study was assessed by criteria related to surgical incision trauma (herniation) and functional results (recurrence, stenosis, bowel function). Our results, with regard to effectiveness in laparoscopy, are in accordance with those reported by others and compare favourably with open surgery [15, 16, 20, 21, 26, 34, 35]. However, an average 4 h of surgery, unaffected by the accumulation of experience, cannot set the standard, as against open surgery. Until prospective randomized trials offer unequivocal evidence, the surgeons should compromise and propose laparoscopy to the patient as an individualized therapeutic option and not as the optimal standard treatment.

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