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Over 1-Year Followup of Laparoscopic Treatment of Enterovesical Fistula

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ABSTRACT

Background and Objective: Entero vesical fistulas (EVFs) are an uncommon complication mainly of diverticular disease (70%) and less commonly of Crohn's disease (10%). Only about 10% are caused by malignancies. At this time, it is unclear whether the laparoscopic approach can be routinely proposed as a safe procedure for patients with EVF. The aim of this study was to assess the feasibility and safety of laparoscopic surgery in the treatment of EVFs in patients with complicated diverticular and Crohn's disease.

Methods: All patients with the diagnosis of EVF who underwent laparoscopic surgery were identified from prospective collected data based in two institutions between 2007 and 2017. Patients with malignancy were excluded. Recorded parameters included operative time, conversion to open surgery, the presence of a protective loop ileostomy, perioperative complications, number of units of blood transfused, postoperative course, and histologic findings.

Results: Seventeen patients were included in the study: 10 patients with a colo-vesical fistula due to diverticular disease, and 7 patients with an ileo-vesical fistula due to Crohn's disease. There were no conversions to open surgery and none of the patients needed a protective ileostomy. The bladder was sutured in 12 patients (70%). No intra-operative complications were met, and no blood transfusions were needed; there were no anastomotic leaks, nor mortality in both groups.

Conclusions: The laparoscopic approach for benign EVF in selected patients is both feasible and safe in the hands of experienced surgeons with extensive expertise in laparoscopic surgery.

Key Words: Enterovesical fistula, diverticular disease, Crohn's disease, laparoscopy.

INTRODUCTION

Entero vesical fistulas (EVF) are a relatively rare complication, mainly of diverticular disease (70%) and less commonly of Crohn's disease (CD) (10%) with another 10% caused by malignancies.[1,2] Other less common causes include appendicitis, Meckel diverticulitis, radiation, and external injury. Because of its relatively rare incidence, there are no current guidelines for the optimal method of management. Between 4% and 20% of patients with complicated diverticular disease will have fistulizing disease, most commonly colovesical fistulas (CVFs).[3,4] In a similar way, diverticulitis is responsible for 60%–70% of cases causing CVF, together with malignancy, inflammatory bowel disease, and radiation.[1,5–7] The mechanism involves mainly direct extension of a perforated diverticulum into the bladder.[7] The most commonly cited etiology of ileovesical fistula (IVF) is CD, with an incidence of 2%.[8] Recurrent urinary tract symptoms, need for antibiotics, repeated hospital admissions, and poor quality of life prompt patients to request definitive therapy in both types of fistulas. With its relatively challenging anatomic location and the dense inflammatory process that often occludes the pelvis, some surgeons consider this disorder still as too technically challenging for laparoscopic surgery.[9] In recent years, a few series of laparoscopic surgery for entero vesical fistulas have been published.[10–13] Although the numbers are small, these studies show that the laparoscopic approach is safe, the conversion rate ranges from 6% to 36%, and its outcome is similar to laparoscopic

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surgery of uncomplicated diverticulitis and terminal ileitis.[8,10–12]

The aim of our study was to assess the safety and feasibility of the laparoscopic approach in the treatment of benign EVF, review the literature, and discuss the different treatment modalities.

PATIENTS AND METHODS

All patients with the diagnosis of EVF were identified from a prospective collected data based in two institutions between 2007 and 2017.

IVF or CVF was defined as an abnormal communication between the intestinal tract and the urinary bladder and was diagnosed by abdominopelvic computed tomography (CT) with intravenous and oral contrast. The preoperative workup included colonoscopy in order to rule out a neoplastic cause for the fistula, or active colitis in cases of CD. Likewise, a cystoscopy was conducted in only one patient to rule out a suspected bladder neoplasm. Patients with malignancy were excluded from the study.

Patients with IVF underwent laparoscopic ileo-colic resection with IVF takedown and an intra-corporeal ileo-colic anastomosis. Patients with CVF underwent laparoscopic sigmoidectomy with CVF takedown and intra-corporeal colorectal anastomosis. Two experienced senior surgeons in laparoscopic colorectal surgery performed or supervised all surgeries.

Surgical Technique: Colo-Vesical Fistula

The patient was placed in a Trendelenburg position and tilt to the right for complete assessment of the abdomen and pelvis. Sigmoid and left colon mobilization and dissection was performed intracorporeally via a medial-to-lateral approach, from the upper rectum past the splenic flexure to the transverse colon. The inferior mesenteric artery and vein were individually dissected and high ligated and the mesorectum was divided just below the anterior peritoneal reflection. The rectum was then divided with an endoscopic linear stapler. The sigmoid colon was then dissected from the bladder. Routine filling of the bladder with saline and methylene blue was done for leakage check. Major bladder defects were repaired with intra-corporeal suturing. The bladder was then decompressed with a urinary catheter for 2 days. The specimen was retrieved through a small pfannestiel incision, and an end-to-side colorectal anastomosis was done. Leak test was done by direct inspection of the anastomosis using a flexible sigmoidosope.

Surgical Technique: Ileo-Vesical Fistula

The patient was placed in a 20° Trendelenburg position and tilted to the left. Intestinal mobilization and dissection was performed intracorporeally via a medial-to-lateral approach. The terminal ileum and cecum were transected using endoscopic linear staplers. Vesical sutures were utilized for IVF repair unless no bladder opening could be observed after releasing the bowel segment. In those cases, a urinary catheter was left for 7 days. A side-to-side iso-peristaltic or anti-peristaltic intra-corporeal anastomosis was performed based on surgeon preference. The entero-colotomy was closed using a running suture. The surgical specimen was retrieved through a pfannestiel incision.

RESULTS

The cohort includes 17 patients, 10 patients with a CVF due to diverticular disease, and 7 patients with an IVF due to CD. Patient characteristics are presented in Table 1. All patients had an albumin level of 3 g/dL or above with a median Body Mass Index (BMI) of 26 kg/m^2 (Interquartile range (IQR) 20.95–31.05 kg/m^2).

In the CVF group, 3 patients (30%) had 3 previous episodes of acute diverticulitis, 4 patients (40%) had 2, and in 3 patients (30%) the diagnosis of CVF was made in the first episode of diverticulitis. At CVF diagnosis all patients were treated conservatively and 4–6 weeks later underwent surgery.

In the IVF group, CD was diagnosed in 4 patients before the fistula was established. After the diagnosis of IVF was

Table 1.
Cohort Characteristics

Median age, years (range)	48 (20–75)
Gender (M/F)	15/2
Median BMI, kg/m^2 (IQR)	26 (20.95–31.05)
ASA	II: 11 (65%)
	III: 6 (35%)
Albumin >3, g/dl	17 (100%)
Underlying disease	Diverticular disease: 10 (59%)
	Crohn's disease: 7 (41%)
Type of fistula	Colo-vesical: 10
	ileo-vesical: 6
	ileo vesical + ileo-sigmoid: 1

ASA, American Society of Anesthesiologists; F, Female; ICR, Ileo-colic resection; IQR, Interquartile Range; M, Male.

made, 2 patients were treated with anti-TNF (Tumor Necrosis Factor) therapy during a period of 3 months unsuccessfully. In 3 patients, the initial clinical presentation of CD was concurrent to the IVF; all of them were treated with antibiotics and underwent surgery within several weeks after the diagnosis.

Operative details are shown in Table 2. One patient with CD had an IVF and an ileo-sigmoid fistula. This patient underwent a laparoscopic ileo-colic resection, takedown of the IVF, and sigmoidectomy. There were no conversions to open surgery, and none of the patients required a protective ileostomy. The bladder was sutured in 12 (70%) patients. In 5 patients the defect was too small to be sutured, and the bladder was decompressed with a urinary catheter for 7 days. No intra-operative complications occurred, and no blood transfusions were needed. Three patients (18%) developed postoperative complications. One surgical site infection (Clavien-Dindo I) and one intra-abdominal abscess was drained under CT guidance (Clavien-Dindo IIIa) in the CVF group. One patient with IVF underwent a laparoscopic exploration due to postoperative fever (Clavien-Dindo IIIb) but without any pathologic findings. There were no anastomotic leaks, nor mortality in both groups.

During a mean follow-up period of 49 (12–119) months, 2 (12%) patients with CVF were lost from followup. In one patient, we were able to identify only one postoperative visit 2 weeks after surgery and in the second patient a visit in the gastrointestinal clinic 4 months after surgery.

Table 2.
Perioperative Data

Type of surgery	ICR: 6
	Sigmoidectomy: 10
	ICR+ Sigmoidectomy: 1
Median operative time, minutes	190 (166–228)
Blood transfusions	0
Conversions	0
Median length of stay, days	7 (6–13)
Anastomosis type	Intracorporeal-side to side ileo-colic: 7
	Circular end to side colorectal 11
Suture of bladder	12 (70%)
Protective ileostomy	0

ICR, Ileo-colic resection.

During the follow-up period, 2 patients were readmitted. One patient with exacerbation of CD, 2 years after surgery and the second one underwent a laparoscopic appendectomy, 4 years after the initial surgery. None of them developed recurrent urinary symptoms.

DISCUSSION

Intestinal fistulas involving the urinary bladder are uncommon and usually of benign origin. Diverticular disease is the most common cause of CVF and CD is the most common cause of IVF.[14] Since the uterus has a protective role from the inflammatory process that induces fistula formation, EVFs are found primarily in males, and rarely in nonhysterectomized females;[1–4] indeed, our series has only 2 females, one of them hysterectomized and both of them had a CVF due to diverticular disease. Median operative time was 190 minutes with a zero-conversion rate, which compares favorably with those reported in other series (median range, 135–240 minutes; conversion range, 0%–5%).[3,9–10] In our series, the median length of stay was 7 days (range, 6–13 days). Our encouraging results are probably explained by the relatively younger age of our patients with an average age of less than 50 years old. Lack of concurrent comorbidities and good nutritional status makes the healing process shorter and less complex.

Ileo-Vesical Fistula Complicating Crohn's Disease

In cases of CD complicated by IVF, there is a debate questioning the need for surgical management at diagnosis. Most patients have a longstanding history of medical management of the disease. With improving in biological therapies, the time interval in which patients need surgical resection has increased. Factors that determine choice of treatment include severity of disease and symptoms, presence of complications such as abscess or bowel obstruction, and surgeon preference.[8] There are few studies from before the anti-TNF era evaluating surgical treatment for EVF. They showed that surgical treatment had good results with a low rate of complications.[15–17] Recently, Zhang et al[18] concluded that patients with only IVF fistula without other CD complications had better results with medical therapy.[17] However, patients with other complications, such as abscess, were more likely to need surgical intervention for IVF.[18] Currently, the best treatment for CD with IVF is still in debate and studies comparing the outcomes of these patients are scarce.[18–19] It has been advocated that adequate nutritional support by total parenteral nutrition and anti-TNF therapy can help heal the

fistulous tract, eliminating the need for surgical intervention.[18] Two of our patients were treated with anti-TNF therapy for 3 months unsuccessfully and only then underwent definitive surgical treatment. All cases were done totally laparoscopic with an intracorporeal anastomosis. Only one patient underwent a negative laparoscopic exploration on the second postoperative day due to fever of unknown origin. To the best of our knowledge, there is only one study in the literature comparing medical with surgical treatment for EVF.[18] In the anti-TNF era the success of medical treatment for this complication is not conclusive.

Based on our limited experience and a few cases series reported in the literature, we believe that in selected patients with CD confined to the terminal ileum with IVF in good nutritional status, laparoscopic surgery can be safe and effective.

Colo-Vesical Fistula Complicated Diverticular Disease

Some studies have proved that laparoscopic surgery in complicated diverticular disease is feasible and safe[20–21] but CVFs are still considered by many surgeons as a relative contraindication for the laparoscopic approach due to increased operating times and high conversion rates.[22–25] A literature review reveals sparse data on the laparoscopic management of a diverticular CVF.[21–24] The outcomes are difficult to interpret because some studies included uncomplicated and complicated disease together, some did not differentiate between CVFs and other diverticular fistulas.[9,26–30] Other studies did not use a total laparoscopic approach; rather, they used a hand-assisted technique.[31–33] Table 3 summarizes the results of a few studies published recently. In 2013 Marney et al[11] published the largest single-center series of 15 patients with diverticular CVF, who underwent laparoscopic anterior resection and bladder repair. Median operating time was 135 minutes and a conversion rate of 33.3% with an increase in hospitalization time ($P = .035$). The median length of stay was 6 days. Overall morbidity was 20% with no major complications nor mortality. Our zero-conversion rate and lower morbidity, compares favorably with previous reports[26–30] and probably reflects the surgeon's experience in laparoscopic colorectal surgery and the evolution of surgical technique.

Bladder Management

EVF is usually a manifestation of a visceral disease rather than a vesical one, and by simply detaching the diseased bowel as cause of the high-pressure blowhole usually suffices to heal the bladder. Repairs of the bladder are usually unnecessary, and only large defects need to be repaired.[11,12,14] In 70% of our patients, the treatment of the bladder was primary suture closure without bladder resection and in the rest, we advocated simple separation. The choice of the treatment depended on the characteristics of the fistula and the surrounding bladder tissue. In cases where we sutured the urinary bladder, we removed the urinary catheter on the second postoperative day, and in cases where we did not suture the bladder, we removed the urinary catheter on the seventh postoperative day to insure the bladder was sufficiently decompressed to allow better healing. The approach in the management of the bladder's defect was the same in patients with CD and patients with

Table 3.
Series of CVF in Complicated Diverticulitis

Author	Study Period	n	Operative Time (Minutes) Mean/ Median/Range	Conversions, %	Complications, %		Bladder Suture, %	Diverting Stoma, %
					Minor	Major		
Menenakos[9]	2002–2008	15	237/n.s./165–330	6	20	13	40	0
Abbass[10]	2006–2012	15	254/240/168–360	0	24	14	n.s.	5
Marney[11]	2004–2011	15	n.s./135/85–240	33.3	20	0	n.s.	0
Kraemer[12]	2008–2014	13	176/180/72–355	16	21	5	16	11
Nguyen[28]	1994–2004	8	209/n.s./78–309	36	14	0	38	n.s.
Engledow[29]	1994–2005	22	n.s./150/60–310	29	6	6	10	3
Laurent[27]	1992–2003	10	172/n.s./100–280	18.75	6.25	6.25	7	0
Own results	2008–2016	10	182/190/166–228	0	10	10	90	0

n.s., not stated.

diverticular disease. De moya et al[34] investigated urinary catheter removal after CVF repair in diverticulitis and found great variability in postoperative management. They concluded that patients may have their urinary catheters removed on the seventh postoperative day without any increased complications. In cases of complex bladder repair, they recommended adding an omental patch, and removed the urinary catheter on the seventh postoperative day.

This study has several limitations. First, the small sample size limits the power of the analysis and precludes broad generalization of the results. Second, the retrospective nature of our study also constrains this data, and more studies are needed to confirm our observational results; nonetheless, we had complete long-term medical data in 15 out of 17 patients with a mean followup of 49 months. None of the patients had recurrent urinary symptoms and none of them was reoperated due to recurrent diverticulitis or CD complications.

CONCLUSIONS

The assimilation of the laparoscopic approach in the surgical treatment of benign EVF has not been vastly investigated and is based on small series and observational studies. Our modest experience demonstrates that in experienced hands, laparoscopic management of diverticular CVF and CD related IVF is safe and feasible with acceptable conversion rates, morbidity, and excellent postoperative convalescence. Larger prospective studies are needed to assess the safety and efficacy of such an approach.

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