Surg Endosc (1998) 12: 1393–1396

Surgical Endoscopy
Ultrasound and
Interventional Techniques

Elective laparoscopic-assisted colectomy for diverticular disease

A prospective study in 50 patients

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Received: 30 July 1997/Accepted: 21 January 1998

Abstract
Background: Although several recent reports described the different methods utilized for laparoscopic colon resection, only a few of them questioned whether the procedure is appropriate for the surgical treatment of diverticular disease. To assess this question, we performed a retrospective study of 50 consecutive patients operated using laparoscopic assistance to remove the sigmoid colon for diverticular disease.
Method: The surgical technique was a laparoscopically assisted procedure that included mobilization of the left colon and vascular ligation laparoscopically and then, via a small abdominal incision, division of the colon, removal of the specimen, and hand-sewn anastomosis.
Results: The surgical goal was achieved in 46 cases, with a conversion rate of 8%. The mean operative time was 195 min (range 150–280 min). There was no mortality, and the morbidity rate was 14%. There were no complications directly related to the laparoscopic technique. The mean return of regular bowel habits was 3.2 days, and the median postoperative stay was 10 days.
Conclusions: These preliminary results suggest that laparoscopic-assisted sigmoidectomy can be used safely for the surgical treatment of diverticular disease.

Key words: Diverticulitis — Sigmoidectomy — Laparoscopy

The widespread acceptance of laparoscopic surgery has changed the medical and surgical approaches to many gastrointestinal diseases. With the success of laparoscopic cholecystectomy, laparoscopic techniques have been applied to many other surgical procedures [12]. The feasibility of laparoscopic or laparoscopically assisted colonic surgery has been studied widely [4, 13, 15, 23, 44], with different surgical laparoscopic procedures employed for several pathologies [11]. But few papers have described the results of laparoscopic colonic surgery for diverticular disease, which is now considered an excellent candidate for this minimally invasive technique [21]. This study evaluated prospectively the results in our first 50 patients in whom an elective laparoscopically assisted colonic resection was performed for sigmoid diverticulitis.

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Patients and methods

From December 1993 to May 1997, 50 consecutive patients undergoing sigmoidectomy for diverticular disease were eligible for the study. There were 23 men and 27 women with a median age of 62 years (range, 35–81 years). The ASA score distribution (American Society of Anesthesia) was 28 patients ASA I, 17 ASA II, and five ASA III. The indications for elective resection are listed in Table 1. A ''major crisis'' is defined as an attack of diverticulitis attested by clinical findings and confirmed by CT scan abnormalities. The median delay between an acute episode and surgery was 2.5 months (range, 15 days–1 year).

Surgical management

Bowel preparation was administered 24 h before surgery, and prophylactic broad spectrum antibiotics were prescribed preoperatively. The operating team consisted of a surgeon and two assistants.

The patient was placed in the Lloyd Davis position with the legs flat to avoid interference with the insertion of instruments into trocar ports. After creation of the pneumoperitoneum, the camera was introduced via an umbilical incision with four accessory sheaths in the four abdominal quadrants. During laparoscopy, the colonic vessels were divided after their clip ligation, and the left colon was entirely mobilized by dividing the lateral peritoneal attachments, including the splenic flexure. Then, via a small midline or transverse incision, the colon was resected and a colorectal manual anastomosis was performed.

The nasogastric tube was routinely removed on the 1st postoperative day, and oral intake was started after return of the bowel habits. The patients were released from the hospital when food and orally administered analgesics could be tolerated.

Results

The surgical plan was accomplished in 46 cases.

Conversion to traditional surgery was mandatory in four

Table 1. Indications for elective sigmoidectomy

Indications for sigmoidectomy	No. of patients
After one severe attack of acute diverticulitis	13
Young patients (<45 yr)	6
Sigmoidovesical fistula	2
Residual abscess	1
Stenosis	2
Immunocompromised transplant	1
Associated with villous adenoma	1
After two severe attacks	17
After three severe attacks	18
After more than three severe attacks	2

patients (8%), necessitating a large midline incision. The reason for conversion was morbid obesity in two cases. In the third one, mobilization of the splenic flexure was insufficient. In the fourth patient, during the open time of the operation, the left colon after vascular ligation was found to be ischemic, necessitating a larger resection than expected.

For the 46 other patients, the small incision for anastomosis was midline in 37 cases (~8 cm long) and transverse (Pfannenstiel) in the other nine. In three cases, a temporary transverse diverting colostomy was performed via an elective incision for the protection of the anastomosis, due to the possible inflammatory nature of the colon. Three cholecystectomies, one ovariectomy for a cyst, and one procedure for bladder incontinence were achieved during the same operative time.

Mean time required for the whole surgical procedure was 195 min (range, 150–280 min). The laparoscopic dissection ranged from 80 to 180 min. Average time for the first passage of flatus was 3.2 days. There were no operative or postoperative mortalities.

During the postoperative stay, seven complications (14%) occurred. One anastomotic leakage, documented by radiographic study, necessitated a reintervention for Hartmann's procedure. One prolonged ileus necessitated an iterative laparotomy on the 10th postoperative day in order to eliminate a surgical complication. One perianastomotic abscess was drained by a small inguinal incision. In one case, intraabdominal hemorrhage in a hemodialyzed patient under high doses of anticoagulants required a reintervention for lavage and hemostasis of a small vessel of the mesocolon. Another patient developed a retroanastomotic hematoma, which was discovered on the 10th postoperative day, 3 days after his discharge from the hospital. He was treated by percutaneous drainage. One patient developed a pulmonary complication (atelectasis); another developed phlebitis.

The median postoperative stay for the 50 patients was 10 days (range, 6–22 days). During follow-up, one incisional hernia occurred 12 months after operation at the site of a 10-mm trocar sheath, necessitating a reintervention for repair.

Discussion

Diverticular disease is increasing in frequency in Western countries as a result of changes in diet. It is found in approximately half of people aged over 60 years, but only a few develop symptoms or complications that require emergency surgery [29]. Until recently, many patients with documented acute diverticulitis who have recovered from an acute attack were managed medically, on the assumption that only a few will have a recurrent attack [20, 27].

Recent reports, however, have emphasized the risk of complications and deaths in patients treated with conservative management [14]. Furthermore, after each recurrent attack, the patient is less likely to respond to medical therapy [28]. Thus, after two attacks of diverticulitis, resection is recommended [34]. The role of computed tomography in predicting the risk of recurrent attack is not well established, but CT does seem to be helpful [1]. In patients under the age of 40, the risk of severe complications—particularly following the initial attack—suggests that the disease is more virulent and that early resection after the first episode should be recommended [2, 18]. Patients with complications after one attack are also good candidates for resection [34].

The decision to proceed with surgical treatment must take into account the morbidity and mortality of the procedure. Recent studies have shown that there is no mortality after sigmoidectomy (as in our study); meanwhile, morbidity is higher than that observed with cancer [25]. Primary resection and anastomosis has become the treatment of choice for uncomplicated diverticulitis. The length of resected colon is not very important, but the anastomosis has to be performed at the level of the rectum, and the margins of resection must be free of inflammation [5].

Following the wide acceptance of laparoscopic cholecystectomy, numerous intraabdominal operations have been performed laparoscopically. It seems logical that laparoscopic techniques can also be applied to colon resection. The first reports consisted of small series of cases demonstrating that certain procedures could be done [9, 33]. Further series have underscored the safety, efficacy, and feasibility of the procedures [13, 17, 24, 31, 32, 38].

Conversion rates reported in the literature have ranged between 14 and 41% [13, 24, 31]. In this series, 8% of cases were converted. The main reason for conversion was obesity, as in other series [30, 32]. A careful selection of patients could, eliminate the morbidly obese. However, laparoscopy should be considered as an access technique, not a procedure, and conversion should not be regarded as a failure [26]. None of the complications observed in this series can be attributed to the laparoscopy itself.

Two techniques have been described for laparoscopic sigmoidectomy—total or assisted. Since there have been no comparative studies of these methods, the choice depends on the surgeon's preference. The total laparoscopic procedure (TPL) has been described for sigmoidectomy and intracorporeal anastomosis [10, 31]. It requires elaborate equipment and special training. The laparoscopic-assisted procedure is the one used in our study. The technique and surgical outcomes for patients undergoing laparoscopic-assisted colectomies are slowly being defined as these procedures become more common and more widely available [16, 45].

This technique offers most of the benefits of minimally invasive surgery (i.e., less operative pain, less ileus, earlier discharge from the hospital) and also has some advantages over TLP. The small incision used for the anastomosis is used to remove the specimen, thus eliminating all the con-

troversy concerning the extraction of the specimen [16]. Performing the resection and anastomosis through an incision minimizes the risk of peritoneal spillage and postoperative infection [32]. The anastomosis is hand-sewn as in open colectomy, thus avoiding the possibility of intraoperative technical problems (e.g., twisted colon) and the postoperative complications (e.g., stenosis) associated with the stapled anastomosis [3, 36]. Furthermore, the hand-sewn anastomosis is cheaper, since there is no need to use expensive disposable laparoscopic instruments for the anastomosis.

Laparoscopic surgery for diverticular disease has several advantages over the traditional approach. In some series of total laparoscopic colectomies, there is a significant reduction in postoperative ileus, and the patient returns to normal bowel habits between the 1st and 2nd days [16, 19, 32]. After laparoscopic-assisted colectomy, the patient has a normal bowel habit a bit later but 1 day earlier than after open colectomy, as we reported in a previous study [8]. The precise mechanism is not well defined but may be related to the diminution of intestinal manipulation, earlier ambulation of the patient due to minimal postoperative pain, or simply secondary to feeding such patients earlier [7]. However, the recovery of the gastrointestinal system from transient ileus after laparoscopic colectomy is not as rapid as after laparoscopic cholecystectomy [37].

Several reports have shown that patients ambulate, eat, and enjoy a general state of well-being earlier than after traditional surgery [24, 30–32, 38]. The result is a shorter hospital stay, with patients leaving the hospital earlier than after open colectomy [30, 39, 40, 44]. In some recent American series, the postoperative stay was ~5–6 days [13, 16, 19, 32], but there have been no prospective randomized trials comparing the length of hospitalization after laparoscopic and open colectomy. In our experience, the hospital stay (identical to another French laparoscopic series [22]) is longer, but still better than the length of hospitalization for traditional surgery [25, 35].

There are a number of reasons for this long stay. First, with our initial patients, we were reluctant to discharge the patients too early, since we feared the occurrence of a complication (e.g., anastomotic leakage). Second, the social status of some of our patients suggested a longer admission. It is likely that the mixed technique that we use (necessitating retraction of the intestine during the open time) decreases the advantages of laparoscopic approach. As we gain more experience and encounter fewer complications (which increase the average hospital stay), we expect the duration of stay to decrease.

One of the major advantages of the technique is cosmesis. There is no longer a need for a large midline incision; a small midline or Pfannenstiel's incision suffices. This improved cosmesis is important to the patients, especially women [43]. However, cosmetics should not be allowed to affect the security of the operation.

There are two important disadvantages to this type of surgery. The operating time is longer, varying in the literature between 107 and 240 min [23, 32, 38]. In a study comparing open versus laparoscopic-assisted colectomies, Hoffman et al. showed a prolonged time of 40 min [16]. However, with greater experience, the operative time eventually becomes comparable to traditional surgery [38]. A fairly steep learning curve, ranging from at least 15 to as many as 60 cases is associated with the procedure [41, 42]. Surgeons who perform a high volume of laparoscopic colectomies have lower rates of intra- and postoperative complications [6]. The total hospital costs for the two types of laparoscopic approach are comparable; however, an increased cost seems to be associated with converted operations [37]. Hospital costs are similar for the laparoscopic and open procedures, since the higher costs of the laparoscopic procedure are offset by an earlier discharge [4, 13].

This study suggests that laparoscopic-assisted segmental colectomy is a safe and feasible alternative to traditional open colectomy for diverticular disease. It offers significant benefits to the patient. The abdominal trauma is decreased, allowing a slightly more rapid recovery with a shorter hospital stay. In the future, with more experience and further development of the surgical technique, the results should be greatly improved. Further studies need to be done to compare the techniques of total and assisted laparoscopic sigmoidectomy.

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