

Laparoscopic Sigmoid Colectomy for Chronic Diverticular Disease

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ABSTRACT

Background: The feasibility of laparoscopic sigmoid colectomy for diverticular disease has now been well established. We report herein our experience with laparoscopic sigmoid colectomy in 100 patients who underwent laparoscopic colectomy for chronic diverticular disease.

Methods: A retrospective review was performed of a 7-year period from January 1995 to June 2002. Chronic diverticular disease was treated with laparoscopic sigmoid colectomy in 100 patients. The setting was a community hospital. All cases were performed by 1 of 2 colorectal surgeons. All laparoscopic sigmoid colectomy patients received lighted ureteral stents placed preoperatively that were removed at the end of surgery.

Results: Mean age was 61.6 years. The male to female ratio was 38:62. The mean estimated blood loss was 138 mL, liquid diet was tolerated for 2.4 days, and hospital length of stay was 4.6 days. The mean operative time for laparoscopic sigmoid colectomy was 196 minutes. Relative complications for laparoscopic sigmoid colectomy are as follows: anastomotic leak in 2 (3.0%) patients, hematuria in 95 (95%) with an average duration for 3.1 days, urinary tract infection in 6 (6%), and ureteral injury in 1 (1%). The mean operating room charges in the laparoscopic sigmoid colectomy patients was \$9,643.

Conclusion: We recommend laparoscopic sigmoid colectomy as the modality of treatment for chronic diverticular disease. Laparoscopic sigmoid colectomy appears to be a reliable, safe, and efficacious treatment modality for chronic diverticular disease. The operative time for laparoscopic sigmoid colectomy is decreasing as surgeons gain more experience.

Key Words: Laparoscopy, Colectomy, Diverticulitis, Sigmoid colon.

INTRODUCTION

Minimally invasive approaches to diseases of the colon and rectum were developed because of the high rates of septic complications associated with invasive bowel procedures.¹ Throughout the 20th Century, surgeons searched for surgical procedures that are less invasive, have a lower risk, are less costly, and allow quicker recovery.

Human laparoscopy was first performed and documented by Jacobeus in 1910.^{2,3} More recently, laparoscopy evolved out of endoscopic principles gaining minimally invasive access to the abdominal cavity, and technological refinements led to the birth of laparoscopic intestinal surgery.⁴ In 1987, Mouret performed the first human laparoscopic cholecystectomy in France.⁵ Shortly thereafter, laparoscopic surgery flourished. The laparoscopic approach offered a minimally invasive procedure that resulted in decreased hospital stay, pain, and wound infection. With increasing popularity, laparoscopy was soon the focus for colorectal surgery.

Redwine and Sharpe⁶ first described laparoscopic colon surgery in 1991. The feasibility of laparoscopic sigmoid colectomy (LSC) has now been well established.⁷⁻¹² Currently, the advantages of laparoscopic colectomy include less intraoperative trauma, reduction in postoperative adhesions, decreased perioperative pain, decreased length of ileus, better cosmesis, early discharge from the hospital, and early return to work.¹³⁻²¹ Nonetheless, laparoscopic colectomy is currently in its infancy and will inevitably undergo many evolutionary stages. The acceptance of LSC, therefore, has been slow and gradual. Our goal was to evaluate the safety and efficacy of laparoscopic sigmoid colectomy for chronic diverticular disease in a community setting and to assess whether the proposed advantages could be realized.

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METHODS

A retrospective review was conducted of 132 charts of patients who underwent laparoscopic sigmoid resection for sigmoid diverticulitis at our hospital from January 1995 to June 2002. Thirty-two patients were excluded from our study, 12 because of lack of data and 20 who underwent surgery for complications of diverticular disease like perforation, abscess, fistula, or bleeding. The operative outcomes for these complicated cases were not included; only elective cases were included. Two colorectal surgeons trained in laparoscopic colorectal surgery performed all of the LSC procedures.

The data reviewed included age, sex, history of prior abdominal surgery, estimated blood loss (EBL), operative time, conversion to open colectomy, reason for conversion, time until liquid diet was tolerated, postoperative complications, hospital length of stay (LOS), operative costs, and total hospital charges incurred. Operative time was defined as the length of time from the start of ureteral stent placement until the patient left the operating room. Time for induction of anesthesia was not included in operative time. The time until a liquid diet was tolerated was recorded as the first day clear liquids were started without interruption from nausea or vomiting. In all patients, a clear liquid diet was started once bowel function had returned, as evidenced by return of flatus or bowel movements. All patients underwent the same operative technique for LSC. Intracorporeal mobilization of the sigmoid colon was performed followed by ligation of the mesenteric vessels. The sigmoid colon was then divided both proximally and distally using an endovascular GIA. The sigmoid colon was then removed through a minimal extension of one of the port sites. The anvil of the circular stapler was secured within the lumen of the exteriorized descending colon and placed back into the abdominal cavity. Pneumoperitoneum was reestablished. A transanal anastomosis was then performed with an end-to-end circular anastomosis. The pelvis was then filled with sterile saline, and the integrity of the anastomosis was inspected by transanal insufflation. The bowel ends taken from the circular stapler were inspected to ensure they were intact and transmural.

Statistical analysis was performed using the Student *t* test and the chi-square test. *P*<0.05 was considered statistically significant. Standard error of the mean was used to express continuous variables.

RESULTS

Between January 1995 and June 2002, 100 patients underwent LSC for diverticular disease. Postoperative follow-up examination within 30 days of surgery was performed in 89 patients. The age, sex, and history of prior abdominal surgery are summarized in **Table 1**. Operative data are summarized in **Figure 1**. It was necessary to convert from laparoscopic to open colectomy in 16 patients. The most common reason for conversion to open was inability to mobilize adequate length of bowel, making dissection difficult. **Table 2** summarizes all reasons for conversion to open. Relevant complications are depicted in **Figure 2**. The most common sequelae following laparoscopic sigmoid colectomy was hematuria (95 patients). This hematuria was attributed to preoperative placement of ureteral stents. In all cases, hematuria was transient with an average length of 3.1 days. The most common complication was due to urinary tract infection (6 patients). One ureteral injury occurred that was identified intraoperatively. This was managed by leaving the ureteral stent in place for 3 weeks. No mortalities occurred.

Liquid diet was tolerated for 2.4 days, and hospital length of stay was 4.6 days. Operative room costs were on average \$9,643±79. Total hospital charges averaged

Table 1.
Patient Demographics (N=100)

Age (years)	61.6±3
Gender (M:F)	38:62
Previous abdominal surgery	16

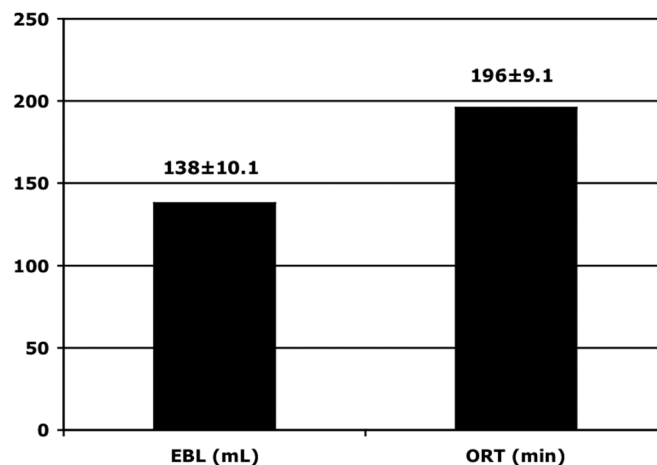


Figure 1. Operative data for laparoscopic sigmoid colectomy (n=100). EBL = estimated blood lost. ORT = operating time.

Table 2.
Reasons for Conversion (n = 100)

Reason	Patients
Difficult visualization, inadequate mobilization	8
Dense adhesions	4
End-to-end anastomosis air leak	2
Ureteral injury	1
Inability to control bleeding	1

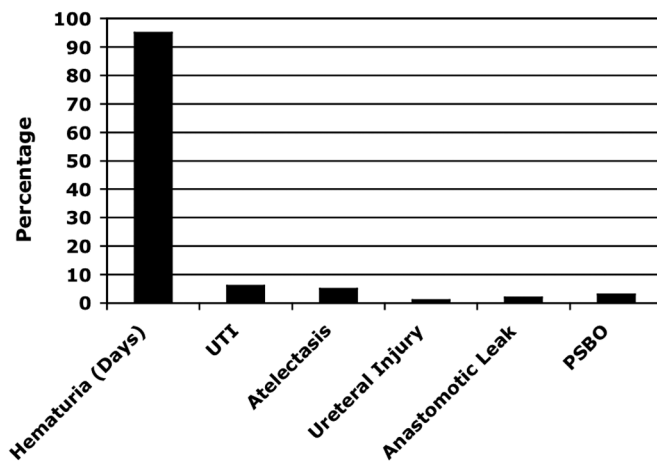


Figure 2. Complications and sequelae. UTI = urinary tract infection. PSBO = partial small bowel obstruction.

\$14,019±98. For open colectomy performed during the same period, the operative room costs were \$7,306±76, and the mean hospital charges averaged \$19,090±104.

DISCUSSION

The majority of patients undergoing colorectal surgery for chronic diverticula are often elderly and debilitated. These chronically ill patients would clearly benefit from minimally invasive surgery. Several prospective studies have demonstrated that laparoscopic colectomy is a safe, feasible, effective alternative to open surgery.^{22–24}

Operative time has been one of the most studied factors when discussing laparoscopic surgery. Clearly, chronically ill patients would benefit from a reduction in operative time. Although most studies have shown operative time for open colectomy to average around 140 minutes, our operative time was 196±9.1 minutes.^{7,18,25,26} In a previous study involving the same colorectal surgeons in this study, operative time was reported as 212 minutes.²⁵ Since this previous study, our results have shown a decrease in

operative time. We believe that operative time will continue to decrease with time and experience, given a reasonable learning curve for laparoscopic procedures.

Estimated blood loss is another important factor when considering surgery for chronically ill patients. Laparoscopic surgery has long been shown to have significantly reduced blood loss when compared with blood loss in open surgery. Our operative blood loss is comparable to that in other prospective trials and significantly less than with the open technique.^{7–13} We believe that reduction in blood loss is also influenced by the learning curve of laparoscopic surgery and will continue to decrease with the use of newer techniques and the advent of robotic surgery.

The duration of hospital stay when dealing with colorectal surgery is directly related to the return of bowel function and toleration of diet. The current research defines the toleration of diet in different ways. This study defined toleration of diet as the time until liquid diet was tolerated without interruption by nausea or vomiting. Our results show an earlier toleration of diet compared with that in other studies.^{7,22} This may be due to several factors contributing to error. Both patients and examiners often perceive a subjective notion of the timing of symptoms of nausea. The definition of diet tolerance alone allows for a broad spectrum of variability. Nonetheless, our data clearly show an early return of bowel function, which translates, to earlier discharge from the hospital. This is shown in our length of stay. Our results show shorter hospital duration than that in other studies.^{8–11,22} Although this may be due to patient selection and study size, an earlier toleration of diet would contribute to a reduced hospital stay.

Operative complications are another factor dependent on the technique and learning curve of the operator. Although we demonstrated a significantly higher rate of hematuria than that in similar studies, this is easily explained by the use of ureteral stents. In all cases, hematuria was transient. Although stenting the ureter does increase the risk of hematuria and urinary tract infections, the incidence of identification of ureteral injury is significantly increased. We believe the tradeoff of transient hematuria and urinary tract infections outweigh the risk and morbidity of a ureteral injury.

CONCLUSION

It is our belief that laparoscopic colectomy is safe and efficacious for the management of chronic diverticular

disease. Given a proper learning curve and technique, we believe that these results will be shown for expanded populations and indications.

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