

Comparison of Return of Bowel Function and Length of Stay in Patients Undergoing Laparoscopic Versus Open Colectomy

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ABSTRACT

Background: Over the last decade, many advances have been made in laparoscopic techniques in various surgical specialties. The technique of laparoscopic-assisted colectomy (LAC) has been reported since 1992 and has been slowly gaining popularity in the surgical community. Several studies have compared laparoscopic versus open colectomy, assessing its applicability to patients with colon cancer, Crohn's disease, and diverticular disease. Studies to date have assessed length of stay, operative time, and clinical outcome. This study focuses on return of bowel function and length of hospital stay in patients undergoing LAC compared with those undergoing open colectomy.

Methods: We performed a retrospective review of patients undergoing either open colon resection or LAC between January 2000 and December 2005. All disease processes and both emergent and elective cases were included. Return of bowel function was determined by passage of flatus or first passage of stool and compared between the 2 groups. The data were statistically analyzed using the Student *t* test for interval data, and nominal data were analyzed using the chi-square analysis (95% confidence interval; CI).

Results: The study included 247 patients; 179 (72.5%) underwent open colectomy and 68 (27.5%) underwent LAC. Passage of flatus took 3.6 days (95% CI .18 or 3.4 to 3.8) for open colectomy, and 2.9 days (95% CI .19 or 2.7 to 3.1) for LAC. First bowel movement took 4.4 days (95% CI .19 or 4.2 to 4.6) for open colectomy and 3.7 days (95% CI .22 or 3.5 to 3.9) for LAC. When compared between the groups, mean length of hospital stay was 8.01 days (95% CI .93 or 7.1 to 8.9) for open colectomy and 4.38 days (95% CI .38 or 4.0 to 4.8) for LAC.

Conclusion: Both return of bowel function and length of stay were statistically significantly shorter in LAC compared with those in open colectomy, which may indicate

faster recovery after bowel surgery in patients undergoing the laparoscopic approach.

Key Words: Laparoscopic colectomy, Malignant disease, Benign disease, Hospitalization, Return of bowel function.

INTRODUCTION

Over the last decade, many advances have been made in laparoscopic techniques in various surgical specialties. The technique of laparoscopic-assisted colectomy (LAC) was reported in the literature as early as 1992, and has since been slowly gaining popularity among the surgical community. Several studies have compared laparoscopic versus open colectomy, assessing its applicability to patients with colon cancer, Crohn's disease, and diverticular diseases. To date, studies have primarily focused on length of stay, operative time, and clinical outcome. This study focuses on return of bowel function and its effect on length of stay in patients undergoing open colectomy compared with those undergoing LAC.

METHODS

After obtaining the formal IRB approval, all patients who underwent colon resection between January 2000 and December 2005 for any indication were included in this nonrandomized, retrospective chart review study. Both emergent and elective cases were included. All authors performed all the surgeries at one community hospital (Ingham Regional Medical Center, Lansing, Michigan). Patients admitted for elective surgery underwent preoperative outpatient mechanical and antibiotic bowel preparation. All patients received identical postoperative management. The choice of postoperative analgesic medication, however, varied slightly according to the surgeon's preference. A clear liquid diet was initiated once the patient passed flatus and was advanced to a regular diet after passage of a bowel movement. All patients were discharged home after tolerating a regular diet and having a bowel movement. Time of first passage of flatus and bowel movement after surgery was reviewed and compared between the 2 groups.

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Statistical Analysis

Statistical significance (P) for resumption of bowel function and length of stay was assessed with the Student *t* test and chi-square analysis.

RESULTS

The medical records of 261 patients were reviewed. Eighteen were excluded for insufficient data and 6 were excluded secondary to their death due to their medical condition, before resumption of bowel function. Patient demographics and history of previous abdominal surgeries are summarized in **Table 1**. Prior abdominal surgeries included appendectomy, cholecystectomy, hysterectomy, Cesarean delivery, gastric resection, and other small- and large-bowel surgeries. Indications for surgery are listed in **Table 2**. The category of “other” diagnoses included appendicitis, volvulus, enterocutaneous fistula, and perforated viscus. Although individual complications were not

specifically analyzed, none of the patients who had an anastomosis had a clinically significant anastomotic leak.

Data analysis showed that it took a mean of 3.4±1.1 days for flatus and 4.2±1.2 days for a bowel movement to occur in all patients, irrespective of the surgical approach (**Table 3**). However, when the groups were individually compared for time to passage of flatus, it took 3.6 days (CI .18 or 3.4 to 3.8) for open colectomy and 2.9 days (CI .19 or 2.7 to 3.1) for LAC. Similarly, first bowel movement took 4.4 days (CI .19 or 4.2 to 4.6) for open colectomy and 3.7 days (CI .22 or 3.5 to 3.9) for LAC. Mean length of stay was favorable for LAC: 8.01 (CI .93 or 7.1 to 8.9) days for open colectomy vs. 4.38 (CI .38 or 4.0 to 4.8) days for LAC; P<0.001. When comparing the different disease processes, age, sex, outcome, and length of stay between the different disease processes, no statistically significant difference was identified.

DISCUSSION

Due to the recent trends toward a minimally invasive approach to most general surgeries, LAC is gaining popularity. This retrospective analysis was designed to examine the potential benefits of early return of bowel function in patients undergoing LAC, and its affect on postoperative length of stay. Hospital readmissions were not studied. Furthermore, no attempt was made to standardize patient management among the different surgeons and no undue encouragement was given to achieve early discharge.

As reported in the multicenter COST trial, the median length of stay was 6 days and 5 days in open colectomy vs laparoscopic colectomy.¹ Milsom et al² conducted a prospective, randomized trial comparing laparoscopic vs.

Table 1.
Demographics

Variable	Open Colectomy (N = 179; 72.5%)	Laparoscopic-Assisted Colectomy (N = 68; 27.5%)	P Value (χ^2)
Male	83	35	0.47
Female	96	33	0.47
Age >50	152	52	0.12
Prior Abdominal Surgery	107	30	0.03

Table 2.
Disease Process

Variable	Open Colectomy		Laparoscopic-Assisted Colectomy	
	Preoperative Diagnosis	Postoperative Diagnosis	Preoperative Diagnosis	Postoperative Diagnosis
Diverticulitis	47	62	20	20
Adenocarcinoma	51	74	6	15
Adenoma	17	13	34	27
Bleed/Ischemia	17	10	2	0
Inflammatory Bowel Disease	10	11	3	3
Other	37	9	3	3

Table 3.
Procedure Versus Bowel Function Return

Variable	Open Colectomy 179 (72.5%)	Laparoscopic-Assisted Colectomy 68 (27.5%)	P Value
Flatus mean days (CI*)	3.6 (.18 or 3.4–3.8)	2.9 (.19 or 2.7–3.1)	< 0.001
Bowel movement mean days (CI*)	4.4 (.19 or 4.2–4.6)	3.7 (.22 or 3.5–3.9)	< 0.001

*CI = 95% confidence interval.

conventional techniques in 60 patients and found that flatus and first bowel movement returned a median of 3 and 4 days, respectively, after laparoscopic surgery versus 3.3 and 4 days, respectively, after conventional surgery. Median length of stay was 5 days for laparoscopic and 6 days for conventional surgery.² Lezoche et al³ in their prospective nonrandomized study of 248 patients undergoing laparoscopic versus open colon resection found that flatus and bowel movement returned a median of 2.9 and 3.5 days for laparoscopic right hemicolectomy, 3.0 and 4.0 days for open right hemicolectomy, 2.7 and 3.8 days for left hemicolectomy, and 3.5 and 5.2 days for open colectomy, respectively. They also found a mean length of hospital stay of 9.2 days for laparoscopic right hemicolectomy and 13.2 days for open right hemicolectomy, and 10 days for laparoscopic left hemicolectomy and 13.2 days for open left hemicolectomy.³ Our outcome is similar to those found in a review of literature as shown in **Table 4**, as well as the multicenter COST trial,¹⁰ Milsom et al,² and Lezoche et al.³

One of the drawbacks of this study is the small number of patients in the laparoscopic arm of the study. This is due to the fact that at the onset of our experience and the beginning of the learning curve (2000 to 2003), only select cases were done using the laparoscopic approach. During that time, the laparoscopic approach was used only for benign conditions with established approval among surgeons. As the surgeons' experience and skills improved, more difficult cases were approved for the laparoscopic approach. Currently, most elective cases are done using the laparoscopic approach. Finally, substantial pre-existing comorbid conditions and the use of narcotic analgesics could not be uniformly identified by chart review in this cohort. Thus, prospective studies are necessary to further elucidate these variables and modify the components of hospital stay.

Although this study does not offer any new information, because of the good results we achieved at a community

Table 4.

Review of Literature Bowel Function Return and Length of Stay in Patients Undergoing Laparoscopic and Open Colon Resection

Study	Year	N	First Stool/Flatus (post of day)		Length of Stay (d)	
			Laparoscopic	Open	Laparoscopic	Open
Milsom ²	2001	60	4.0	4.0	5.0	6.0
Lezoche ³	2002‡	248	3.5/3.8	4.0/8.6	7.8/8.6	9.0/9.5
Schoetz ⁴	1997	226				8.5
Begamaschi ⁵	1997	185	3.5	4.4	5.2	12.2
Kohler ⁶	1998	61	3.7	5.3	7.9	14.3
Muckleroy ⁷	1999	77	2.4	5.2	3.3	7.5
Curet ⁸	2000	43			5.2	7.3
Diamond ⁹	2001†	23				
Lauter ¹⁰	2001	150			4.5	

†Patients who underwent laparoscopic surgery went home 2.2 days earlier compared to open surgery patients; all patients had Crohn's disease.

‡Comparison between right hemicolectomy and left hemicolectomy.

teaching hospital, we believe they add valuable information to the existing database regarding comparison of bowel function return in open vs. LAC.

CONCLUSION

Both return of bowel function and length of stay were statistically significantly shorter in LAC compared with open colectomy, which may indicate faster recovery after bowel surgery in patients undergoing the laparoscopic approach.

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