Laparoscopically assisted colon surgery

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Laparoscopy has been used in surgical procedures more frequently in the past decade because it reduces postoperative pain, decreases the length of hospitalization, decreases the duration of disability, and provides a better cosmetic result. We retrospectively reviewed our experience with laparoscopic colon surgery at Baylor University Medical Center. Since 1995, we have done 17 procedures, including 10 colon resections and 7 colostomies. The results in these patients have been quite good: only 1 patient was converted to an open procedure, and the remaining 16 patients experienced no mortality, major morbidity, or wound infection.

In the early 1990s, surgeons began performing a variety of colon operations laparoscopically, including colectomy, colostomy, colostomy closure, and reversal of Hartmann's procedure. Cooperman, Fowler, Jacobs, and others did laparoscopically assisted colectomies by mobilizing the colon, preparing for resection intracorporeally, and then doing the actual resection and anastomosis extracorporeally through a minilaparotomy incision (1–3). Franklin did the first fully intracorporeal resection and anastomosis in January 1991 (4).

The advantages of minimal access surgery in general are applicable to laparoscopic colon surgery. They include less pain, lower narcotic requirements, a shorter period of ileus, a shorter hospitalization, a shorter duration of disability, and a much better cosmetic result. The surgery is less disruptive and more accurate because the operative field is magnified and the surgeon can manipulate the laparoscope to see areas difficult to visualize in open surgery. Because there is less incisional pain, there are fewer pulmonary problems postoperatively (5, 6). In this study, we reviewed our experience with laparoscopic colon surgery at Baylor University Medical Center in Dallas.

METHODS

Chart review

Our private practice consists of 2 surgeons who practice general and laparoscopic surgery, with a special interest in advanced laparoscopic surgery. We reviewed the charts of all 17 patients who had laparoscopic colon operations since 1995—the year we began recommending the laparoscopic approach to all patients who were having colon operations unless they had contraindications to laparoscopy, such as dense adhesions. We called each patient for information on his or her present status.

Techniques

Laparoscopy diminishes the surgeon's ability to feel polyps in the colon. To locate polyps, we used India ink injected into the colon wall at the site of a polyp to "tattoo" the wall. For surgeries of the right colon, we used laparoscopically assisted extracorporeal resection and anastomosis. We mobilized and devascularized the right colon and terminal ileum using the laparoscope and then delivered the colon through a 4- or 5-cm right abdominal muscle-splitting incision. We performed the resection and anastomosis extracorporeally and returned the bowel to the abdominal cavity.

For sigmoid low anterior resection, we mobilized, devascularized, and divided the colon intracorporeally and did the resection extracorporeally through a minilaparotomy muscle-splitting incision in the left lower quadrant. We sewed the anvil of an end-to-end anastomosis stapler in place, replaced the colon into the abdomen, and closed the incision. We placed the stapler through the rectum and mated it with the anvil laparoscopically to complete the colorectal anastomosis.

Sigmoid colostomies were done in patients with spinal cord trauma to make care easier and to divert the fecal stream from decubitus ulcers. We mobilized and divided the sigmoid colon laparoscopically and brought it out through a 3- to 4-cm incision in the left lower quadrant. These patients returned to Baylor Institute for Rehabilitation the day following the operation.

RESULTS

Ten colon resections and 7 sigmoid colostomies were performed laparoscopically at Baylor University Medical Center between March 1995 and January 2000 (Table). Eight resections were low anterior sigmoid colectomies with colorectal anastomosis, and 2 were right hemicolectomies. The patients ranged in age from 33 to 76 years (mean, 55 years).

There was no mortality, major morbidity, or wound infection in patients who had laparoscopic colon surgery without conversion to open surgery. Two patients experienced ileus that responded to conservative therapy. One patient (6%) was converted to an open procedure. This patient developed deep venous thrombosis and a nonfatal pulmonary embolus successfully treated with placement of a vena caval filter.

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Table. Results of 17 laparoscopically assisted colon surgeries performed at Baylor University Medical Center

Patient	Age	Date	Type of laparoscopic procedure	Postop LOS (days)	Converted to open procedure	Complications
1	61	3-24-95	Sigmoid colectomy with low anterior anastomosis	4	0	0
2	47	4-20-95	Sigmoid colostomy	3	0	0
3	65	12-5-95	Sigmoid colostomy	1*	0	0
4	50	12-12-95	Sigmoid colectomy with low anterior anastomosis	3	0	0
5	44	2-13-96	Sigmoid colostomy	1*	0	0
6	72	10-4-96	Sigmoid colostomy	1*	0	0
7	59	9-30-97	Sigmoid colectomy with low anterior anastomosis	3	0	0
8	33	2-6-98	Sigmoid colostomy	1*	0	0
9	75	3-13-98	Sigmoid colectomy with low anterior anastomosis	4	0	Ileus
10	76	4-30-98	Sigmoid colectomy with low anterior anastomosis	6	0	Ileus
11	51	4-14-99	Sigmoid colectomy with low anterior anastomosis	4	0	0
12	72	5-11-99	Sigmoid colectomy with low anterior anastomosis	10	+	PE
13	35	7-15-99	Right hemicolectomy	3	0	0
14	47	7-19-99	Sigmoid colectomy with low anterior anastomosis	3	0	0
15	57	8-13-99	Sigmoid colostomy	1*	0	0
16	69	7-13-99	Right hemicolectomy	3	0	0
17	43	1-3-00	Sigmoid colostomy	1*	0	0

*Returned to Baylor Institute for Rehabilitation.

LOS indicates length of stay; PE, pulmonary embolism.

Analgesic use was reduced and consisted of oral acetaminophen and hydrocodone by the second postoperative day in most laparoscopic patients. One patient who had open surgery for small bowel obstruction 3 months prior to a laparoscopically assisted sigmoid colectomy and low anterior anastomosis commented that there was far less pain from the laparoscopic procedure.

A nasogastric tube usually is unnecessary following laparoscopic colectomy. In our total laparoscopic series, the median patient began a diet 1.5 days postoperatively. The median time to diet in our laparoscopic colectomy patients was 1.8 days. The median hospital stay for all laparoscopic colon operations was 3 days, and for laparoscopic colectomies, 3.5 days. Hospital charges for laparoscopic colectomies ranged from \$10,247 to \$14,947, with a median charge of \$12,742.

DISCUSSION

Our results demonstrate that laparoscopy minimizes the complications and length of stay for colonic surgery. The advantages of minimal access surgery in general are applicable to laparoscopic colon surgery. The use of the laparoscopic approach for colectomy is ideally suited for benign disease. While we believe that laparoscopic colectomy is appropriate for many cancers, currently we reserve the procedure for small cancers in polyps or cancers that have metastasized.

Reports of tumor occurrence at port sites have tempered enthusiasm for laparoscopic colectomy for carcinoma of the colon (7, 8). Proponents now contend that appropriate surgical techniques can prevent most port-site recurrences. These techniques include reducing instrument exchanges, securing trocars so that they do not become dislodged, irrigating the abdominal

cavity with a diluted iodophor solution, and removing the bowel containing the tumor into a plastic bag. Recent reports show low rates of port-site recurrence when these precautions are used (9, 10). It is well known that metastases can occur in abdominal incisions following conventional open operations, in percutaneous catheter tracts, and even in needle biopsy tracts (11–13). Phillips reported a 10% to 15% incidence of local recurrence in England and Wales after open curative resections for carcinoma of the colon (14). The overall incidence of port-site recurrence is not known, but reports thus far do not indicate an incidence this high. It is possible to remove comparable numbers of lymph nodes in doing laparoscopic colon resection for carcinoma and to achieve similar margins. In early reports, 5-year survival rates for laparoscopic and open procedures are equivalent (15).

The trauma of surgery can be a factor in enhancing recurrent or metastatic disease. Eggermont et al showed that laparotomy enhances intraperitoneal tumor growth and abrogates the anti-tumor effects of interleukin-2 and lymphokine-activated killer cells (16). Surgical trauma producing injured tissue can enhance the growth of metastases (17, 18). Since laparoscopy is less traumatic than open surgery, immune function may be better preserved and the growth of metastatic lesions lessened (19). This may reduce infectious complications and improve survival from malignant disease.

A definite learning curve is associated with laparoscopic colon surgery (20–22). This learning curve may be especially troublesome for surgeons inexperienced in other advanced laparoscopic procedures and may account for some of the criticism leveled against the laparoscopic approach. However, surgeons experienced in advanced laparoscopy can perform these procedures safely.

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