Laparoscopic Total Colectomy: An Evolutionary Experience

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PURPOSE: Laparoscopic total abdominal colectomy and total proctocolectomy are technically challenging operations. Advances in minimally invasive techniques, including sleeveless hand-assist devices, may influence performance of these procedures. This study was designed to evaluate the results of laparoscopic total colectomy and to compare the hand-assisted approach with straight laparoscopy. METHODS: Sequential patients undergoing hand-assisted and straight laparoscopic total abdominal colectomy and total proctocolectomy from 1997 to 2004 were identified from a single institution prospective database involving four colorectal surgeons, of which three had limited laparoscopic experience. Patient characteristics, perioperative parameters, and outcomes were assessed. RESULTS: A total of 130 patients were analyzed. Sixty-nine patients underwent total abdominal colectomy (hand-assisted 17 vs. straight laparoscopic 52), and 61 underwent total proctocolectomy (hand-assisted 28 vs. straight laparoscopic 33). For both total abdominal colectomy and total proctocolectomy, the hand-assisted and straight laparoscopic groups were well matched. Although no differences were observed in operative blood loss and intraoperative complications, hand assistance resulted in fewer overall conversions to open (1/45 (2.2 percent) vs. 6/85 (7.1 percent); P<0.01), with no conversions in the total abdominal colectomy group (0 vs. 9.6 percent; P=0.05). There was a trend toward reduced operative time with hand assistance, and nonlaparoscopic staff surgeons performed a greater proportion of the hand-assisted cases (22.2 vs. 10.6 percent; P<0.05). CONCLUSIONS: Laparoscopic total colectomy is technically feasible and safe. With a significant reduction in conversions and a greater proportion of cases performed by nonlaparoscopic surgeons, there was an evolutionary shift to a hand-assisted technique. A hand-assisted approach may be a useful alternative to a straight laparoscopic approach for this technically challenging operation. [Key words: Total abdominal colectomy; Total proctocolectomy; Laparoscopy; Laparoscopic colectomy; Hand-assisted laparoscopic surgery]

Numerous studies have demonstrated the short-term benefits of laparoscopic segmental colonic resection in the setting of benign and malignant disease.1 Similarly, the feasibility, oncologic safety, and long-term oncologic adequacy of laparoscopic resections for colon cancer have recently been demonstrated in the multicenter COST (Clinical Outcomes of Surgical Therapy) trial.2 In contrast, the data surrounding the routine use of laparoscopy for total abdominal colectomy (TAC) and total proctocolectomy (TPC) has not been as compelling.3 In fact, the use of these procedures has been mostly limited to expert laparoscopists, as a result of the technically demanding nature of this procedure. Hand-assisted (HA) laparoscopy thus represents a viable alternative to straight laparoscopic (SL) TAC and TPC, because it has the potential to lessen the steep learning curve associated with the procedure for novice laparoscopists and experienced surgeons, while maintaining the short-term benefits of laparoscopic colon surgery.

Until now, few studies have evaluated the postoperative outcomes associated with hand-assisted laparoscopic TAC and TPC. In fact, only two small,
prospective, comparative case series have compared the HA procedure with straight laparoscopy,\(^4,5\) whereas one small, randomized trial has compared hand-assisted total colectomy with open surgery.\(^6\) For hand-assisted laparoscopic TAC and TPC to become a realistic alternative for practicing surgeons, its outcomes must be demonstrated to be at least equivalent to those of straight laparoscopy. The current study represents the largest comparative series of hand-assisted and straight laparoscopic TAC and TPC in the literature, the goal of which was to assess safety, feasibility, and outcomes equivalency.

**PATIENTS AND METHODS**

A prospectively collected database maintained by the supervising surgeon (PWM) was used to identify all consecutive cases of elective laparoscopic total abdominal colectomy and total proctocolectomy performed from October 1997 to October 2004. Before August 2001, all cases were performed by using a straight laparoscopic approach. Thereafter, patients were routinely offered a choice between hand-assisted or straight laparoscopic total colectomy. In cases for which straight laparoscopy was not believed to be feasible as a result of obesity or severity of disease, the hand-assisted approach was recommended by the primary surgeon. A single surgeon (PWM) performed all procedures with general surgery residents, colorectal surgery residents, and three colorectal staff surgeons. Of the three staff surgeons, two had performed no previous laparoscopic surgery, and one had limited experience with laparoscopic colon resection before this study. Each of the three staff members initially assisted with the straight laparoscopic procedures and then later the hand-assisted approach. Each found it difficult to perform the straight laparoscopic technique and stopped assisting in these procedures until the hand-assist technique was used, which allowed them to learn and perform this technically demanding procedure more easily.

The technical aspects of the operative procedures were comparable between the two groups, including the use of a medial to lateral dissection approach. In the SL group, the procedure was performed by using five ports (Fig. 1) and a flexible-tip or zero-degree laparoscope. The dissection began with the identification and ligation of the ileocolic artery inferior to the third portion of the duodenum. Dissection of the right colon off the retroperitoneum was performed medial to lateral until the white line of Toldt. The attachments overlying the duodenum also were dissected free. A medial approach was used to ligate the middle colic vessels before entering the lesser sac. The remaining mesocolon between the ileocolic and middle colic vessels were carefully dissected. The remaining attachments of the right colon were then mobilized laterally. The gastrocolic omentum was dissected free from the transverse colon and the lesser sac entered. With the right colon fully mobilized and devascularized, the sigmoid colon was then mobilized medial to lateral by dissecting posterior to the inferior mesenteric (IM) vessels and entering the retrorectal plane. The left ureter was identified before ligating the IM artery and vein. The left colon was mobilized off the retroperitoneum up to the splenic flexure and laterally to the white line of Toldt, staying anterior to Gerota’s fascia. The left colic artery and vein were identified and ligated. The white line of Toldt was incised and any remaining omental attachments at the splenic flexure were divided. For the majority of total colectomy cases, the colon was extracted through enlargement of the right lower quadrant extraction site. For proctocolectomy, some or all of the rectal mobilization was performed laparoscopically and then a Pfannenstiel incision is formed, through which proctectomy could be completed in an open fashion when necessary. An ileostomy, ileoanal pouch, or rectal anastomosis can then be fashioned by using this same incision. Before

**Figure 1.** Trocar distribution for straight laparoscopic total abdominal colectomy and total proctocolectomy. Specimen extraction was through the Pfannenstiel incision.