

## Laparoscopic Colonic Surgery: Early Experience

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### Abstract:

**Introduction:** The paper reports early experience with laparoscopic colonic surgery in relation to indications, tumour size, operative time, duration of analgesic requirement postoperatively, return of bowel activity, postoperative complications and mortality.

**Methods:** A multicentre case series study at Jinnah Postgraduate Medical Centre, Orthopedic & Medial Institute, SIUT and South City Hospital between February 2007 and February 2010. Clinical and operative records of all laparoscopic-assisted colonic procedures performed between February 2007 and February 2010 were studied.

**Results:** 80 laparoscopic-assisted colonic surgeries were performed during this period. There were 74 cases of carcinoma, 5 cases of tuberculosis and 1 case of polyp. Laparoscopic-assisted procedures included right hemicolectomy in 54 cases, left hemicolectomy in 15 cases, sigmoid colectomy in 6 cases, segmental resection of splenic flexure in 2 cases, transverse colostomy in 3 cases. Eight cases were converted to open surgery; six because of locally advanced disease, one because of bleeding and one because of failure to localize the tumour. Mean operative time was 150 minutes. The mean tumour size was 6cm. Mean duration for analgesic requirement was 2.5 days. Mean time to return of bowel activity was 2.7 days with a mean hospital stay of 5 days. Intraoperative traction injury to the small bowel was encountered in 1 patient. Postoperatively 2 patients had local wound infection and 2 patients developed pulmonary infection.

**Conclusions:** Laparoscopic-assisted colonic procedures are associated with a smaller wound, quicker return of bowel activity, reduced consumption of analgesics, a shorter hospital stay and low rates of pulmonary infection. Laparoscopic colonic surgery is feasible and a logical progression towards acquisition of advanced laparoscopic skills with good results.

**Key Words:** Colonic cancer, laparoscopic assisted colonic surgery, laparoscopy

### Introduction

Laparoscopic surgery has proved its application in cholecystectomy, Nissen's fundoplication and appendicectomy. However, laparoscopic colonic surgery has been slow to gain widespread acceptance. Laparoscopic colonic surgery has been one of the slowest areas of development in minimally invasive surgery because it is often complex, multi-quadrant and frequently involves the treatment of a malignancy. Jacobs first reported laparoscopic colon resection (LCR) in 1991.<sup>1</sup> The procedure, however has been slower to evolve as it is considered technically demand-

ing and time-consuming with a steep learning curve.<sup>2,3</sup> Initial concerns on the radicality of the resection, in particular the adequacy of the lateral and distal margins and lymph node clearance, as well as the early reports on the high incidence of port site recurrence,<sup>4,5</sup> limited the wide application of laparoscopic colectomy for cancer.

Recently, there is an ever-increasing body of evidence demonstrating the significant advantages of LCR, in terms of less pain, less postoperative analgesia, early return of bowel activity, a shorter hospital stay and lower rates of postoperative

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morbidity.<sup>6-11</sup> In addition several prospective, randomized studies have reported that the initial concerns regarding the oncologic outcomes in LCR were unfounded.<sup>12-14</sup> Notably, 3 clinical trials: the COST, COLOR and CLASSIC, have provided level 1 data supporting LCR for colon cancer.<sup>6,15,16</sup> The purpose of this study is to describe the short-term outcomes of our patients who underwent LCR for a variety of colonic pathologies.

#### Materials and Methods:

All laparoscopic-assisted colonic (LAC) surgical procedures performed between February 2007 and February 2010 were included in this study. The clinical and operative records of these patients were reviewed to obtain relevant clinical data, record selected intraoperative parameters and their postoperative outcomes.

All procedures were performed by the same surgeon. Initial patient selection was confined to patients who had benign conditions but gradually with improving experience, the technique was also offered to patients with malignancies.

All patients had their procedures performed under general anaesthesia. Right-sided colectomies

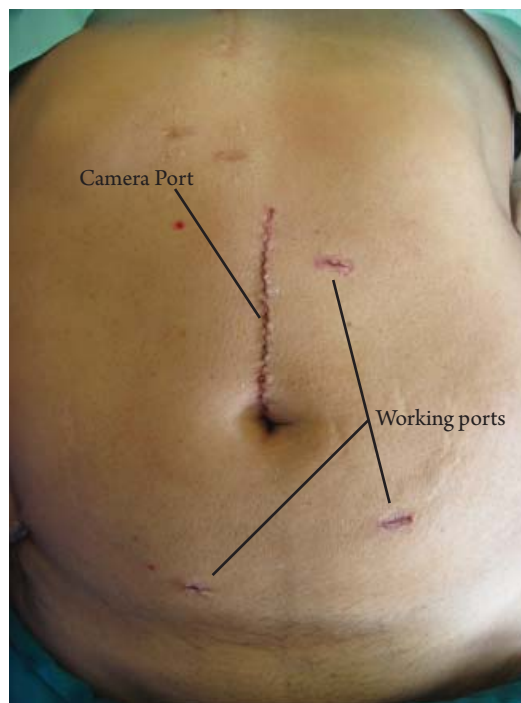


Figure 1: Wounds following Laparoscopic Right Hemicolectomy

were performed in the supine position while modified Lloyd-Davies position was used for left-sided colectomies. Standard thromboembolic prophylaxis was used in the form of Thrombo Embolism Deterrent (T.E.D.) stockings, pneumatic calf compression stockings and low molecular weight heparin (Enoxaparin).

Veress needle insufflation was used for the initial 10mm trocar insertion and four trocars were used in all cases. Pneumoperitoneum was achieved with carbon dioxide and an intra-abdominal pressure of 12 – 15mm Hg was maintained. Subsequent 5mm, 10mm or 12mm trocars were inserted under direct laparoscopic vision. 0o, 30 o and 45o telescopes were used. Dissection was facilitated by the use of the harmonic shears (Harmonic Scalpel, Ethicon Endo-Surgery, Inc, Cincinnati, OH, USA), the Ligasure (Valleylab) and/or monopolar diathermy. A standardized medial to lateral dissection technique was carried out in all but 3 patients, who had benign disease. The bowel was delivered extra-corporeally after adequate mobilization through an incision large enough to allow easy withdrawal and the diseased segment resected. Endo-GI staples (Proximate® Linear Cutter and Proximate® ILS Curved Intraluminal Stapler; Ethicon Endo-Surgery) were used in 28 patients and hand sewn single layer anastomosis with Vicryl® was carried out in the rest. Peritoneal drains were placed in-situ where indicated.

Postoperative analgesics were administered either via epidural catheters, patient controlled analgesia (PCA) pumps or intravenous opioids/



Figure 2: Tumour right colon



Figure 3: Resected Right Hemicolectomy specimen

NSAIDs. These were converted to oral analgesics once the patient was able to tolerate oral feeding.

### Results:

A total of 80 laparoscopic-assisted colonic (LAC) procedures were performed during this period. There were 56 male and 24 female patients. Their mean age was 46 years (range, 22 to 82). (Table 1)

The diagnoses of these 80 patients are shown in Table 2. 74 patients had procedures performed for malignancy; 71 adenocarcinoma, 2 carcinoid and 1 non-Hodgkin's lymphoma. 5 patients had ileocaecal tuberculosis, and 1 had a submucosal polyp. Of these 80 procedures there were 54 right hemicolectomies, 15 left hemicolectomies, 6 sigmoid colectomies, 2 segmental resections of splenic flexure and 3 transverse colostomy (Table 2).

Of these 80 LAC procedures, eight were converted to open for the following reasons: 1 was converted because of excessive bleeding due to venous avulsion, 6 because of locally advanced disease with tumour infiltrating the abdominal wall and adjacent viscera and 1 because of the failure of localizing the tumour. Five patients un-

derwent right hemicolectomy, two sigmoid and one underwent left hemicolectomy.

All the 54 right hemicolectomies had extracorporeal construction of anastomoses using 1 Proximate® Linear Cutter in 40 and hand sewn anastomosis in the remaining 14. The 15 left-sided colectomies, had hand sewn anastomosis constructed extra-corporeally. The 6 sigmoid colectomies had the segment delivered extra-corporeally after bowel mobilization, and intra-corporeal anastomosis was constructed using 1 Proximate® ILS Curved Intraluminal Stapler, after resecting the segment. 3 patients with advanced colorectal adenocarcinoma had a transverse colostomy fashioned prior to receiving neo-adjuvant therapy.

Histopathological analyses of resected specimens of the 71 patients with adenocarcinoma revealed 1 patient with T1 size of tumour, 18 with T2, 46 with T3 and 6 with T4. The mean tumour size was 6 cm (range 2-12 cm). The mean number of lymph nodes harvested was 20 (range 6 to 28). (Table 3)

Table 1: Patient Demographics

Age	46 years (range 22-82)
Gender (%)	
Male	56 (70)
Female	24 (30)
ASA (%)	
1	65 (81)
2	10 (12)
3	5 (6%)
4	0
TNM Stage (%)	
I	1 (1.4)
II	18 (25)
III	46 (65)
IV	06 (8)

Table 2: Indications for Surgery

Cancer	74	92%
Adenocarcinoma	71	
Carcinoid	02	
Non-Hodgkin's lymphoma	01	
Ileocecal tuberculosis	05	6%
Polyp	01	

Table 3: Perioperative Outcomes

Mean operative time	130 minutes
Range	60-240 minutes
Number of conversions to open	8
Mean tumour size	6 cm
Range	2-12cm
Mean number of lymph nodes harvested	20
Range	6-28
Mean duration of analgesic requirement	2.5 days
Range	2-5 days
Mean time to first bowel movement	2.7 days
Range	2-4 days
Mean length of hospital stay	5 days
Range	4-10 days

The mean operative time for LAC procedures was 150 minutes (range 60 to 250). Mean duration for requirement of analgesics was 2.5 days (range 2-5). The mean time to first bowel movement was 2.7 days (range 2-4) and the mean length of hospital stay was 5 days (range 4-10). (Table 3)

Intraoperative injury to small bowel was encountered in 1 patient due to inadvertent traction. This was managed with a serosal stitch. Two patients developed wound infection postoperatively. This was managed with antibiotics and dressings. Chest infection developed in two patients who underwent sigmoid colectomy. This responded to empirical antibiotics.

#### Discussion:

Colonic resection has evolved over the past decades. Turnbull et al<sup>17</sup> in 1960s, suggested the "no-touch" technique for colonic cancer, advocating early ligation of mesocolic vessels and atraumatic manipulation of the tumour to avoid spreading cells. Eggermont et al<sup>18</sup>, demonstrated the value of reducing surgical trauma in cancer in an experimental study. In laparoscopic surgery, peritoneal access is gained by small incisions, manual retraction of viscera is avoided and blood loss is minimal because of meticulous dissection facilitated by videoscopic magnification. Recent published series have proven that morbidity from laparoscopic procedures is less than that seen after traditional open procedures. These include diminished postoperative pain,

quick return of gastrointestinal function, shorter hospital stay, more rapid convalescence and less immunosuppression.<sup>19,20</sup> The results of this study of postoperative analgesic requirement, return of bowel activity and total hospital stay are comparable to the figures reported in literature. A meta-analysis<sup>21</sup>, consensus report<sup>22</sup> and more recent large randomized studies<sup>6,9,23,24</sup> in more than 3500 procedures have documented improved outcomes: hospital stay decreases by about 20% as a consequence of less pain and a reduced duration of paralytic ileus.

Laparoscopic conversion to open surgery is known to vary among studies: 7% to 25% in large series and 2% to 41% in smaller series.<sup>25,26</sup> Although conversion itself is not a complication, it is associated with a greater postoperative morbidity.<sup>26</sup> Risk factors associated with conversion to open surgery have been well described in the literature such as BMI, excessive tumour bulk, adhesions and operative experience.<sup>27-30</sup>

In this series, 8 patients (10%) underwent conversion to open surgery. As reported in literature, proper patient selection is important so is an earlier decision to convert.

An interesting aspect of the study is the significant number of patients with stage III disease (65%). These patients did well postoperatively and are in follow-up for tumour recurrence and survival.

The overall complication rate was 5 % with two patients developing chest infection. Literature also shows a reduced rate of postoperative complications following LAC, particularly respiratory complications.<sup>31,32,33</sup>

The resected segments had at least 5cm proximal and distal margins and on final histopathology all margins were reported tumour free. The mean number of lymph nodes harvested in this series was 20, in keeping with sound oncologic principles. These results are comparable to reported literature.<sup>6,34,35</sup>

#### Conclusion

Laparoscopic-assisted colonic procedures are

associated with a smaller wound, quicker return of bowel activity, reduced consumption of analgesics, a shorter hospital stay and low rates of pulmonary infection. Laparoscopic colonic surgery can be performed safely and effectively. However, it is associated with a steep learning curve. After gaining confidence in laparoscopic surgery, its application to diseases of the colon is the logical progression towards acquisition of advanced laparoscopic skills with good results.

#### Acknowledgement:

All authors are acknowledged for their contribution. Dr. Shamim Qureshi and Dr. Tabinda Aslam facilitated the data collection at the Jinnah Postgraduate Medical Centre and Dr. Aneela Malik contributed in the same at the Sindh Institute of Urology & Transplantation.

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