

# A Selective Policy Ensures Safe Integration of Laparoscopic Colorectal Resection into the Practice of a Newly Appointed Consultant Surgeon

Atif Alvi, Lesley Wood and R. Justin Davies\*

Cambridge Colorectal Unit, Addenbrooke's Hospital, Cambridge University Hospitals NHS Foundation Trust, Hills Road, Cambridge, CB2 2QQ, UK

**Abstract:** *Introduction:* Integration of laparoscopic colorectal surgery into consultant practice can be a challenge. We present the first year of practice for a suitably trained surgeon using a selective policy.

*Materials and Methodology:* Patients requiring an elective colorectal resection under the care of a newly appointed consultant surgeon were considered for laparoscopic surgery. Exclusion criteria included multiple previous abdominal operations, rectal cancer less than 12cm from the anal verge, radiological/clinical suspicion of tumor involvement of adjacent organs and a mass  $\geq 6$ cm. Prospective data collected from August 2007 to August 2008 included types of surgeries, body mass index (BMI), median operating time, lymph node yield, complications, 30 days mortality, length of stay and 30 days readmissions.

*Results:* Laparoscopic colorectal resection was performed in 42 patients (26 females), with a median age of 65 years (range 14-83 years). There were 18 right hemicolectomies/ileocaecal resections, 15 sigmoid colectomies/high anterior resections, 7 subtotal colectomies and 2 reversal of Hartmann's. Indications for surgery were colorectal cancer (n=27), inflammatory bowel disease (n=10), diverticular disease (n=3) and others (n=2). There were 5 (11.9%) conversions. Median operating time was 150 minutes (range 75-280 minutes) and BMI was 25.5 (range 16-38). There were no deaths reported. Eight (19%) patients had complications. Median lymph node yield in malignant cases was 13 (range 8-30). Median length of stay was 4 days (range 3 to 20 days) and there were 3 (7%) readmissions.

*Conclusions:* Laparoscopic colorectal resection can be safely integrated into the practice of a suitably trained, newly appointed consultant surgeon if a selective policy is employed. With greater experience, a less selective policy may become appropriate.

## INTRODUCTION

Laparoscopic colorectal resection (LCR) may be appropriate for both benign and malignant disease. It is associated with fewer wound complications, reduced hospital stay, faster recovery and reduced use of analgesia and blood transfusion when compared to open surgery, [1] and is cost-effective [2,3]. More recent data suggest that LCR is associated with fewer adhesions [4] and incisional hernia formation [5] compared with open surgery, and is oncologically safe [6]. In addition, data from Barcelona suggest that patients with stage III colorectal cancer may have improved survival, if their surgery is carried out laparoscopically, rather than open [7,8].

Major randomized studies, such as the Clinical Outcome of Surgical Therapy (COST) trial in North America [9], the United Kingdom Medical Research Council trial of Conventional versus Laparoscopic-Assisted Surgery in Colorectal Cancer (CLASICC) [10], and the Colon Cancer Laparoscopic or Open Resection (COLOR) trial in Europe [11], confirm the benefits of laparoscopic-assisted colectomy with respect to morbidity and hospital stay. Other studies have

shown that the number of intraoperative laparoscopic-related complications, conversion rate, and morbidity and mortality rates decrease with increasing surgeon experience [12].

Therefore, LCR has clear advantages over open surgery; however, the effectiveness of the approach may depend on the conversion rate. The evolution of the learning curve in LCR and the conversion rate correlates with the experience of the surgical centre and the experience of the operating surgeon. Several studies have quoted the duration of the learning curve for LCR to be between 30 and 70 operations [13,14]. A prospective non-randomized analysis by Buchanan *et al.* [15] including 230 laparoscopic and 135 open resections for colorectal carcinoma showed a decrease in the conversion rate from an initial 16% (6 of 37) to 12.5% (15 of 120) following 230 LCRs. As the demand for LCR increases, patient selection, case-mix, and laparoscopic outcomes such as conversion rates and readmission rates may vary between surgeons and institutions.

As shown previously, [10] a significantly higher rate of morbidity may follow conversion from laparoscopic to open resection for colorectal carcinoma. This raises the question as to what extent the conversion to an open procedure exerts a negative influence on patient outcome. Thus, it would seem appropriate that careful selection and auditing of LCRs may provide some benefits in reducing conversion rates and ensuring oncological adequacy and patient safety.

\*Address correspondence to this author at the Cambridge Colorectal Unit, Addenbrooke's Hospital, Cambridge University Hospitals NHS Foundation Trust, Hills Road, Cambridge, CB2 2QQ, UK; Tel: 01223 586701; Fax: 01223 216015; E-mail: justin.davies@addenbrookes.nhs.uk

The aim of this study was to evaluate short-term outcomes of a selective policy in performing LCR during development of a laparoscopic colorectal service by a newly appointed, appropriately trained consultant surgeon. Specific targets were low morbidity, mortality and conversion rates, with acceptable oncological resections in cases of malignancy.

## MATERIALS AND METHODOLOGY

From August 2007 to August 2008, prospective data were collected for all patients undergoing elective LCR. The responsible consultant had been trained in laparoscopic surgery in the United Kingdom and a 12-month fellowship in North America.

Exclusion criteria included multiple previous abdominal operations, rectal cancer less than 12cm from the anal verge, radiological/clinical suspicion of tumor involvement of adjacent organs and a mass  $\geq 6$ cm. Demographic patient data included types of surgeries, body mass index (BMI), median operating time, lymph node yield, complications, 30 days mortality, post-operative length of stay and 30 days readmissions. Conversion was defined as the need for an incision larger than would otherwise have been required to remove the specimen. All cancer cases had a pre-operative colonoscopy with tattooing of the tumor site (see Fig. 1), to facilitate identification of the tumor at the time of laparoscopy. The same surgeon (RJD) acted as either the primary operating surgeon or as the supervising surgeon.

### Principles of Surgical Technique

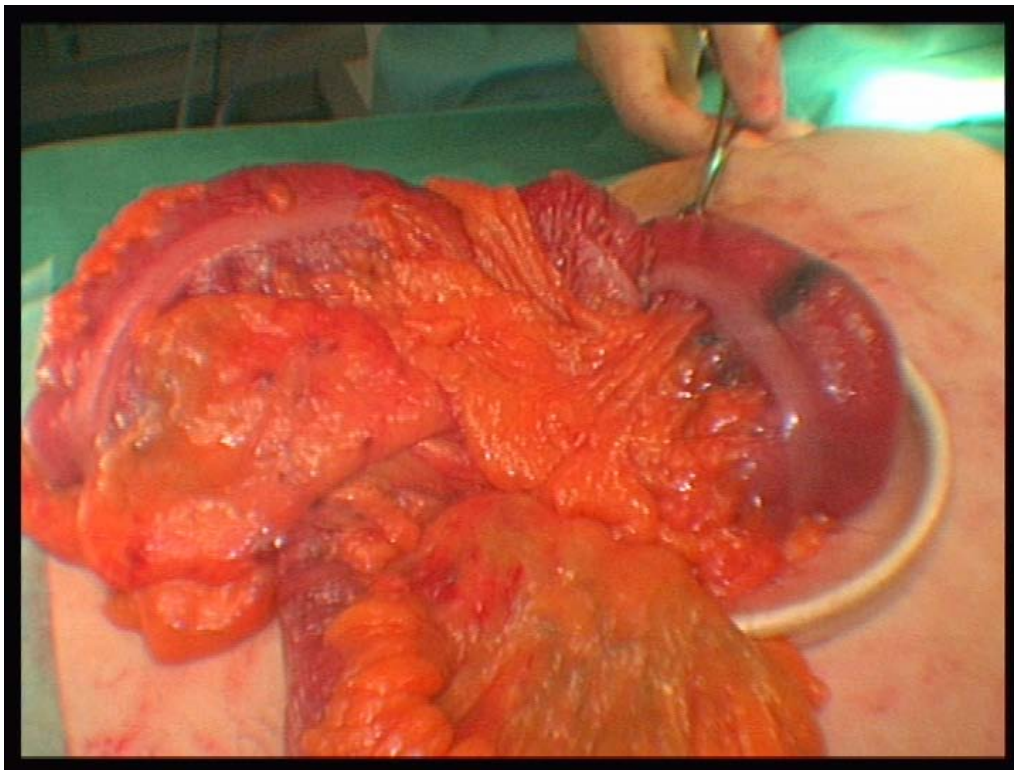
During the first year, we adopted a standard surgical approach that was used in all cases. For right-sided resections, a four port technique was used, with inferomedial dissection,

intracorporeal vascular division (often with the Ligasure™ (Covidien, Gosport, UK)), specimen exteriorization and extracorporeal anastomosis. For left-sided resections, a four port technique was used. Wherever possible, medial to lateral dissection was performed, with intracorporeal vascular division after ureteric identification. Lateral mobilization with selective splenic flexure mobilization was performed, with intracorporeal distal transection, exteriorization of the specimen with proximal transection and subsequent intracorporeal anastomosis using a circular stapler. For subtotal colectomies, a five port technique was used (see Fig. 2).

## RESULTS

From August 2007 to August 2008, 42 elective LCRs were performed. Twenty-six patients (62%) were females with median age of 65 years (range 14-83). The median BMI was 25.5 (range 16-38). The indications for surgery were colorectal cancer (n=27), inflammatory bowel disease (n=10), diverticular disease (n=3) and others (n=2). The types of operations performed were right hemicolectomy / ileocaecal resection (n=18), sigmoid colectomy / high anterior resection (n=15), subtotal colectomy (n=7) and reversal of Hartmann's (n=2). Median operating time was 150 minutes (range 75-280 minutes). The median lymph node yield in cases of colorectal cancer was 13 (range 8-30) and the median post-operative length of stay was 4 days (range 3-20 days). No deaths were reported.

Over the same time period, 27 elective open colorectal resections were also performed. These included right hemicolectomy (n=10), anterior resection (n=10), abdominoperineal excision of the rectum (n=3), left hemicolectomy (n=2), panproctocolectomy (n=1) and reversal of Hartmann's (n=1). All these patients were excluded from the analysis.



**Fig. (1).** Tattoo of transverse colon cancer following laparoscopic mobilization and delivery of the specimen to be resected.



**Fig. (2).** Laparoscopic-assisted subtotal colectomy and ileostomy.

### Morbidity

Eight patients (19%) had complications. These included pneumonia (n=1), wound infection (n=1), ileus (n=2), myocardial infarction (n=1) and a superior sagittal sinus thrombosis (n=1) that occurred eighteen days after surgery. There were two anastomotic leaks; one following an anterior resection for upper rectal cancer, and the other after an ileocaecal resection for Crohn's disease. Both patients made full recoveries.

### Conversions

There were 5 (11.9%) conversions. The reasons for conversion were dense adhesions (n=2), severe Crohn's disease affecting the entire ileum with inter-loop abscesses (n=1), and potential locally advanced malignancy (n=2). All conversions occurred within 30 minutes of the start of the operation.

### Readmissions

There were 3 (7%) readmissions. These included: one patient with an anastomotic leak, one with minor rectal bleeding, and another with non-specific abdominal pain.

## DISCUSSION

Laparoscopic colorectal resection can be technically challenging. These procedures frequently involve two or more abdominal quadrants, control of large blood vessels, identification of extraperitoneal structures such as the ureters, and intracorporal restoration of intestinal continuity. Moreover, inflammatory conditions such as Crohn's disease and diverticulitis may present a hostile environment for the laparoscopic surgeon, due to distorted anatomy and handling of

friable and inflamed tissue. These factors may affect the initial outcome early in the development of a laparoscopic service.

Laparoscopic colorectal surgery performed in well-selected patients is associated with reduced hospital stay, quicker return of bowel function and lower morbidity when compared to open procedures [1, 16]. Many studies have shown higher perioperative morbidity and complications for converted cases compared with entirely laparoscopic resections. Thus, in the CLASICC trial [10], increased morbidity, prolonged operating time, longer hospital stay and increased need for blood transfusion was observed in the converted group (conversion rate of 29%). Prolonged ileus, increased operating time and longer hospital stay for converted cases compared with those performed entirely laparoscopically was also found in a meta-analysis that included 3,232 patients [17]. In addition, an increased rate of postoperative complications following conversion has been described by others [11, 18]. We believe that wherever possible, a decision to convert an open operation should be made as soon as possible, in order to potentially reduce the complications associated with prolonged operating times in cases converted late.

Tekkis *et al.* [14] showed six factors found to be independent predictors of conversion from laparoscopic to open surgery: the ASA grade, BMI, type of surgery, intra-abdominal abscess or fistula and the operative experience of the surgeon. Other important reasons for conversion are the narrow, male pelvis, inflammation caused by diverticular disease, fixed tumours, adhesions, intraoperative complications and anatomical difficulties [10, 19]. Conversion rates between 17% and 29% are reported for LCRs in previously published prospective randomized multicentre trials [11, 20].

In other non-randomized studies with over 100 LCRs, conversion rates up to 41% are reported [21]. In comparison, the conversion rate in our present series is 11.9%; this may be attributed to the selective approach described.

Current recommendations of the American Society of Colon and Rectal Surgeons, suggest a prior experience of at least 20 LCRs for benign disease or metastatic colon cancer before using laparoscopy to treat curable malignant disease [22]. Although we have no long-term data regarding survival or disease recurrence, we are encouraged by the low morbidity and adequate lymph node retrieval (compared with the minimum number of 12 nodes recommended by the Association of Coloproctology of Great Britain and Ireland) [23] in the cases of colorectal cancer carried out laparoscopically.

Timely conversion of a laparoscopic approach should be regarded as good surgical judgment rather than as a surgical failure. Early conversion in appropriate cases may avoid possible complications and unnecessarily prolonged operations. In our series, all 11.9% of cases were converted at an early stage, thus potentially preventing a prolonged period of laparoscopic surgery prior to conversion to an open operation.

## CONCLUSION

Laparoscopic colorectal resection can be safely integrated into the practice of a suitably trained, newly appointed consultant surgeon if a selective policy is employed. Our early results have demonstrated acceptable conversion rate, morbidity, readmission rate and lymph node yield. With greater experience, a less selective policy may become appropriate.

## ABBREVIATIONS

LCR = Laparoscopic colorectal resection

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