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LAPAROSCOPIC COLECTOMY IN A DISTRICT HOSPITAL; THE SINGLE SURGEON CAN BE SAFE

Authors: Aikoye AA[1], Khushal A[2], Parkin C[3], Bates T[3]

Affiliations: 1. Department of Surgery, William Harvey Hospital, East Kent Hospitals NHS Trust, Kennington Road, Ashford, Kent TN24 0LZ.

2. Department of Surgery, Kent and Canterbury Hospital, East Kent Hospitals NHS Trust, Canterbury, Kent CT1 3NG, UK.

3. Centre for Professional Practice, University of Kent, Medway Building, Chatham Maritime, Kent ME4 4AG, UK

Corresponding author: Mr Alexander Aikoye

Department of Surgery, William Harvey Hospital,

East Kent Hospitals NHS Foundation Trust,

Kennington Road, Ashford, Kent TN24 0LZ, UK

E-mail: alexander.aikoye@nhs.net

ABSTRACT

Background:

Several outcome measures have been identified for colorectal surgery and published in the literature. This study sought to compare outcomes of high volume laparoscopic colectomy by a single surgeon in a district hospital with outcomes from tertiary referral centres.

Methods:

This was a retrospective review of elective laparoscopic colectomy by a single laparoscopic general surgeon in a district hospital over a 51 month period using a prospectively maintained database.

The key outcome measures studied were length of hospital stay, conversion to open, anastomotic leak, wound infection, re-admission and 30 day mortality.

Results:

187 elective laparoscopic colectomies were performed at the Kent and Canterbury Hospital between July 2008 and October 2012.

The median patient age was 69 years (range 22-90 years). Median length of hospital stay was 4 days (range 1 – 48 days). Anastomotic leak occurred in 4 (2.1%) patients. 7 (3.7%) patients underwent conversion to open surgery. Re-admission occurred in 4 (2.1%) patients for small bowel obstruction (1), wound infection (1), anastomotic leak (1) and colo-vaginal fistula (1). There

was one postoperative death from severe chest infection (0.5%). These results are similar to those published by tertiary referral centres.

Conclusion:

This study of outcomes at a district hospital shows that the outcome reported from laparoscopic colorectal surgery in tertiary referral centres is reproducible at the district hospital level by a single surgeon with a high operative volume.

Key Words: Laparoscopic colectomy, surgeon volume, district hospital

INTRODUCTION

The benefits of laparoscopic colectomy have been demonstrated in a number of outcome areas by several large studies[1,2,3]. Most landmark trials come from high volume tertiary centres. The outcomes from District hospitals are generally considered to be less satisfactory than that from tertiary centres on account of the low hospital volume.

The apparent disparity in outcome between large volume centres and the smaller district hospital centres for specialist colorectal cancer services[4] is widely accepted. However, Hogan et al have pointed out the need for convincing evidence before pursuing the agenda of centralisation of colorectal specialist services[5].

District hospitals are generally smaller, have fewer specialists and are less well equipped than tertiary referral higher volume centres.

In the UK, there is an increasing trend towards centralisation of specialist services resulting in laparoscopic colectomy for cancer being concentrated in tertiary referral centres.

This trend towards centralisation has resulted in the recent removal of laparoscopic colorectal cancer operations from the study hospital, the Kent and Canterbury Hospital (K&C), to the larger surgical hospitals in the same Trust, Queen Elizabeth the Queen Mother Hospital Margate (QEQM) and William Harvey Hospital (WHH) Ashford. This situation has been driven primarily by the occurrence of a single solitary laparoscopic colorectal

surgeon at the K&C Hospital. All complex and cancer patients were considered at multidisciplinary review with colleagues at the QEQM hospital. Re-admissions were made to K&C Hospital but in the absence of the single surgeon the colorectal surgeons at the sister hospitals cared for these patients. The single surgeon in question now carries out laparoscopic colectomy for cancer at the QEQM Hospital with his results largely unchanged.

Since the first segmental colectomy of the early 90's laparoscopic colectomy has continued to see increasing proficiency and uptake in England and worldwide. The first recorded laparoscopic segmental colectomy was laparoscopic assisted right hemicolectomy undertaken by Moises Jacob in Miami, Florida (June, 1990)[6]. This was closely followed by a laparoscopic sigmoid colectomy undertaken in the same year by Denis Fowler[7].

Early during the introduction of laparoscopic colon resection, the benefits of laparoscopic colectomy over standard open colectomy were in question. The key issues raised for laparoscopic colectomy were in the areas of cost, duration of surgery, the learning curve of conversion to open surgery, morbidity[8] and oncological safety[9].

Several authors have compared the two approaches to colectomy with respect to these important areas of concern. Many studies reveal comparable or superior advantage to laparoscopic colectomy over open colectomy e.g. with respect to cancer recurrence[1], analgesic requirement[1], length of hospital stay[2], disease control/ survival[10] and blood loss[11,12].

In a study of short term end points to predict long term outcomes in patients with colorectal cancer, the UK Medical Research Council CLASICC trial (conventional vs. laparoscopic assisted surgery in colorectal cancer) found no

difference in the rate of positive resection margins as well as in-hospital mortality rates between these two groups[13].

Lower costs have been demonstrated with laparoscopic colectomy. This is thought to be due to shorter length of stay, lower complications rates and mortality[14].

Community/ District hospitals may have poorer outcomes by reason of their lower hospital volume, smaller critical mass of experts and reduced intensive care unit support. However, such hospitals may have a low hospital volume but could yet have high surgeon volumes if they possess few specialist surgeons. Could it be that surgeon volume is a better predictor of outcome than hospital volume? [15]. This is an important question considering that centralisation of services is often tied to specialisation and hospital volume. Different figures have been used to define the surgeon number of colorectal resections per year that should be designated high volume and what numbers constitute low volume. Drolet et al[16] defined low and high surgeon volumes as <5 and >9 colectomies per year respectively. Borowski et al, on the other hand, defined low and high surgeon volumes by <26 and >40 colectomies per year respectively[17].

A handful of studies have specifically looked at laparoscopic colectomy in the district/ community hospital. Tang et al found no anastomotic leak or mortality over a 3-year period with a surgeon volume of over 20 colectomies per year[18].

Although the impact of surgeon volume on outcome for colorectal cancer surgery has been demonstrated in the literature[19] more emphasis has been placed on hospital volume-outcome relationship than on surgeon volume.

There is some evidence in literature that higher surgeon volume can result in lower stoma rate[20,21] and better disease free and overall survival following colon cancer surgery[21].

METHODS

This study was a retrospective study of laparoscopic colorectal resections undertaken at the Kent and Canterbury Hospital from July 2008 to October 2012, a 51-month period.

Ethical approval for this study was obtained from the K&C audit and research unit, NRES (National Research Ethics Service) and the University of Kent Research & Ethics Committee.

The results of all elective laparoscopic colectomies were studied. All colorectal laparoscopic surgical procedures at this district hospital were undertaken by a single laparoscopic general surgeon.

There were only 3 emergency laparoscopic colorectal resections which were excluded from the study. These were subtotal colectomy operations for ulcerative colitis. All were uncomplicated.

The surgeon followed a standard approach to colectomy. The technique began with division of the vascular pedicle before dissection, mobilisation and resection of the colon.

The laparoscopic colectomy operations included right hemicolectomy, left hemicolectomy, sigmoid colectomy, anterior resection, subtotal/ total colectomy and abdomino-perineal excision of rectum. The follow up period varied from 2 months to 5 years.

Long term oncologic outcome was assessed for the cancer laparoscopic resections (excluding those who had distant metastases or locally advanced disease at time of initial surgery) by analysis of Disease Free Survival and Disease Specific Survival. Each patient had an initial outpatient review at 6 weeks after surgery and subsequently at 6 monthly intervals up to 5 years post-surgery. This follow up regime was altered where complications or recurrences were encountered.

The data for the above participants were obtained from a robust prospectively maintained database. Other sources of data included the Trust electronic patient record, patient data centre, correspondences & electronic discharge notifications as well as the theatre management system (theatreman).
The data were entered into an Excel spread sheet.
Data analysis and Kaplan-Meier plots of recurrence and survival were carried out with SPSS (version 24).

The key outcome measures studied were length of hospital stay, conversion to open, anastomotic leak, wound infection, re-admission and 30-day mortality. The results from this study were compared with studies from high volume tertiary centres in the literature.

RESULTS AND ANALYSIS

A total of 209 elective colectomies were undertaken by a single surgeon at the K&C Hospital. 187 of the colectomies were undertaken laparoscopically while the remaining 22 cases were open colectomies. The operating surgeon's caseload for laparoscopic colectomy was 44 operations per year.
The median age of the laparoscopic patients group was 69 years (range 22 to 90) and there were 105 male and 82 female patients. In the preoperative assessment of fitness, 135 (72%) patients were ASA grade 1/2 and 52 (28%) were ASA grade 3. There was no elective laparoscopic colectomy patient with ASA grade 4.

In this study, the indications for colorectal resection surgery include colorectal cancer (136, 65.1%), colorectal polyps (31, 14.8%), Ulcerative colitis (19, 9.1%), diverticular disease (12, 5.7%) and Crohn's disease (11, 5.3%).

Analysis of the laparoscopic operations showed that 67 (35.8%) were for right hemicolectomy, 6 (3.2%) left hemicolectomy, 18 (9.7 %) total colectomy, 30 (16.0 %) sigmoid colectomy, 49 (26.2%) anterior resection, 8 (4.3%) abdominoperineal resection and 9 (4.8%) for Hartmann's operation.

The analysis of overall outcomes for laparoscopic colorectal resection showed the following. The length of postoperative hospital stay ranged from 1 to 48

days (median of 4 days). 150 (80.2%) were uneventful. Three patients (1.6%) had transient ileus while adhesive bowel obstruction requiring laparotomy occurred in 6 (3.2%) patients. Anastomotic leak occurred in 4 (2.1%) patients, one of whom was successfully managed conservatively but 3 required diversion proximal stoma. Seven (3.7%) patients underwent conversion to open surgery for reasons varying from bleeding to tumour perforation. Reoperation by open laparotomy was required in 4 (2.1%) additional patients, 2 for mesenteric bleeding and 2 for intra-abdominal sepsis . There was one laparoscopic reoperation. Re-admission rate of 4 (2.1%) was recorded for small bowel obstruction (1), wound infection (1), anastomotic leak (1) and colo-vaginal fistula (1). Wound infection occurred in 2 (1.1%) patients, one of which was complicated by superficial wound dehiscence. Early local tumour recurrence occurred in 2 (1.7%) of the cancer patients at a median follow up of 12 months. A metachronous cancer was recorded in 1 (0.8%) of the cancer patients. Other complications in this laparoscopic surgery group include; chest infection (1, 0.5%), acute coronary syndrome (1, 0.5%) and parastomal hernia (1, 0.5%). There was one postoperative mortality (0.5%) from severe chest infection.

A subgroup analysis of the cancer laparoscopic resections was undertaken to show time to cancer recurrence and cancer specific survival over a 5-year period. Analysis was undertaken for 122 out of the total of 129 patients (7 patients were excluded as they had evidence of locally advanced or distant metastases at time of initial surgery). The above findings are presented as Kaplan Meier plots. Figure 1 shows the disease free survival (71.3%) and

Figure 2, the disease specific survival (88.9%) at 5 years. The overall survival was 79.5% at 5 years.

A sub-group analysis of patients having an anterior resection was carried out. This was undertaken considering that anterior resection is more challenging and is associated with more significant risks than other types of colectomy.. Laparoscopic anterior resection represents a more difficult operation for the experienced laparoscopic colorectal surgeon due to the narrow access into the pelvis and the need for careful identification of tissue planes.

Laparoscopic Anterior Resection (n=49)

The gender proportion in this group was 28:21 (m:f). The ages ranged from 31 to 90 years (69 years median age). The indications for this operation were colorectal cancer (42, 91.3%), colonic polyps (4, 8.2%), Ulcerative colitis (2, 4.1%) and diverticular disease (1, 2.0%).

Overall outcome for this operation include a median length of postoperative hospital stay of 4 days and re-admission (3, 6.1%). The indications for re-admission were wound infection (x1), anastomotic leak (x1), and colo-vaginal fistula (x1). Other outcomes include postoperative ileus (1, 2.0%), parastomal hernia (1, 2.0%), superficial wound dehiscence (1, 2.0%), conversion to open (1, 2.0%), and re-operation/ Laparoscopy (5, 10.2%). Re-operation was undertaken for the above patients with an anastomotic leak (diversion colostomy) as well as the patient with colo-vaginal fistula (diversion colostomy). Other indications for re-operation included small bowel

obstruction (laparoscopic adhesiolysis) and 2 cases of intra-abdominal sepsis treated by laparoscopic washout.

Subgroup analysis was undertaken for the colorectal cancer subset of patients (n=42). Median age was 69 years. The median length of postoperative hospital stay was 4 days. Other outcomes include anastomotic leak (1, 2.4%) and conversion to open (1, 2.4%).

We compared the local outcomes with major studies in the literature. Table 1 compares the local result (K&C Hospital) with 5 laparoscopic colectomy studies from tertiary referral centres.

DISCUSSION

Table 1 demonstrates that the outcomes reported from tertiary high volume centres can be reproduced in the district hospital by a single surgeon with an adequate operative volume.

The median age of 69 years for the colectomy patients is similar to average age reported in the literature. The median length of hospital stay of 4 days compares favourably with some studies in the literature[1].

The results from this district hospital are also attributable to the dedicated team of anaesthetists, operating theatre personnel and critical care staff that worked with the laparoscopic surgeon.

These findings are in keeping with similar recent district or community hospital experience reported in the literature. In a community hospital study with average surgeon volume of over 15 colectomies per year, Sebajang et al demonstrated that outcomes similar to those from tertiary centres are achievable[26] and three more recent studies from community hospitals with a single surgeon have shown that laparoscopic colorectal surgery can be safe in this setting[27,28,29].

In a large population based study, Drolet et al showed that surgeon volume was an independent predictor of outcome following colorectal resection for cancer[15]. The same finding has been demonstrated by other authors[30,31,32] but a UK wide study of Hospital Episode Statistics failed to show a consistent relationship between laparoscopic surgical caseload and patient outcome[33,34].

It had previously been suggested that hospital volume may be more important than surgeon volume[35].

The Cochrane review by Archampong et al considered the impact of caseload and specialisation on outcomes of colorectal cancer surgery and found a positive relationship between high surgeon volume and better outcomes[21].

The literature therefore supports the finding of good outcomes in laparoscopic colon resection at the district hospital level. Essentially low hospital volume does not automatically translate to poor outcome since the surgeon's volume may be a better predictor of outcome.

The key reasons for the transfer of laparoscopic colorectal surgery from the K&C hospital included access to the MDT (multidisciplinary team), continuity of care during inevitable absences of the solitary surgeon, the potential risks of failure to rescue and professional isolation.

This retrospective study was subject to a number of shortcomings since it relied on the availability of accurate records. There were few missing data but information on risk factors such as comorbidities were under-reported and body mass index (BMI) was available on only a few patients. For this reason, the BMI was not included in the analysis of outcomes in this study.

The use of length of stay as an outcome measure is open to variation of local custom and practice over time and may also affected by a variety of non clinical factors[36]. The wound infection rate was very low and this may have been under-recorded.

Since this was effectively an elective unit it is possible that the case mix may have been more favourable than in hospitals covering emergency colorectal surgery.

CONCLUSION

This study has shown that laparoscopic colorectal surgery can be safely delivered to a high standard by a single surgeon provided that all cases are duly considered by the multidisciplinary team and that regular audit of outcome is carried out.

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