Abstract

Our aim was to assess the long term survival advantage associated with the laparoscopic approach for colon cancer resection in an Irish minimally invasive unit. Between January 2005 and December 2006, 154 patients underwent resection for colon cancer. 108 underwent a laparoscopic resection, with a conversion rate of 11%. The overall 5 year survival was 71.4%. The overall 5 year survival rate for laparoscopic resections was 80.6% where as the overall survival for open resections was 55%. Laparoscopic surgery had a significant 5 year overall survival advantage compared to open in both non metastatic disease (Stage I and II) (92.2% vs. 69.6%, p<0.0288) and metastatic disease (Stage III and IV), (68.4% vs. 30.4%, p<0.0026). Laparoscopic surgery in a dedicated minimally invasive unit with verifiable low conversion rates is feasible and in our experience associated with a long term survival advantage for colon cancer.

Methods

Patients were identified retrospectively from a prospectively recorded database. Patients were analysed on an intention to treat basis. All patients underwent colonoscopy, biopsy, tumour markers and computed tomogram of the thorax, abdomen and pelvis. All cases were discussed at our multi-disciplinary conference. Open resections were advised on bulky tumours, patients with multiple previous abdominal surgeries and patients with a BMI >30.

The conversion rate. 46 patients had a de novo open resection. The median length of stay was 10 days (range 5 – 35). Of the converted cases, three were due to failure to progress as a result of dense adhesions, one was due to haemorrhage at the splenic angle and one was due to respiratory compromise secondary to the pneumoperitoneum. Post operatively patients were managed according to a revised enhanced recovery program which is proven to enhance recovery and shorten hospital stay, the RAPID protocol (remove, ambulate, post-operative analgesia, introduce diet) along with haematological investigations (including serum CEA levels). CT TAP and endoscopy were performed 1 month after discharge. Subsequently, patients were followed up in a dedicated cancer outpatient clinic (OPD) led by a colorectal oncology nurse. This consisted of an OPD every three months for the first two years and then six monthly for the subsequent 3 years. Surveillance consisted of both history and physical examination (including faecal occult blood testing) along with haematological investigations (including serum CEA levels), CT TAP and endoscopy were performed annually. Statistical analysis was performed using GraphPad Prism (California, USA). A p value of 0.05 was deemed statistically significant.

Results

Between January 2005 and December 2006, 154 consecutive patients underwent resectional colon surgery. 108 patients underwent laparoscopic surgery for colon cancer, 96 patients were completed laparoscopically with an 11.1% conversion rate. 46 patients had a de novo open resection. The median length of stay was 10 days (range 5 – 35). Of the 12 patients converted to an open procedure, three were due to failure to progress as a result of dense adhesions, five were due to bulky adherent tumours, two were due to technical difficulties as a result of obesity, one was due to difficult haemorrhage at the splenic angle and one was due to respiratory compromise secondary to the pneumoperitoneum. Procedures performed included: anterior resections (97.63%), abdomino-perineal resections (8.52%), left hemicolecystectomy (10.6.5%), right hemicolecystectomy (39.25.3%). All pathological subtypes were adenocarcinoma. The median number of lymph nodes retrieved was 14 (range 2 – 37). 87 (56.4%) patients received adjuvant chemotherapy following discussion at the multidisciplinary conference. According to the AJCC staging system 19 (12.3%) were stage I, 46 (30.7%) stage II, 73 (47.4%) stage III and 7 (4.5%) stage IV. Of the converted cases, one was stage I, 3 were stage II, 7 were stage III and 1 was stage IV.

Introduction

Cancer of the colon is the third most common cancer in men and women in the developed world, and surgical resection is the only curative treatment. Three notable randomised control trials (COLOR, MRC CLASICC and COST) have reported laparoscopic surgery to be a safe acceptable alternative to open surgery. These studies have proven laparoscopic surgery to offer non inferior survival outcomes. The Barcelona trial (Lacy et al.), suggested laparoscopic assisted colorectal surgery may be effective than open colectomy for the treatment of non metastatic colon cancer. The Barcelona trial has clear benefits compared with open colectomy with shorter length of stay, quicker return of bowel function, decreased use of analgesia and lower rates of wound complications. These benefits are offset by prolonged operating time, intra-operative cost and the learning curve associated with this technically challenging approach. Within Ireland our unit is the first unit to report 5 year survival data following laparoscopic colon resection. Our aim is to establish the long term survival associated with laparoscopic resectional colon cancer surgery in a minimally invasive surgical (MIS) unit in an Irish setting.

Methods

Patients were identified retrospectively from a prospectively recorded database. Patients were analysed on an intention to treat basis. All patients underwent colonoscopy, biopsy, tumour markers and computed tomogram of the thorax, abdomen and pelvis. All cases were discussed at our multi-disciplinary conference. Open resections were advised on bulky tumours, patients with multiple previous abdominal surgeries and patients with a BMI >30.

Patients were placed in the Lloyd Davis position. Port placement consisted of a 10mm sub-umbilical camera port, a 12mm right lower quadrant and a 3 X 5mm ports in the remaining 3 quadrants. After initial inspection the colon was mobilised using a medial to lateral approach and the vessels (inferior mesenteric or illocici) were identified, skeletonised and early flush ligation performed. For right hemicolecystectomies, the hepatic flexure and remaining lateral attachments were then divided, the specimen delivered through a mini-laparotomy (<5cm) at the umbilicus, the remaining mesentery ligated and divided and after delivery of the specimen a stapled functional end-to-end anastomosis was fashioned intraoperatively. For left sided lesions, the lateral attachments were divided and splenic flexure taken down, after transection distal to the tumour the bowel was delivered through a <5cm incision extended form the left iliac fossa port site. After the specimen was resected and pulsatile flow confirmed and end-to-end anastomosis was fashioned with a circular stapler (Ethicon, Inc.) intraoperatively. All mini-laparotomy sites were covered with 3M Steri-Drapefi wound protector. Conversion was defined as intra-abdominal dissection carried out through an extended extraction or new incision site.
The overall 5 year survival was 71.4%. The overall 5 year survival rate for laparoscopic resections was 80.6% whereas the overall survival for open resection was 50%. The overall number of deaths was 44, of which 36 were colon cancer related, as compared with the National Colon Cancer Registry, Ireland. Laparoscopic surgery in non-metastatic disease (Stage I and II) had a significant 5 year overall survival advantage compared to open (92.2% vs. 69.6%, p=0.0028).

Laparoscopic surgery also had a significant 5 year overall survival in metastatic disease (Stage III and IV) (88.4% vs. 30.4%, p= 0.0006).

Overall, laparoscopic surgery resulted in a significant 5 year overall survival advantage compared to open surgery (80.6% vs. 50%, p= 0.0002). Resections completed by the laparoscopic approach resulted in a significant survival advantage compared to those converted to an open procedure (83.3% vs 58.3%, p= 0.05). There was no significant difference noted between de novo open resections and those converted to open from the laparoscopic approach (50% vs. 58.3%, p= 0.75).

Discussion

This study reports for the first time the 5 year survival outcomes for colon cancer in an Irish unit which specialises in minimally invasive surgery. Our units rate of laparoscopic surgery has improved from 70.1% in 2005 to 92.4% in 2011. During the study period the unit had 3 colorectal surgeons with varying levels of laparoscopic experience. The overall conversion rate of the unit was 11.1% (Range 6.7-14.3%), the individual conversion rates were indicative of the surgeons laparoscopic training and experience. In 2011, the units conversion rate has decreased to 4% with 98% of resections being carried out by a single surgeon. Our unit continues to establish itself as a dedicated MIS unit with a growing laparoscopic experience. This is one of the largest studies in the British Isles to report long term outcomes for laparoscopic surgery.

Interestingly, our study has not only shown a survival advantage for non metastatic resectional surgery, as Lacy et al. have also reported an overall survival advantage favouring the laparoscopic approach. In our study, we report a unit conversion rate of 11.1%. This compares with the COLOR, CLASICC, COST and Barcelona trials (17%, 25%, 21% and 11%). This also compares favourably to a composite figure of 14% conversion rate has been calculated by the European Association of Endoscopic Surgery consensus group looking at 2800 published cases. A low conversion rate is reflective of a rich expertise in case selection as well as technical proficiency. This study has analysed our units first two years with a dedication to laparoscopic surgery, our conversion rate has significantly improved since as our laparoscopic caseload has increased and surgeons experience, with a 92% laparoscopic case load for 2011 with a 4% conversion rate, more in line with dedicated minimally invasive units. With an increased laparoscopic caseload and the adoption of an enhanced recovery program (RAPID protocol) the units length of stay for colon surgery has decreased from 10 days in 2005 to 6 days in 2011. String adherence to a modified enhanced after surgery recovery protocol aimed at early ambulation, removal of tubes, parenteral analysis and early resumption to diet aids a quicker recovery. Our length of stay reflects stringent institutional discharge criteria which include: absence of sepsis, resumption of normal oral intake and the passage of formed stool. The advantage of this comparably longer mean stay is a 0% 30 day readmission rate.

In an Irish context, there is limited published survival data available. In 2006, a case mix of 100 cases with 61 cancers resected concluded the challenge facing Irish surgery is to disseminate this technique in a controlled and safe manner for Irish patients. Our study is the first Irish study reporting long term follow up of laparoscopic colon resection. In 2011, Markey et al. published the long term experience for open colorectal resectioning in a peripheral hospital in Ireland, reporting an overall 5 year survival rate of 61.8%. Our data compares favourably with this, highlighting the survival advantage of the laparoscopic approach in a dedicated minimally invasive unit. Overall survival rates for the open cases in this series is reduced in comparison to other reported series and our laparoscopic cohort, possible reasons for this include the favoured laparoscopic approach of the unit limiting the number of open resections (n=46) and the pre-operative case selection of laparoscopic cases at the multi disciplinary meeting. De novo open cases were undertaken due to increased BMI (>30), multiple previous abdominal surgeries or bulky tumours. Furthermore there was a significant difference (71.4% vs 62.5 years, p=0.0041) this difference between our open and laparoscopic series although not comparable, outlines the further benefits of a high volume unit demonstrating with our favourable laparoscopic results.

Limitations include this study was carried out in dedicated MIS unit which favours the laparoscopic approach where possible, with published low conversion rates and a high proportion of laparoscopic case load. Furthermore, a direct comparison between our laparoscopic and open case load is not valid as there is a limited number of open cases performed in the unit. The open cases were excluded from a laparoscopic approach pre-operatively which again makes direct comparison flawed. Our experience in a dedicated minimally invasive surgical unit advocates the laparoscopic approach for colon cancer as a safe alternate to conventional open surgery. Excellent long term survival rates can be achieved with laparoscopic surgery when performed in the expert hands.

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References


Long Term Follow up for Colon Cancer in a Minimally Invasive, Colorectal Unit 2


Long Term Follow up for Colon Cancer in a Minimally Invasive, Colorectal Unit