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Laparoscopic Colorectal Resection in Patients With Previous Abdominal and Colonic Surgery

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Abstract

Background: Previous abdominal surgery and its related adhesions are usually a relative contraindication for laparoscopic surgery or reason for conversion.

Objectives: This study aim to identify patients with previous abdominal surgery and compare the clinical outcomes in patients with and without previous abdominal surgery.

Patients and Methods: Data was collected prospectively from September 2006 to Dec 2010 of all laparoscopic colorectal resections done for both benign and malignant diseases.

Results: Out of 718 patients 476 had no previous abdominal surgery (Group A), whilst 190 patients had previous abdominal surgery not involving colonic surgery (Group B), and 52 had previous bowel surgery (Group C). The conversion rate was 4% for all groups, the re-admission rate was 11.8% for Group A, 12.6% for Group B and 9.6% for Group C, the median length of stay was 4 days for Groups A and B and 5 days for Group C. There was no statistically significant difference between groups for any of the above measures. However, there was a statistically significant difference in the length of operative time between groups. Patients in Group A and Group B requiring a median of 180 minutes, whilst Group C required a median of 210 minutes of operative time. (P = 0.026 and 0.002, respectively).

Conclusions: Previous abdominal surgery, including previous colonic surgery, confers no added risk of conversion to an open operation, morbidity or mortality for patients undergoing laparoscopic colorectal surgery. The operative time however is longer (30 minutes) for patients with previous colonic surgery.

Keywords: Laparoscopic Surgery, Conversion Rates, Previous Abdominal Surgery, Previous Colonic Surgery

1. Background

Since Jacobs et al. (1) described the first laparoscopic colectomy in 1991, the use of laparoscopic approaches to benign and malignant colorectal disease has increased dramatically. Despite initial concern over surgical learning curves and port site recurrence, several large multicentre trials have shown that laparoscopic surgery is safe and has comparable surgical outcomes and complication rates when compared with open surgery (2) and in particular can improve return to function of GI tract, reduce length of hospital stay and shorten time off work.

However, concern remains over laparoscopic conversion rates, which vary wildly in the published literature (3, 4). Indeed, patients who have conversion to open surgery are more likely to have increased length of stay (2), decreased survival (5) and increased complication rates (6). Therefore attention has turned to identifying subgroups of patients who are thought to be particularly high risk for conversion to open surgery (7-10). Patients with previous abdominal surgery and therefore are predisposed to having intra-abdominal adhesions, are one such group (11).

Adhesions are a common consequence of previous surgery. Indeed, reports suggest that 90% of patients with previous abdominal surgery will have adhesions on post-mortem (12) or on subsequent laparotomy (13). Morbidity from adhesions range from periodic abdominal pain, infertility to intestinal obstruction requiring adhesiolysis or bowel resection (14-16) and are a significant cause of readmission to the surgical acute take. In addition, adhesions may cause concern for the laparoscopic colorectal surgeon. Curet (11) describes how adhesions can cause increased risk of bowel injury, inadequate operative field exposure and a restricted view of the operative field and subsequent operative series found an increased conversion rate (17), re-operation and higher complication rates (10). This led many surgeons to avoid laparoscopic approaches in patients with previous abdominal surgery or, opt for early conversion upon demonstrating intra-abdominal adhesions.

2. Objectives

Our study aim is to examine the effects of previous abdominal surgery on clinical outcomes. In addition, patients previously undergone open colonic resections were also included.

3. Patients and Methods

We describe a prospective series of 718 unselected patients. From 2006 to 2010, patients undergoing elective and emergency laparoscopic colonic surgery for benign and malignant disease at Queen Alexandra hospital, Portsmouth, U.K., were enrolled in our study.

Data collected includes, Patient's demographic details, previous abdominal procedures, indication for surgery, type of surgery, conversion to open surgery, length of operation, length of hospital stay, readmissions within 30 days following surgery, postoperative major complications and 30 days mortality.

3.1. Operative Technique

Laparoscopic colorectal surgery was performed under general anaesthetic, with the patients positioned in modified Lloyd Davies position. Pneumoperitoneum was established using Hassan's open technique or blunt port insertion. Surgeon stands on the opposite side of the colon to be resected. The standard 4 - 5 ports techniques was used with extraction of the specimen carried out using either transverse or paraumblical incision of approximately 3 - 5 cm. Mobilisation of the colon and ligation of supplying vessels were performed intra-corporeally and specimens were extracted according to onco-surgical principles using wound protector. Right-sided resections were followed with extracorporeal anastomosis, while all left sided resections were completed using intra corporeal anastomosis techniques (18).

All patients had DVT prophylaxis with subcutaneously administered clexane. All patients with rectal cancer underwent bowel preparation while all other patients including the emergency resection were not given bowel preparation. Post operatively, all elective resection patients were managed with enhance recovery protocol as described by Kehlet and Wilmore (19) with an exception of selective use of epidural catheter and avoidance of preoperative glucose loading.

3.2. Statistical Analysis

Microsoft access Database was used to collect and store data. Continuous data was expressed as median (range). To compare treatment groups, the Mann-Whitney U test was applied to the continuous data and the Chi square test to categorical data. $P < 0.05$ was considered as statistically significant. All analyses were performed using Graphpad prism 5. (Graphpad software Inc., San Diego, CA).

4. Results

For the comparison of outcomes, patients were divided into three groups based on their previous surgical history. Patients in Group A (n = 476) did not have previous abdominal surgery. Patients included in Group B had previous abdominal surgery, but not colonic surgery (n = 190) and Group C patients had previously undergone colonic surgery (n = 52). Details of the laparoscopic procedures performed during are listed in Table 1 details of previous operative abdominal procedures for Groups B and C are listed in Table 2.

Table 1. Patient Demographics of the Different Patient Groups, Including Indication of Surgery and Laparoscopic Procedure at the Time of Study[a]

Patient Demographics	No Previous Surgery	Previous Abdominal Surgery	Previous Colonic Surgery
Elective laparoscopic lower GI surgery	476 (66)	190 (26)	52 (7)
Male	280 (59)	74 (39)	32 (62)
Age (median, range)	68 (18 - 92)	69 (24 - 89)	58 (22 - 90)
Current Procedure			
Anterior resection	223 (46.8)	89 (46.8)	9 (17.3)
Right Hemicolectomy	131 (27.5)	54 (28.4)	8 (15.4)
Other	7 (1.5)	1 (0.5)	21 (40.4)
Sigmoid colectomy	28 (5.9)	22 (11.6)	0 (0.0)
Proctectomy	0 (0.0)	0 (0.0)	7 (13.5)
Panproctocolectomy	9 (1.9)	3 (1.6)	4 (7.7)
Extended right Hemicolectomy	20 (4.2)	6 (3.2)	0 (0.0)
Hartmann's procedure	7 (1.5)	4 (2.1)	1 (1.9)
APER	27 (5.7)	4 (2.1)	1 (1.9)
Subtotal colectomy	13 (2.7)	4 (2.1)	1 (1.9)
Left Hemicolectomy	11 (2.3)	3 (1.6)	0 (0.0)
Other current procedure			
Reversal Hartmann's	0 (0)	0 (0.0)	11 (21.2)
Ileo-colic resection	0 (0)	0 (0.0)	8 (15.4)
Ileo-rectal resection	0 (0)	0 (0)	1 (1.9)

Rectal resection	0 (0)	0 (0)	1 (1.9)
Excision rectovaginal septum	3 (0.6)	0 (0)	0 (0.0)
Small bowel resection	4 (0.8)	1 (1)	0 (0.0)
Anastomosis	430 (90)	179 (94)	46 (88)
Diagnosis			
Colorectal cancer	368 (77.3)	155 (81.6)	19 (36.5)
Diverticular disease	25 (5.3)	14 (7.4)	6 (11.5)
Colitis	13 (2.7)	4 (2.1)	12 (23.1)
Other	13 (2.7)	5 (2.6)	6 (11.5)
Crohn's disease	32 (6.7)	4 (2.1)	7 (13.5)
Adenoma	16 (3.4)	2 (1.1)	2 (3.8)
Volvulus	6 (1.3)	3 (1.6)	0 (0.0)
Carcinoid	3 (0.6)	3 (1.6)	0 (0.0)

[a]Data are presented as No. (%) except age (median, range).

Table 2. The Previous Abdominal Surgeries for Patients in Groups B and C[a]

	Previous Abdominal Surgery	Previous Colonic Surgery
Previous Abdominal Procedure		
Unrecorded	27 (14)	0 (0)
Hysterectomy	59 (31)	0 (0)
Appendicectomy	52 (27)	0 (0)
Laparotomy	14 (7)	0 (0)
Hartmann's	0 (0)	12 (23)
Other	15 (8)	5 (10)
Subtotal colectomy	0 (0)	10 (19)
Right Hemicolectomy	0 (0)	10 (19)
Cholecystectomy	10 (5)	0 (0)
Anterior resection	0 (0)	7 (13)
Bowel resection (unknown detail)	0 (0)	6 (12)
Caesarian	9 (5)	0 (0)
AAA repair	4 (2)	0 (0)
Sigmoid colectomy	0 (0)	2 (4)
Total	190	52
Other previous abdominal procedure		
Sterilisation	3	0
Pyeloplasty	2	0
Liver resection	4	0
Nephrectomy	1	0
Stoma	0	3
Splenectomy	1	0
Umbilical hernia repair	2	
Twisted bowel	0	1
Adhesiolysis	1	0
Perforated colon after polyp removal	0	1
Perforated diverticulum	1	0
Total	15	5

[a]Data are presented as No. (%) or No.

During our series, overall conversion rate was 4.0% (29/718) and 30 days mortality rate of 0.6% (5) was seen. Post-operative morbidity was 12.5% (90/718), of which 30 patients (4.2%) required re-operation < 30 days following surgery. Overall, median length of stay in hospital was 4 days (range 1 - 74).

There were no significant differences detected between groups for conversion rates (P = 0.954), post-operative re-admission rate (P = 0.852), re-operation (P = 0.701) rate or mortality (P = 0.281). This is shown below in Table 1. Indications for conversion are given in Table 3. Clinical outcomes, readmission rate and reopera-

tion rate with reasons for reoperations are displayed in Table 4.

Table 3. The Conversion Rate and Indication of Conversion[a]

Conversion or Complete	No Previous Surgery	Previous Abdominal Surgery	Previous Colonic Surgery
Laparoscopic complete	456 (96)	183 (96)	50 (96)
Conversion to open surgery	20 (4)	7 (4)	2 (4)
Adhesions	0 (0)	3 (2)	2 (4)
Oncological	9 (2)	3 (2)	0 (0)
Obese	1 (0)	1 (1)	0 (0)
Technical	2 (0)	0 (0)	0 (0)
Difficult operation	5 (1)	0 (0)	0 (0)
Bleed	1 (0)	0 (0)	0 (0)
Other	2 (0)	0 (0)	0 (0)

[a]Data are presented as No. (%).

Table 4. Outcomes and Complication Rates for the Three Patient Groups[a]

Outcomes	No previous surgery	Previous Abdominal Surgery	Previous colonic surgery
Length of hospital stay: median, range	4 (1 - 74)	4 (2 - 50)	5 (2 - 43)
Readmission < 30 days surgery	56 (11.8)	24 (12.6)	5 (9.6)
Postoperative mortality	5 (1.1)	0 (0)	0 (0)
Reoperation < 30 days surgery	22 (5)	6 (3)	2 (4)
Reoperation for anastomotic leak	14 (3)	2 (1)	1 (2)
Reoperation for abscess	0 (0)	0 (0)	1 (2)
Reoperation for bleed	0 (0)	1 (1)	0 (0)
Reoperation for obstruction	0 (0)	1 (1)	0 (0)
Reoperation for revision of stoma	2 (0)	2 (1)	0 (0)
Reoperation for small bowel injury	1 (0)	0 (0)	0 (0)
Reoperation for wound dehiscence	1 (0)	0 0 ()	0 (0)
Reoperation for exploration port site	2 (0)	0 (0)	0 (0)
Reoperation for exploratory investigation	2 (0)	0 (0)	0 (0)

[a]Data are presented as No. (%) except median, range.

In addition, length of hospital stay was not significantly different between groups A and B (P = 0.07) and groups A and C (P = 0.22). However, median length of operating time did differ between groups. Surgery for patients in Group A took 180 minutes (SD = 79.2 minutes), Group B took 180 minutes (SD = 69.2 minutes) and Group C took 210 minutes (SD = 86.4 minutes) on average to complete. The difference between Groups A and C was statistically significant (P = 0.026), as was the difference between groups B and C, (P = 0.002)

5. Discussion

Experience in minimally invasive surgery has rapidly increased and adhesions due to previous abdominal surgery are not considered to be contra-indication for laparoscopy (20).

In our series of 718 unselected patients, the overall conversion rate was 4%. This is lower than previously published conversion rates in laparoscopic colorectal surgery, which ranged from 5% in selected patient groups to in excess of 20% in unselected groups (3, 4, 21).

Postoperative mortality and morbidity was low and hospital length of stay was only 4 days, further corroborating the findings of randomised control trials of laparoscopic surgery (2, 22, 23). Therefore, we too conclude that laparoscopic surgery is a safe approach for colorectal surgery with few postoperative complications.

There were more women in the previous abdominal surgery group and this is likely to be due to previous abdominal hysterectomies. However, there was no statistical difference in the number of males with no previous surgery and those with previous colonic surgery (P = 0.809).

In patients with no previous abdominal surgery, the commonest cause for conversion was oncological clearance. However, the reason for conversion in groups with previous abdominal and colonic surgery was abdominal adhesions. Our study revealed no statistically significant difference in conversion rates between all three groups of patients with no previous abdominal surgery (4 %), those with previous abdominal surgery (3.8%) and even between patients with previous colonic surgery (4%). These results show that having previous abdominal or colonic surgery confers no added risks for conversion to open surgery or worse clinical outcomes.

Previous studies have also shown that conversion rates are unaffected by previous surgery (24). However, Gonzalez (17) described a 20% increase (P = 0.02) and Vignali

(25) an 8% increase (P = 0.001) in conversion rates for patients with previous abdominal surgery compared with patients with a "virgin abdomen". However, the numbers involved in these studies were smaller (n = 86 and n = 182, respectively) and additionally, having found no difference in complication rates, both Gonzalez (17) and Vignali (25) concluded that laparoscopic surgery was safe in patients with previous colonic surgery.

Complications encountered are included in Table 4. Of note, no statistically significant difference in complication rates was detected between patients with and without prior surgery, even those who have had prior colonic surgery (P = 0.852). These findings are consistent with previously published studies (17, 26).

Concerning operative time, previous studies have shown little consensus over whether patients with previous abdominal surgery require more operative time. Indeed, Vignali (25), found that approximately 26 minutes extra were needed for laparoscopic resections in patients with previous abdominal surgery, whilst Gonzalez (17) found no significant difference in operating times, between these groups. Our results show that laparoscopic colectomies on patients with previous abdominal but not colonic, surgery does not take longer. However, laparoscopic resections on patients with previous colonic surgery take approximately 30 minutes longer than for patients with virgin abdomens or with other previous abdominal surgeries. In addition, patients with protective ileostomies in Group C resulted in increase length of stay by one day due to stoma competencies. We therefore suggest that previously contradicting studies' findings in patients with previous abdominal surgery may have been due to not taking account of whether patients had previous colonic surgery or not.

A surgeon experience in laparoscopy plays an important role in patients with previous abdominal surgery. Low conversion rate in our study is due to the fact they are heavily experienced in laparoscopic surgery. In literature authors have used different sites for port insertion but in our experience the best approach is to either use umblical port, but if this is not possible we have used right upper quadrant or left upper quadrant 5mm port with an off centre 5mm camera which enable us to create pneumoperitoneum and division of adhesions.

Our study found no difference in conversion rate and short term clinical outcomes including major morbidity, re operation rate, readmission rates, length of hospital stay and 30 days mortality for patients undergoing laparoscopic colorectal surgery with or without previous abdominal surgery. Previous colonic surgery does require additional operating time but other previous abdominal surgeries confers no added risk for this too. We conclude that previous abdominal surgery and previous colonic surgery confer no added risk to laparoscopic colonic surgery and therefore, should not be considered contra-indication for a laparoscopic approach. However extensive experience with laparoscopic technique makes the surgery safe and possible with very low rate of conversions. Additionally, with recent publications showing a reduced rate of adhesion formation in laparoscopic surgery (27), it is likely that future surgeons will be able to operate on patients with previous abdominal and previous colonic surgery with even greater confidence.

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