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Original Research

Safety and feasibility of laparoscopic sigmoid colon and rectal cancer surgery in patients with previous vertical abdominal laparotomy☆

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HIGHLIGHTS

- Only vertical incisions and sigmoid colon or rectal cancers are included.
- Previous vertical laparotomy does not worsen outcomes of laparoscopic resection.
- Laparoscopic sigmoid colon&rectal resection in cases with previous laparotomy is safe.

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ABSTRACT

Introduction: Current study aims to analyze the impact of previous vertical laparotomy on safety and feasibility of laparoscopic sigmoid colon and rectal cancer operations.
Methods: All consecutive patients who underwent a laparoscopic resection for sigmoid colon or rectal cancer were included. These aspects were abstracted and compared within no laparotomy and previous vertical laparotomy groups: demographics, perioperative aspects, pathological features and survival.
Results: There were 252 patients in no laparotomy group, and 25 cases with previous vertical incisions including lower (n = 12, 48%), upper (n = 7, 28%), and lower&upper (n = 2, 8%) midline and paramedian (n = 4, 16%) laparotomies. Veress insufflation and open technique were used in 19 (76%) and 6 (24%) cases, respectively, during the insertion of the first trocar in previous laparotomy group. Patients in previous laparotomy group were significantly older (59.2 ± 13.4 vs. 66.2 ± 10.1, p = 0.01), but gender, ASA scores, tumor and technique related factors were similar within the groups, including operation time (200 [70–600] vs. 200 [130–390] min, p = 0.353), blood loss (250 [100–1500] vs. 250 [0–2200] ml, p = 0.46), additional trocar insertion (10 [4%] vs. 3 [12%], p = 0.101), conversion (20 [7.9%] vs. 4 [16%], p = 0.25), postoperative complication (59 [23.4%] vs. 4 [16%], p = 0.06) and 30-day mortality (7 [2.8%] vs. 1 [4%], p = 0.536) rates. Oncological outcomes regarding pathological features and 5-year survival rates (65% vs. 73.2%, p = 0.678) were not different.
Conclusion: The presence of a previous laparotomy does not worsen the outcomes in patients undergoing laparoscopic removal of sigmoid or rectal cancer, thus laparoscopy may be considered to be safe and feasible in these cases.

1. Introduction

Adhesions have long known to be a consequence of abdominal operations; and besides its effects including small bowel obstruction, chronic abdominal pain and female infertility, they have been also accepted to increase intra-operative risks in case of an abdominal re-operation, particularly when a laparoscopic procedure is planned [1]. Abdominal adhesions have been believed to lengthen the operation time, and increase the incidence of

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intestinal injury [2,3]. It has been reported in a review that the incidence of access injury during laparoscopy was 0.18% and 60% of those occurred in patients who had previous surgical procedures [2]. Accordingly, previous laparotomy had been initially considered as a contraindication for advanced laparoscopic surgical procedures. This is particularly true for colorectal cancer operations due to the complexity of the surgery in these cases, which requires dissections in different quadrants of the abdominal cavity [4].

Laparoscopic colorectal surgery for cancer has been accepted to be technically feasible and oncologically safe [5,6]. The benefits of laparoscopic surgery include better cosmesis, decreased surgical trauma, reduced requirements for analgesics, earlier return to bowel function, and a shorter postoperative stay [7,8]. However, because of potential risks of laparoscopy, surgeons have more commonly preferred to perform conventional surgery in cases with a previous laparotomy [9,10]. In recent years, increasing expertise, and successful results in laparoscopic abdominal surgery have encouraged surgeons to extent the limits of laparoscopy beyond more challenging occasions. Accordingly, it has been recently questioned whether or not previous laparotomy is truly a valid contraindication for laparoscopic colorectal approach. Several studies have evaluated the perioperative outcomes in patients with previous abdominal surgery and generally denied the superiority of conventional colorectal surgery over laparoscopy [4,9,11–15]. But most of these studies may be criticized in two standpoints. First, several analyses have included different kinds of previous abdominal incisions, some of which have limited or no effect on laparoscopic technique, since the location of the procedure is far from the previous incision site [4,9,12,14,15]. This is particularly true for subcostal or McBurney incisions, which are less likely to adversely affect the outcomes in cases undergoing laparoscopic sigmoidal or rectal resections. Secondly, other studies have included different types of laparoscopic procedures such as right or left hemicolectomy or anterior or low anterior resections, which makes the data heterogeneous and the conclusions relatively unreliable [4,11,12]. Accordingly, little data exist evaluating the influence of the precise type of previous procedure or incision on the outcomes of laparoscopic colorectal surgery [9]. Thus, current study aims to analyze the safety and effectiveness of laparoscopy in sigmoid colon or rectal cancer patients, who had previous vertical laparotomy.

2. Materials and methods

Institutional Ethics Board approved the design and content of the study prior to data abstraction (Reference number: B104ISM4340029/1009/58). All consequent patients who underwent laparoscopic resections for lesions located at sigmoid colon or rectum between 2006 and 2013 were retrospectively abstracted from a prospectively designed database. Those who had a recurrent cancer operation or surgery for other tumors rather than adenocarcinoma were excluded in order to homogenize the information. For the same purpose, the study was confined to include only the cases with sigmoid colon and rectal tumors, for which the procedures were quite similar regarding the extent of dissection field, type of anastomosis, and the locations of trocars and incisions. Finally, patients with previous laparotomy via subcostal, pfannenstiel, umblical, flank, McBurney incisions or those underwent a laparoscopic cholecystectomy were excluded, since the effect of these incisions on laparoscopic sigmoid or rectal cancer surgery was believed to be limited. In case of an advanced (T3-4 or N positive) rectal cancer, the patients received preoperative chemoradiation therapy if the tumor was located at the distal two third of the rectum. Patients were assigned into two groups according to whether or not they had had a previous laparotomy. All procedures were performed or supervised by a single surgeon (MO).

Operation Technique

A Veress needle insertion just below or above the umbilicus was performed during the initiation of pneumoperitoneum in no laparotomy group. Veress needle insertion was also usually preferred in cases in previous laparotomy group, but the location was taken far from the previous incision line, where would be later used as a trocar site. Open technique for trocar placement was only chosen in selected cases in previous laparotomy group, generally in obese patients or when Veress needle insertion technique failed. In previous laparotomy group, the first trocar was generally inserted far from the previous incision line, where was planned to be used as a working trocar during the further steps of the operation. Following trocars were inserted under the direct vision obtained via the first trocar. The operation was generally completed with 5 trocars in both groups as reported in our previous papers; except in case of an abdominoperineal resection which was performed via 4 trocars, since extensive splenic flexure mobilization was not necessary for these cases [16,17]. Consequently, the 5th or 6th trocars were considered as additional ports in case of an abdominoperineal or anterior/low anterior resections, respectively. A medial to lateral approach was preferred and high ligation of the inferior mesenteric artery was routinely performed in both groups [18]. In case of a previous lower midline incision, it was used instead of pfannenstiel incision for the removal of the specimen out of abdomen. An intracorporeal anastomosis was often performed; however in case of an anterior resection an extracorporeal anastomosis was sometimes preferred especially in non-obese patients. A longer incision than that required for the extraction of the specimen from the abdominal cavity is defined as conversion. The perioperative management policies were similar in no laparotomy or previous laparotomy groups, including evaluation of the disease, preoperative patient preparation, and intraoperative decisions such for conversion and stoma creation, or postoperative patient care.

These aspects were abstracted and compared within the groups: demographics, patients' characteristics, tumor localization, application/omission of neoadjuvant radiation therapy, intraoperative information (operation technique, extension of the resection, operation time, requirement of additional organ resection, amount of intraoperative bleeding, necessity of additional trocar and conversion to open surgery), postoperative data (requirement for transfusion, complications, reoperation and 30-day mortality rates; and length of hospital stay), pathological characteristics (T stage [T0-2 or T3-4], length of the specimen, number of harvested lymph nodes, N status [node negative and positive], presence of vascular and perineural invasions, differentiation [well-moderate, poor and undetermined], length of distal margin and radial margin positivity); and survival. The causes of conversion, reoperations and 30-day mortality were stated. The impact of adhesions on conversion was separately evaluated.

Statistical Analysis: Data were analyzed by using SPSS 15.0 for Windows. Results were given as percentages, mean and standard deviations or median and ranges. Quantitative and qualitative variables were compared with student's t-test and chi-square (Pearson's or Fischer's Exact) test, respectively. Survival analysis was performed with Kaplan–Meier analysis. A p value less than 0.05 was considered to be statistically significant.

3. Results

A total of 347 patients underwent a laparoscopic sigmoid colon or rectal cancer surgery at our institutions between 2006 and 2013