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Security and Feasibility of Laparoscopic Rectal Cancer Resection in Morbidly Obese Patients

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Abstract

Background: Rectal resection for cancer can be technically challenging, especially in the obese patient. While some have investigated the impact of laparoscopic surgery on rectal cancer, no study looked at the subgroup of morbidly obese patients.
Objectives: Our goal was to evaluate feasibility and safety of laparoscopic rectal resection for cancer in this population.
Methods: All morbidly obese patients, defined as a body mass index (BMI) of 40 kg/m^2 or greater, undergoing laparoscopic rectal cancer resection for primary cancer between January 2006 and July 2013, were identified using medical records in a single academic hospital center.
Results: Thirteen patients underwent laparoscopic approach. The median BMI was 42.4 kg/m^2. There were 4 conversions (30%). Anastomotic leak occurred in 2 patients (15.4%). TME was complete in only 9 patients (69.2%), with 3 patients with incomplete TME being also in the conversion group. There was no mortality. There was no recurrence.
Conclusions: This study suggests that laparoscopic rectal resection for cancer in morbidly obese patients is challenging and associated with a higher rate of conversion compared to patients with lower BMI. Mortality, morbidity and readmission rates are similar to the literature showing the same benefit for laparoscopic procedure.

Keywords: Rectal Cancer, Mordid Obesity, Laparoscopic Surgery

1. Background

The prevalence of obesity in the United States has increased significantly over the past decades, especially over the past fifteen years. It has been identified as a major risk factor for multiple chronic conditions, including hypertension, diabetes mellitus, dyslipidemia, ischemic heart disease (1) and some forms of cancer, including colorectal cancer (2-4).

Rectal resection for cancer can be technically challenging. Visualisation in the narrow pelvis and surgical exposition to achieve a perfect TME dissection can be difficult, especially in the obese patient. The laparoscopic approach has been accepted as safe and technically feasible for colorectal resection over the past years for such patients (5-7). Recent studies have evaluated the feasibility of this approach specifically for rectal cancer, reporting an increase in duration of surgery and conversion rates compared to non-obese patients (8-12). Common reasons reported include difficulties in visualisation and dissection. These authors reported no difference in mortality, morbidity and oncological resection when compared to non-obese patients. Some recent studies also reported no difference in long-term outcomes (13, 14).

2. Objectives

While some have investigated the impact of obesity on rectal cancer, no specific study looked at the subgroup of morbidly obese patients. The goal of this study was to evaluate feasibility and safety of laparoscopic rectal resection for cancer in morbidly obese patients.

3. Methods

All morbidly obese patients, defined as a body mass index (BMI) of 40 kg/m^2 or greater, undergoing laparoscopic rectal cancer resection for primary cancer between January 2006 and July 2013, were identified using medical records. All patients were treated by one of six trained colorectal surgeons performing laparoscopic rectal resection in a single academic hospital center. Standardized retrospective chart review was performed to collect demographic (gender, age, comorbidities, ASA grade, body mass index), tumor-related (TNM stage, neoadjuvant therapy, distance to anal verge), surgical (type of procedure and anastomosis, stoma construction, operative time, estimated blood loss, conversion rates), pathologic (pTNM,

number of lymph node harvested, TME grading, radial and distal margins) and postoperative data (LOS, time to resume diet, readmission rates, 30-day morbidity and mortality). Complication were recorded and classified according to Clavien-Dindo system. Ileus was defined as delayed oral intake for more than five days after surgery Survival data were recorded from follow-up clinic chart and telephonic interview. All patients or family were contacted by phone and questioned on local or distant recurrence and survival.

4. Results

4.1. Demographic

A total of 450 patients underwent rectal cancer resection between January 2006 and July 2013. Fifty-four patients were excluded because the surgery was for a recurrence or because the tumor had been removed without resection of the rectum. Twenty five percent (111/450; 24.6%) were obese patients defined as a BMI over 30. Seventeen patients (3.7%) were classified as morbidly obese with BMI over 40. Thirteen patients underwent laparoscopic approach. There were 7 males (53.8%) and the median BMI was 42.4 kg/m^2 (Table 1). The median ASA and Charlson scores were 2 and 5 respectively and the median number of comorbidities was 1. Preoperative cTNM classification revealed 6 (46.2%) T2, 6 (46.2%) T3 and 1 (7.7%) T4 adenocarcinoma (Table 2). Four patients (30.8%) were N+ clinically. Median tumor high was 7 cm from anal verge. There were 2 upper rectal, 6 mid-rectal and 5 low rectal tumors. Six patients (46%) received neoadjuvant chemoradiation treatment prior to surgery.

Table 1. Demographics and Other Characteristics

Characteristic	Median	Range
Sex, No. (%)		
Male	7 (53.8)	-
Female	6 (46.2)	-
Age, y	57	36 - 72
BMI, kg/m^2	42.4	40.1 - 65.0
No. of comorbidities	1	0 - 3
ASA score	2	1 - 3
Charlson score	5	2 - 7

4.2. Perioperative Outcomes

Operation performed was LAR in 10 patients (77%) and APR in 3 patients (23%). Temporary stoma was used in 5 patients (38.5%). Type of anastomosis was performed with circular stapler in 7 patients (53.8%) and handsewn in 3 patients (23.1%). Operative complications included 2 vaginal traumas and 1 enterotomy. There were 4 conversions (30.8%) due to difficulty of visualisation and dissection. Conversion was associated with increased estimated blood loss (EBL), with a median of 1450 mL and a range from 200 to 3500, and 1 anastomotic leak. Median operative time was 315 minutes ranging from 200 to 555. Median (EBL) was 605 mL ranging from 25 to 3500 ml (Table 3). The median length of stay (LOS) was 9 days ranging from 4 to 23. Median time to resume diet was 4 days. Major and minor postoperative complications occurred in 4 (30.7%) patients (Table 4). Anastomotic leak occurred in 2 patients (15.4%). These were treated using percutaneous drainage. There was no mortality.

Table 2. Tumor Characteristics and Distribution

Characteristic	No.	%
Clinical T stage		
T1	0	0
T2	6	46.1
T3	6	46.1
T4	1	7.7
Clinical N stage		
N0	9	69.2
N+	4	30.8
Neoadjuvant treatment	6	46.1
Distance from anal verge, cm		
0 - 6.0	5	38.5
6.1 - 10.0	6	46.1
10.1 - 15.0	2	15.4

Table 3. Perioperative Outcomes

Parameter	Median	Range
Median operative time, min	315	200 - 555
Median estimated blood loss, mL	605	25 - 3500
LOS, d	9	4 - 23
Time to resume diet, d	4	2 - 7
Conversion, %	30 (4/13)	
No. of patients with complications	3	-
Readmission	0	-
Mortality	0	-

Table 4. Postoperative Complications

Complication		CD Grade
Anastomotic leak	2	IIIa
Pelvic abscess	1	IIIa
Wound infection	1	I
Acute renal failure	2	I
Ileus	2	I
UTI	1	II
Urinary retention	1	I

4.3. Oncologic Outcomes

Median number of lymph node retrieved was 20.0 (Table 5). CRM was positive in one patient (7.7%). Total mesorectal excision (TME) was complete in only 9 patients (69.2%), with three patients with incomplete TME being also in the conversion group. They were not tumor-directed TME. The median time of follow-up was 30.5 months. There was no local or distant recurrence of cancer and no long term mortality related or unrelated to cancer.

Table 5. Oncologic Outcomes

Parameter	Median	Range
Number of lymph nodes retrieved	20	7 - 35
Positive CRM margins, %	7.7 (1/13)	-
Complete TME, %	9 (69.2)	
Follow-up time, mo	30.5	9 - 91

5. Discussion

The aim of this study was to evaluate the impact of severe obesity on the feasibility and security of laparoscopic rectal cancer surgery. Initially, we wanted to compare the laparoscopic group to the open group with a case-match method, but the number of patients in the open group was insufficient. Because this is the first study to address specifically the feasibility of laparoscopy in severely obese patients, we decided to compare the results of our modest cohort to the available literature on obese patients.

Obese patients tend to have more preoperative comorbidities like cardiopulmonary conditions and diabetes (15) than non-obese patients. Severely morbid patients are believed to have even more comorbidities, as these conditions are more prevalent as the BMI increases (1). Some recent studies have demonstrated that it doesn't necessarily correlate with more postoperative comorbidities (15-17), while a recent review described more pulmonary events, ileus and wound infection in obese cohorts than non-obese cohorts (18) The post-operative morbidity rate in our series is high, but seems equivalent to the rates described in obese patients. The anastomotic leak rate seemed comparable to the rates seen in non-morbidly obese patients and even lower than the rates described for obese patients in some series. The absence of readmission and mortality is encouraging.

It came as no surprise that the median operative time and blood loss were superior to those seen in non-obese patients. It supports the available literature comparing non-obese and obese cohorts. The conversion rate, which is high compared to non-obese cohorts, is equivalent to the rates described in non-morbidly obese patients. This can be explained by the difficulty of dissection and exposure related to the obesity of the patients. Still, it did not seem to have an impact on the morbidity and mortality in this series.

The high rate of incomplete TME was concerning, because it seemed inferior to the rates described in the available literature. It is important to note that three of the four patients with incomplete TME were also in the conversion group. It did not seem to have a negative oncologic impact because no recurrence was reported in this series. However, the long-term follow-ups for these patients were only 10, 12, 15 and 25 months respectively.

5.1. Conclusion

This study suggests that laparoscopic rectal resection for cancer in morbidly obese patients is challenging and associated with a higher rate of conversion compared to patients with lower BMI. Adequate TME resection can be achieved in most patients, although conversion is associated with worse specimen quality. Mortality, morbidity and readmission rates are similar to the literature showing the same benefit for laparoscopic procedure. Further studies are needed to identify patients at risk of conversion that may benefit from an open approach.

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Footnotes

Authors' Contribution: Alexandre Brind'Amour developed the original idea and the abstracted and analyzed

data, wrote the manuscript. Francois Letarte helped abstract and analyse data. Sebastien Drolet and Alexandre Bouchard are guarantors of the project.

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