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Outcomes in Laparoscopic Colectomy for Colorectal Cancer in the Obese

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Abstract

Background: Although laparoscopic resection is widely accepted for the surgical treatment of colorectal cancer (CRC), the impact of obesity on the potential short-term benefits of laparoscopy seems unclear since oncological outcomes must be preserved.

Objectives: This review aimed to examine the published data supporting laparoscopic surgery in obese patients with localized CRC.

Methods: We reviewed the relevant literature (PUBMED, EMBASE and the Cochrane databases) from 2005 to 2013 for obese patients with CRC who underwent laparoscopic surgery.

Results: A total of 18 studies were included. Conversion to open surgery was higher in the obese population, without affecting oncologic long-term outcome. The harvested lymph nodes, specimen length, or resection margins were not affected by obesity. One study reported no differences in disease-free (p=0.6) and overall survival (p=0.5) between obese and non-obese patients. The anastomotic leak was similar in both groups; only one study reported a higher incidence of anastomotic leak in obese patients, but only in the mid to lower rectum. No studies reported any statistically significant differences between obese and nonobese patients in terms of mortality and time to resumption of intestinal function or oral intake. The incidence of wound infection had variable results among the studies.

Conclusion: Laparoscopic surgery for localized CRC can be safe in obese patients, including preservation of oncological outcome.

Keywords: Laparoscopic surgery; Obesity; Pathologic outcomes; Colorectal cancer; Postoperative; Review

Introduction

Obesity has become a global epidemic. The world Health Organization (WHO) defines obesity as a body mass index (BMI) of ≥ 30 kg/m^2 [1]. In 2009/2010 37.5% of adults in the U.S. were considered obese [2]. Obesity is associated with a higher incidence of comorbidities including diabetes, coronary artery disease, hypertension, and hypercoagulopathy [3,4]. Furthermore, obesity is considered a higher risk for surgical complications, as well as intraoperative technical difficulties. Previous studies have suggested adverse outcomes after colorectal surgery in patients who are obese [5], increasing the rate of conversion, wound infection, cardiopulmonary disease, hospital stay, and anastomotic leak [6]. In terms of oncological outcomes, obesity could potentially influence the local recurrence rate as well as the degree of downstaging following neoadjuvant chemotherapy [7].

Laparoscopic resection is widely accepted in the treatment of colorectal cancer (CRC), based on a number of randomized controlled trials (RCTs) [8,9]. Short-term advantages for this procedure are well known, including early postoperative recovery, less pain, better pulmonary function, shorter duration of ileus, less fatigue, and better quality of life [10,11]. Based on large RCTs [11-13] and systematic reviews of RCTs [14], oncologic long-term outcomes are similar when comparing laparoscopic to open surgery for CRC.

The impact of obesity on the potential benefits of laparoscopic surgery for CRC seems unclear because, in addition to short-term benefits, oncological outcomes must be preserved. The aim of this review was to examine the data supporting laparoscopic surgery in obese patients with localized CRC.

Methods

The literature was searched using PUBMED, EMBASE and the Cochrane databases based on the search terms: laparoscopy, obesity, colorectal cancer, body mass index, conversion, and long-term outcome. All relevant studies from 2005 to 2013 were included if they provided postoperative outcome data from obese patients with CRC who underwent laparoscopic surgery. The most relevant oncologic and postoperative aspects were evaluated. To avoid duplicate data, only study was selected and included from the same institution utilizing the same data pool. The authors of the selected studies were not contacted for additional information.

Results

A total of 18 articles were selected: 12 included patients with CRC, 4 only with rectal cancer, 1 with left colectomy and rectal cancer, and 1 with colon cancer only (excluding rectal cancer). Ten were retrospective, 3 were matched case control, 4 were prospective, and 1 was a systematic review meta-analysis. There were no RCTs included in this review.

Oncological Aspect

The effect of conversion to open surgery

Analysis of the literature comparing obese and nonobese patients with localized CRC [15-18] showed higher conversion rates to open surgery in obese patients (26.4% vs. 8.6%, respectively). However, the effects of conversion to open surgery on oncologic outcomes were unclear and controversial for both colon and rectal cancer [19,20]. Interpretation of these analyses is difficult as reasons for conversion

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to open surgery were variable and included comorbidity, tumor stage, surgeon training, and patient characteristics. In a systematic review and meta-analysis, Makino et al. [21] determined that difficulties related to exposure and dissection were the most common indications for conversion; however, they did not report if this affected oncologic outcomes. A case-matched study [22] with a small patient population suggested that conversion to open surgery does not affect oncologic survival or local recurrence. Allaix et al. [23] determined that the most common cause of conversion related to the tumor was stage; specifically, a pT4 cancer was independently associated with poor survival. These authors also reported that the most frequent non-tumor cause of conversion was obesity, and that conversion itself does not affect long-term survival in patients with localized CRC.

Lymph node retrieval

Evaluation of lymph nodes is very important for the optimal treatment of colorectal adenocarcinoma. Confirmation of lymph node metastasis is fundamental to directing adjuvant therapy. In 2006, The College of American Pathologists released a consensus statement recommending a minimum harvest of 12 lymph nodes. Comparison of harvested lymph nodes during laparoscopic surgery between obese and non-obese patients with localized CRC has been well studied [18,24-29]. While the majority of studies do not demonstrate any differences among groups, Park et al. [15] reported statistically significant differences in harvested lymph nodes between obese and non-obese patients. However, they did not describe their technique of harvesting lymph nodes or why their average harvested lymph nodes was greater than that reported in other studies (Table 1).

Specimen length and resection margin

Two retrospective studies [24,26] reported that in patients who underwent elective laparoscopic surgery for localized CRC, no statistically significant differences were noted between obese and nonobese patients with respect to resection margins or specimen length. However, in rectal cancer, one study [28] showed a significant difference in distal margins between the obese vs. non-obese groups (2 cm versus 3.5 cm, respectively; p=0.02) (Table 2).

Disease-free and overall survival

Of the studies included in this review, only Singh et al. [24] reported a median follow-up of 24 months, with similar outcomes in terms of disease-free (p=0.6) and overall survival (p=0.5) between obese and nonobese patients who underwent elective laparoscopy surgery for localized CRC.

Postoperative Aspect

Postoperative gastrointestinal function

Reduced gastrointestinal function is considered to be a result of nociceptive and sympathetic neural activity induced by surgery, and may last for 2-5 days, depending on the type of anesthesia, surgical technique (open or laparoscopic), and postoperative analgesia [30]. The studies [24,25,31,32] included in this review did not report any statistically significant differences between obese and nonobese patients in terms of time to resumption of intestinal function or oral intake, establishing a mean of 3.5 days for the obese group and 3.07 days for the non-obese group for recovery of bowel function (Table 3).

Anastomotic leak

Anastomotic leak is a major concern in obese patients because they may experience more intraoperative technical difficulties, comorbidities, and healing delays secondary to neoadjuvant chemoradiation (NCRT) [28]. However, the majority of studies included in this review that evaluated this concern in CRC [16,24-26] or only rectal cancer [29] did not report any significant differences between obese and non-obese patients. One study [28] showed a higher leak rate in obese patients who did or did not undergo NCRT vs. non-obese patients (14 vs. 5, respectively; p=0.003). But this is related only to mid to lower rectal anastomoses and only 25 of 571 underwent laparoscopy. The authors discussed that the technical complexity expected in obese patients and the low tumor location explain the increased anastomotic leak rate.

Mortality

Studies [16,18,29] that evaluated postoperative mortality did not report any significant differences between obese and non-obese patients.

Wound infection

Postoperative wound infection is variable in laparoscopic surgery for CRC when comparing obese and nonobese patients. As seen in this review, 2 studies [16,24] reported higher wound infection rates in obese vs. nonobese patients (8.1 vs. 5, respectively) while others [15,17,18,23,26,29] found no such differences.

		Harvested lymph nodes		P-value
Author	**Country (Hospital/University)**	**Obese**	**Nonobese**	
Park et al. [15]	Korea (multicenter study)	24.3 ± 14	27.4 ± 14.1	0.007
Bege et al. [18]	France (Institut Paoli Calmettes)	14.3 ± 7.5	12.7 ± 6.1	NS
Singh et al. [24]	United Kingdom (ICENI Centre)	10.3 ± 4.6	11.2 ± 5.7	NS
Blumberg [25]	United Sates (University of Pittsburgh)	13 ± 6	11 ± 6	NS
Leroy et al. [26]	France (IRCAD/EITS)	7.2 ± 6.4	9.1 ± 5.5	NS
Yacoub et al. [27]	United States (St. John Hospital)	17.7 ± 7.4	18.4 ± 10.4	NS
Aytac et al. [28]¶	United Sates (Cleveland Clinic Foundation)	18	17	NS
Karahasanoglu et al. [29]¶	Turkey (Cerrahpasa Medical School)	14	19	NS

NS: no significant ¶: Rectal cancer.

Table 1: Mean lymph node harvest

Author (year)	Country (Hospital/University)	Specimen length (cm)		Resection margin (cm)		P-value
		Obese	Nonobese	Obese	Nonobese	
Singh et al. [24]	United Kingdom (ICENI Centre)	22.7 ± 9.6	23.5 ± 11.4	Negative	Negative	NS
Leroy et al. [26]	France (IRCAD/EITS)	29.5 ± 8.5	27.5 ± 9.6	Negative	Negative	NS
Aytac et al. [28]¶	United Sates (Cleveland Clinic Foundation)	NA	NA	Negative (2cm)	Negative (3.5cm)	0.02
Karahasanoglu et al. [29]¶	Turkey	NA	NA	Negative	Negative	NS
	(Cerrahpasa Medical School)			(2.5cm)	(2.5cm)	

NS: no significant; NA: data not available ¶: Rectal cancer.

Table 2: Specimen length and resection margin (cm).

Author	Country (Hospital/University)	Bowel movement (days)		P-value
		Obese	Nonobese	
Singh et al. [24]	United Kingdom (ICENI Centre)	3	3	NS
Blumberg et al. [25]	United Sates (University of Pittsburgh)	3.1	3.1	NS
Khoury et al. [31]	United Sates (Cleveland Clinic Foundation)	4.2	3.9	NS
Tsujinaka et al. [32]	Japan (University Saitama Medical Center)	2	2	NS

NS: not significant

Table 3: Postoperative gastrointestinal function.

Discussion

Obese patients with CRC are becoming increasingly more common in the surgical practice, and are in fact a common health problem [24]. Laparoscopic surgery for CRC offers short-term benefits and is oncologically safe; however, these benefits in the obese population are uncertain. Our decision to restrict data to studies performed in the last 8 years was based on an attempt to include updated information on this topic. There was no evidence to support that obesity has a negative impact on postoperative gastrointestinal function and mortality. The incidence of anastomotic leak did not appear to be significant in obese patients, with the exception of one study [28] which included only mid to lower rectal cancer. Finally, wound infection is a controversial subject. Some studies [16,24] have shown higher rates of infection in obese compared to non obese patients undergoing laparoscopic surgery for CRC, while others [15,17,18,23,26] do not report such differences. We believe that standardization of the procedure, wound protection devices, and the experience of the surgical team have contributed to the lower wound infection rates in both obese and non-obese patients. In addition, details about wound care including intraoperative use of wound protectors are missing in the available literature.

This review showed that despite the higher rate of conversion to open surgery in obese patients with localized CRC, when conversion is not related to advanced disease but rather to obesity, long-term survival is not affected. Similarly, lymph node harvest is not affected in obese patients with CRC who undergo laparoscopic surgery. In this review, only Park et al. [15] found any significant differences in lymph node harvest in their retrospective single center study.

In patients with colon cancer, specimen length and resection margins are not affected by obesity, with all articles included in this review reporting negative margins. In regards to rectal cancer, one retrospective study showed a significant difference in distal margins between the obese and non-obese groups; the authors did not report whether such findings had any effect on oncologic results. Finally, disease-free and overall survival does not seem to be affected by obesity. However the longest available follow up is 2 years and long-term data is warranted.

Conclusion

The findings from this review suggest that laparoscopic surgery for localized CRC can be safe in obese patients and can confer similar short-term benefits as in non-obese patients, while preserving oncological outcomes.

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