



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/m² [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.

Author	Country (Hospital/University)	Harvested lymph nodes		P-value
		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 States (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 States (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	Specimen length (cm)		Resection margin (cm)		P-value
	(Hospital/University)	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 States (Cleveland Clinic Foundation)	NA	NA	Negative (2cm)	Negative (3.5cm)	0.02
Karahasanoglu et al. [29]¶	Turkey (Cerrahpasa Medical School)	NA	NA	Negative (2.5cm)	Negative (2.5cm)	NS

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 States (University of Pittsburgh)	3.1	3.1	NS
Khoury et al. [31]	United States (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.

References

- (2000) Obesity: preventing and managing the global epidemic. Report of a WHO consultation. *World Health Organ Tech Rep Ser* 894: 1-253.
- Ogden CL, Carroll MD, Kit BK, Flegal KM (2012) Prevalence of obesity in the United States, 2009-2010. *NCHS Data Brief* 1-8.
- Poirier P, Giles TD, Bray GA, Hong Y, Stern JS, et al. (2006) Obesity and cardiovascular disease: pathophysiology, evaluation, and effect of weight loss: an update of the 1997 American Heart Association Scientific Statement on Obesity and Heart Disease from the Obesity Committee of the Council on Nutrition, Physical Activity, and Metabolism. *Circulation* 113: 898-918.
- Stein PD, Beemath A, Olson RE (2005) Obesity as a risk factor in venous thromboembolism. *Am J Med* 118: 978-980.
- Rullier E, Laurent C, Garrelon JL, Michel P, Saric J, et al. (1998) Risk factors for anastomotic leakage after resection of rectal cancer. *Br J Surg* 85: 355-358.
- Balentine CJ, Wilks J, Robinson C, Marshall C, Anaya D, et al. (2010) Obesity increases wound complications in rectal cancer surgery. *J Surg Res* 163: 35-39.
- You JF, Tang R, Changchien CR, Chen JS, You YT, et al. (2009) Effect of body mass index on the outcome of patients with rectal cancer receiving curative anterior resection: disparity between the upper and lower rectum. *Ann Surg* 249: 783-787.
- Quirke P, Thorpe H, Walker J, Jayne DG, Smith AM, et al. (2005) Short-term end points of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer: (MRC CLASICC trial group): multicentre, randomised controlled trial. *Lancet* 365: 1718-1726.
- Veldkamp R, Kuhry E, Hop WC, Jeekel J, Kazemier G, et al. (2005) Laparoscopic surgery versus open surgery for colon cancer: short-term outcomes of a randomised trial. *Lancet Oncol* 6: 477-484.
- Bauwens K, Schwenk W, Böhm B, Hasart O, Neudecker J, et al. (1998) [Recovery and duration of work disability after laparoscopic and conventional appendectomy. A prospective randomized study]. *Chirurg* 69: 541-545.
- Lacy AM, Garcia-Valdecasas JC, Delgado S, Castells A, Taurá P, et al. (2002) Laparoscopy-assisted colectomy versus open colectomy for treatment of non-metastatic colon cancer: a randomised trial. *Lancet* 359: 2224-2229.
- Jayne DG, Guillou PJ, Thorpe H, Quirke P, Copeland J, et al. (2007) Randomized trial of laparoscopic-assisted resection of colorectal carcinoma: 3-year results of the UK MRC CLASICC Trial Group. *J Clin Oncol* 25: 3061-3068.
- Leung KL, Kwok SP, Lam SC, Lee JF, Yiu RY, et al. (2004) Laparoscopic resection of rectosigmoid carcinoma: prospective randomised trial. *Lancet* 363: 1187-1192.

14. Kuhry E, Schwenk W, Gaupset R, Romild U, Bonjer J (2008) Long-term outcome of laparoscopic surgery for colorectal cancer: a cochrane systematic review of randomised controlled trials. *Cancer Treat Rev* 34: 498-504.
15. Park JW, Lim SW, Choi HS, Jeong SY, Oh JH, et al. (2010) The impact of obesity on outcomes of laparoscopic surgery for colorectal cancer in Asians. *Surg Endosc* 24: 1679-1685.
16. Kamoun S, Alves A, Bretagnol F, Lefevre JH, Valleur P, et al. (2009) Outcomes of laparoscopic colorectal surgery in obese and nonobese patients: a case-matched study of 180 patients. *Am J Surg* 198: 450-455.
17. Scheidbach H, Benedix F, Hügel O, Kose D, Köckerling F, et al. (2008) Laparoscopic approach to colorectal procedures in the obese patient: risk factor or benefit? *Obes Surg* 18: 66-70.
18. Bège T, Lelong B, Francon D, Turrini O, Guiramand J, et al. (2009) Impact of obesity on short-term results of laparoscopic rectal cancer resection. *Surg Endosc* 23: 1460-1464.
19. Chan AC, Poon JT, Fan JK, Lo SH, Law WL (2008) Impact of conversion on the long-term outcome in laparoscopic resection of colorectal cancer. *Surg Endosc* 22: 2625-2630.
20. Rottoli M, Bona S, Rosati R, Elmore U, Bianchi PP, et al. (2009) Laparoscopic rectal resection for cancer: effects of conversion on short-term outcome and survival. *Ann Surg Oncol* 16: 1279-1286.
21. Makino T, Shukla PJ, Rubino F, Milsom JW (2012) The impact of obesity on perioperative outcomes after laparoscopic colorectal resection. *Ann Surg* 255: 228-236.
22. Rottoli M, Stocchi L, Geisler DP, Kiran RP (2012) Laparoscopic colorectal resection for cancer: effects of conversion on long-term oncologic outcomes. *Surg Endosc* 26: 1971-1976.
23. Allaix ME, Degiuli M, Arezzo A, Arolfo S, Morino M (2013) Does conversion affect short-term and oncologic outcomes after laparoscopy for colorectal cancer? *Surg Endosc*.
24. Singh A, Muthukumarasamy G, Pawa N, Riaz AA, Hendricks JB, et al. (2011) Laparoscopic colorectal cancer surgery in obese patients. *Colorectal Dis* 13: 878-883.
25. Blumberg D (2009) Laparoscopic colectomy performed using a completely intracorporeal technique is associated with similar outcome in obese and thin patients. *Surg Laparosc Endosc Percutan Tech* 19: 57-61.
26. Leroy J, Ananian P, Rubino F, Claudon B, Mutter D, et al. (2005) The impact of obesity on technical feasibility and postoperative outcomes of laparoscopic left colectomy. *Ann Surg* 241: 69-76.
27. Yacoub M, Swistak S, Chan S, Chichester T, Dawood S, et al. (2013) Factors that influence lymph node retrieval in the surgical treatment of colorectal cancer: a comparison of the laparoscopic versus open approach. *Am J Surg* 205: 339-342.
28. Aytac E, Lavery IC, Kalady MF, Kiran RP (2013) Impact of obesity on operation performed, complications, and long-term outcomes in terms of restoration of intestinal continuity for patients with mid and low rectal cancer. *Dis Colon Rectum* 56: 689-697.
29. Karahasanoglu T, Hamzaoglu I, Baca B, Aytac E, Kirbiyik E (2011) Impact of increased body mass index on laparoscopic surgery for rectal cancer. *Eur Surg Res* 46: 87-93.
30. van Bree SH, Bemelman WA, Hollmann MW, Zwinderman AH, Matteoli G, et al. (2013) Identification of Clinical Outcome Measures for Recovery of Gastrointestinal Motility in Postoperative Ileus. *Ann Surg*.
31. Khoury W, Kiran RP, Jessie T, Geisler D, Remzi FH (2010) Is the laparoscopic approach to colectomy safe for the morbidly obese? *Surg Endosc* 24: 1336-1340.
32. Tsujinaka S, Konishi F, Kawamura YJ, Saito M, Tajima N, et al. (2008) Visceral obesity predicts surgical outcomes after laparoscopic colectomy for sigmoid colon cancer. *Dis Colon Rectum* 51: 1757-1765.

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