

Laparoscopic Resection for Rectal Cancer: A Review and Update on Perioperative and Long-term Oncologic Outcome

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ABSTRACT

Backgrounds: With the advancement of science and technology in the field of minimal access surgery and refinement of techniques in laparoscopic resection of rectal cancer, it has been widely accepted that the procedure is technically feasible. The safety and oncologic efficacy of laparoscopic colonic cancer resection have been demonstrated. However, the availability of review and data are scarce in evaluating the perioperative safety and long-term oncologic outcome between laparoscopic surgery in the setting of rectal cancer and open approach.

Aim: The aim of this review is to provide an update on most recent review regarding perioperative safety and oncologic feasibility of laparoscopic resection for rectal cancer.

Methods: A review of up-to-date literature and the more recent retrospective and prospective data on laparoscopic resection for rectal cancer were undertaken for utilizing Pubmed/Google/Springer Link, specifically focussing on the long-term and perioperative outcomes.

Keywords: Rectal cancer, Laparoscopic rectal resection, Anterior resection.

INTRODUCTION

In the current age of minimally invasive surgery, laparoscopic surgery (LPS) for colon cancer has been established as oncologically equivalent to conventional open surgery. The advantages of laparoscopic surgery have translated into smaller incisions and shorter recovery. However, regarding rectal cancer surgery, laparoscopic resection encounters far more challenges mainly due to steep learning curve and technical challenges including difficulties for pelvic exposure, rectal dissection, sphincter preservation and more importantly a lack of long-term data from large scale randomized controlled trail (RCT) series.

CONVERSION RATE

In general, rectal cancer surgery is associated with high morbidity and mortality rates as compared to colon cancer surgery. The addition of total mesorectal excision (TME) reduces the local recurrence rate, but complete removal of mesorectum down to the pelvic floor devascularizes the rectal stump and increases anastomotic leak predisposing to higher mortality and morbidity. However, the safety of laparoscopic rectal cancer surgery has been extensively reported in the literature. In a recent Cochrane review of 4,424 patients from 48 studies comparing laparoscopic vs open TME for rectal cancer, Breukink reported no significant differences in morbidity and mortality rates with several short-term advantages in favor of laparoscopic resection, such as less blood loss, quicker return to normal diet, less pain as measured by narcotic use and reduced length of hospital stay.¹

Among larger series, the morbidity and mortality rates of laparoscopic resection for rectal cancer ranged from 6.1 to 40% and 0 to 3% respectively.²⁻¹² All reports comparing laparoscopic vs open rectal cancer resection, including laparoscopic resection and APR, found no difference in morbidity and mortality.

The feasibility of any laparoscopic procedure is reflected by the associated conversion rate. It is a very important marker for laparoscopic success. The reported conversion rate of laparoscopic resection for rectal cancer generally range from 6 to 15.5%.¹³⁻¹⁷ Excellent results could be achieved from series performed by single surgeons or surgical teams.^{8,14,15,17,18} Leroy and Tsang et al reported conversion of only 3 and 1.9% respectively, in their series for laparoscopic rectal resection.^{4,7} Open conversion during laparoscopic rectal resection has been reported to be associated with poor perioperative and oncological outcome. Strohlein et al⁹ related an increase in metachronous metastasis and local recurrence in the converted group when compared with successful laparoscopic resection and open surgery group in rectal cancer surgery (metachronous metastasis: 26.3 vs 17.8 vs 14.9% respectively; local recurrence: 16 vs 6.9 vs 9.5% respectively). The multicenter CLASICC trial reported one of the highest conversion rates (34%) among the published reports and demonstrated poor perioperative outcome. When compared with the open group and successful laparoscopic resection, patients with conversion for colorectal resection in the CLASICC trial had higher operative mortality (5 vs 1 vs 9% respectively)

and also a higher complication rate.² Pugliese et al reported a 10% conversion in a series of 209 patients with laparoscopic rectal resection and observed significantly higher anastomotic leak rate in the converted group ($p = 0.008$).¹⁹ Both the CLASICC trial and the non-randomized comparative series from Strohlein et al reported tumor infiltration/fixation and obesity as the most common reason of conversion.^{2,9} Fixation of tumor indicates more advanced disease and has been suggested as a reason of poor oncologic outcomes in previous studies.^{9,20}

PORT-SITE METASTASIS

The actual overall incidence of port-site metastasis is a rare event and about 0.1% from reviews and meta-analysis on this subject.^{16,21,22} This figure is comparable to that of wound recurrence following open surgery.^{23,24} According to these findings, port-site metastasis is not an inherent drawback of LPS for rectal cancer.

LYMPH NODES HARVESTED

A proper oncologic curative resection of rectal cancer requires the adequate resection of regional lymph nodes. Retrieved lymph nodes are associated with improved survival and increased accuracy in staging. From most of the previous comparative studies, the mean number of lymph nodes retrieved ranges from 10 to 13.3 and that there was no significant difference compared with the open procedure.^{3,5,9,10,13} In fact, there is an RCT trial which reported a difference in favor of laparoscopic TME.²⁵

LOCAL RECURRENCE

Local recurrence is a key indicator of oncological adequacy in rectal cancer surgery which varies dramatically among surgeons, the surgical technique being a major determinant.

In open surgery, the standard for local recurrence has been set by Heald et al²⁶ who reported a 4% local recurrence rate following low anterior resection of the rectum and TME with 10 years follow-up. The majority of the studies found similar local recurrence rates ranging from 3.9 to 5.9% for laparoscopic rectal resection.^{14,27,28}

LONG-TERM OUTCOME

Long-term survival data following laparoscopic resection of the rectum are scanty in the literature. The majority of long-term outcome data refer to a single surgeon experience series or comparative studies and only five RCT studies focusing on this subject are currently available with different length of median follow-up period with figures ranging from 33.1 to 87.2 months.^{14,18,25,29,30} Data from these series reported no difference in terms of local recurrence, overall and disease-free survival among groups.

In contrast, Laurent et al²⁸ reported a better survival rate in laparoscopic stage III tumors with no difference in term of local recurrence and cancer-free survival between laparoscopic and open surgery with similar quality of surgery in a monocentric comparative study with over 400 patients with mid-and low-rectal cancer. A better survival rate in patients with stage III tumor was also reported by Lacy et al³¹ in an RCT trial in patients with colon cancer and by Morino et al⁵ in a prospective comparative study which focused on patients with extraperitoneal rectal cancer treated with laparoscopic or open surgery. More recently, Law et al³² reported in a comparative monocenter series with a median follow-up of 34 months in patients with stage II and III rectal cancer, a 5-year actuarial survival of 71% in the laparoscopic group compared to a 59% survival rate in the open group, also identifying laparoscopy as one of the independent significant factors associated with better survival at the multivariate analysis.

CONCLUSION

Based on the available data in literature, the mini-invasive approach to rectal cancer surgery is safe and feasible and does not seem to confer any disadvantage in term of local recurrence. With the recently concluded 5-year analysis of MRC CLASICC trial, laparoscopic resection of rectal cancer proves to be oncologically safe and does not compromise the long-term oncological results. The use of laparoscopic rectal surgery should be exploited to fully maximize favorable short-term outcomes and the long-term oncological results.

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