Should laparoscopic-assisted proctectomy be the standard of care for patients with resectable rectal cancer?

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“Those who routinely treat cancers of the colon and rectum will be the first to agree that the surgical approach and oncological priorities for colon and rectal cancer are different.”

Cancer of the large intestine is often referred to as colorectal cancer. The problem with using the term ‘colorectal’ when referring to the large intestine is it fails to draw a distinction between the abdominal colon and the rectum. Those who routinely treat cancers of the colon and rectum will be the first to agree that the surgical approach and oncological priorities for colon and rectal cancer are different. For example, local–regional recurrence of cancer is much more prevalent when treating rectal cancer and likely reflects surgical technique [1,2]. High-quality surgical studies have found the rates of local recurrence for colon cancer to be in the order of 1% [3,4]. However, similar high-quality surgical studies have found rates of local recurrence of rectal cancer to vary between 5 and 30% [2,5,6]. In addition, rates of postoperative anastomotic leak for patients undergoing surgery for colon cancer differ from those of patients undergoing surgery for rectal cancer by a factor of 2–30 [7–9]. Finally, the preoperative evaluation and

treatment of patients with rectal cancer is more involved than patients with colon cancer [10,11].

Given the obvious difference between cancers of the colon and rectum, the next task is to consider the operative approach of these distinct problems. We know from high-quality randomized controlled trials that a laparoscopic surgical approach to colon cancer does not lead to inferior oncological outcomes compared with open surgery [3,12,13]. We also know that laparoscopic colon surgery is more difficult than open colon surgery and involves a steep learning curve [14,15]. However, once surgeons learn the technique, the oncologic outcomes with laparoscopy are the same outcomes as with open surgery and low-volume experts perform as well as high-volume experts [13,16]. Finally, multiple investigators have reported high-quality studies from large national databases demonstrating measurable benefits of laparoscopy over open surgery for the treatment of colon cancer and other colon diseases [17–19].

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“...the laparoscopic approach provides measurable benefits to patients. However, these results need to be taken with a grain of salt...”

Given the differences in surgical therapy of colon and rectal cancer, it is important to answer the following questions before recommending widespread adoption of laparoscopy for the treatment of rectal cancer. Do we have high-quality data demonstrating the oncologic noninferiority of laparoscopy compared with open surgery for the treatment of rectal cancer? Do we know that laparoscopic surgery for rectal cancer is a skill that can be easily taught to practicing surgeons? Finally, does laparoscopy provide measurable benefits compared with open surgery for rectal cancer surgery?

Do we have high-quality data demonstrating the oncologic noninferiority of laparoscopy compared with open surgery for the treatment of rectal cancer? The strict answer to this question is ‘no’. There are a number of small single-institution studies that have shown no difference in oncologic outcomes in patients undergoing laparoscopic or open surgery [20–24]. However, there are only a very small handful of multi-institution studies that have either found no difference in outcomes between laparoscopy and open surgery or have not published their results as they are not yet complete [12,25–27]. First, the 3-year results of the MRC-CLASICC trial were published in 2007 [12]. In this study, patients with colon or rectal cancer were randomized to laparoscopic or open surgery. Of the 268 patients randomized to open and 527 patients randomized to laparoscopic surgery, 97 and 193 patients, respectively, had cancer of the rectum. While the authors found the rates of circumferential resection margins to be slightly higher in the laparoscopic group (16 vs 14%; $p = 0.8$), there were no differences in rates of local recurrences at 3 years (9.7% in the laparoscopic group vs 10.1% in the open group; $p = 0.96$) [12]. In addition, the authors found no differences between the groups in overall or disease-free survival at 3 years. While these data are compelling they are not conclusive as it is a relatively small group of patients with rectal cancer in either the open or laparoscopic arm. More recently, a Korean group has published the early results of a multicenter randomized controlled trial in which 340 patients were randomly assigned to open or laparoscopic surgery in a 1:1 fashion [26]. All patients had the diagnosis of rectal cancer and the authors found no difference in rates of margin positivity, macroscopic quality of the mesorectum, or in the number of lymph nodes harvested [26]. We eagerly await the next

publication demonstrating the long-term oncologic follow-up. Finally, the American College of Surgeons Oncology Group is currently running the multicenter Z-6051 trial in which patients with the diagnosis of rectal cancer are being randomly assigned to laparoscopic or open surgery [24]. Along with the COREAN trial, the results of this study will provide a definitive answer to the question of noninferiority of laparoscopy compared with open surgery for the treatment of rectal cancer.

Do we know that laparoscopic surgery for rectal cancer is a skill that can be easily taught to practicing surgeons? The answer is we do not know if this is a skill that can be easily taught. We know from the Dutch TME trial that an open total mesorectal excision can be taught to surgeons with varied experiences [28]. However, all studies of laparoscopy with rectal cancer have been published by surgeons highly skilled in laparoscopic colon and rectal cancer surgery. There is no evidence that experience and skill with laparoscopic surgery elsewhere translates into skill with pelvic dissection. It is clear that the learning curve with laparoscopic rectal cancer surgery is steep and that patient morbidity is higher in the earlier part of the learning curve [29]. The break point in the learning curve has been proposed to be somewhere around 50 cases [29]. It is difficult to ascertain how many rectal cancer operations the average surgeon performs from the literature. However, a recent publication studying 2003 and 2004 hospital discharge data from 11 US states found 7519 patients who underwent proctectomy for the diagnosis of rectal cancer by 2588 surgeons [30]. Half of those surgeons did only one operation for rectal cancer in the 2-year time frame. If these findings are reflective of most surgical practice in the USA, it seems unlikely that laparoscopy for rectal cancer can be effectively taught as the surgeons will take many years to accumulate the volume of patients to overcome the learning curve.

Does laparoscopy provide measurable benefits compared with open surgery for rectal cancer surgery? This question is difficult to answer as many will look to the randomized controlled trials for the answer. However, no randomized controlled trial has been powered to detect differences in rates of complications. Therefore, the results of these trials cannot be taken as proof that there is or is not a measurable benefit of laparoscopy over open surgery for rectal cancer. That being said, it is important to consider the

secondary analyses that have been performed in these studies. Focusing on the multicenter COREAN trial, the authors did find some differences in short-term outcomes between laparoscopic and open surgery [26]. Patients who underwent a laparoscopic approach had decreased time to first flatus and defecation, decreased time to resume liquid and regular diet, and a slightly decreased hospital stay (8 vs 9 days; $p = 0.056$). Postoperative complications were the same except that wound discharge was less in patients who had a laparoscopic operation (1.2 vs 6.5%; $p = 0.02$) [26]. If we look at studies other than randomized controlled trials, the data indicate that patients who have a laparoscopic operation have improved short-term outcomes. Using the participant file from the American College of Surgeons National Surgical Quality Improvement Project, our group found a significantly lower rate of complications in patients undergoing a laparoscopic proctectomy for the diagnosis of rectal cancer (20.5 vs 28.8%; $p < 0.001$) [31]. We utilized a propensity score analysis to partially control for nonrandomization and found that an open operation was an independent predictor for increased complications (odds ratio: 1.41; 95% CI: 1.19–1.68) [31]. These findings are consistent with the conclusion that the laparoscopic approach provides measurable benefits to patients. However, these results need to be taken with a grain of salt given

that they are derived from a large, national, prospective, nonrandomized database we could not control for all sources of bias in treatment assignment.

In summary, the answer to the question is, ‘no, laparoscopic proctectomy should not be the current surgical standard-of-care for patients with rectal cancer’. Given the difficulty of the operation, the steep learning curve associated with the operation and the fact that there are no definitive trials demonstrating oncologic noninferiority or superior short-term outcomes associated with the technique, we cannot in any good conscience recommend the widespread adoption of laparoscopy for the treatment of rectal cancer. Until the oncologic safety is clearly proven, laparoscopic proctectomy for the treatment of rectal cancer should be the approach taken by the few highly trained expert surgeons performing high-volume rectal cancer surgery.

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