Società Italiana di Chirurgia ColoRettale
www.siccr.org 2009; 21: 180-184

Laparoscopic Management of Rectal Cancer

Rahila Essani, MD, Roberto Bergamaschi, MD, PhD, FRCS, FASCRS, FACS

Roberto Bergamaschi, MD, PhD, FRCS, FASCRS, FACS
Division of Colon and Rectal Surgery, State University of New York,
HSC T18-060, Stony Brook, NY 11794-8191
bergamaschi.roberto@gmail.com

The objective of this review is to present a current opinion on the laparoscopic management of rectal cancer. We attempt to give readers a concise insight into the evidence available in the English language literature. This paper does not offer a comprehensive review of the topic; rather it highlights some relevant issues and then outlines what role, if any, laparoscopic surgery should play in the management of rectal cancer. There are at least four categories for discussion.

Published Data

The Cochrane review [1] has identified 48 studies with more than 4000 patients. Only three were RCTs accounting for over 600 patients. However, these RCTs did not comply with the CONSORT statement [2], as there was no allocation concealment. Therefore, it is questionable whether these were truly randomized. Moreover, two of these three RCTs provided no data on the distance of the cancer from the anal verge [3, 4]. It is quite possible that these trials were about recto-sigmoid cancer rather than low rectal cancer. Leung et al. did not provide data on conversion rates in their first RCT. However, their second trial is the only RCT which describes primary outcome and provides 3- and 5-year disease-free survival rates. The third RCT [5] is a relatively small trial which does provide data on the location of tumor from the anal verge. However, again there are no data provided on conversion rates or follow-up. None of the RCTs reported adequacy of resection margins. The definitive criterion for the evaluation of LTME (Laparoscopic Total Mesorectal Excision) as an established therapeutic technique in curative rectal surgery is the long-term outcome, particularly the 3- and 5-year disease-free survival and local recurrence rates. The Cochrane review showed no indication of poorer long-term outcome or higher local recurrence rate of LTME compared with OTME (Open Total Mesorectal Excision).

In light of the sub-optimal quality of data, there is little point at this time in performing meta-analyses to conclude that laparoscopic surgery is associated with longer operating time and fewer complications [6]. The former is hardly a surprise and the latter is difficult to believe. Inexperienced readers should not be distracted by forest and funnel plots, but rather should focus on the end points of the meta-analysis. Early recovery as concluded by another meta-analysis [7] is an example of surrogate end point, particularly in a socialized healthcare system. The CLASICC trial provides the only credible source of truly randomized data, however, with a 57% conversion rate [8]. This figure may testify to the good judgment of the surgeons and may be attributable to non-selection of patients, but also clearly includes the learning curve of the surgeons.

Future Data

The random operation design is usually biased in favor of widely used operations and technically simple procedures [9]. In the specific case of rectal cancer surgery, an RCT would be biased in favor of conventional surgery. So the question is what study designs are available to minimize the inclusion of the learning curve into an RCT. The process of care study is a design that measures what is done to the patient in addition to measuring what happens to the patient (outcomes) [10]. There are indeed not many examples of process of care studies. The best example in rectal surgery is perhaps the Norwegian Rectal Cancer Project [11]. A 34 % local recurrence rate initiated implementation of a standardized total mesorectal excision technique and retraining of colorectal surgeons resulting in a decreased recurrence rate to 6%. We suggest that in order to minimize the inclusion of learning curves, process of care studies should be carried out prior to RCT. Currently ACOSOG is getting ready to launch a new RCT in the United States on open vs. laparoscopic rectal surgery for rectal cancer. Hopefully this trial will include the process of care design.

Technical Limitations

A limiting factor in laparoscopic low rectal transection is the fulcrum effect of operating a stapler through a port. Another limitation is the degree of angulation of the currently available staplers. A virtual simulation study has shown that current staplers will have to go through the iliac bone to achieve a 90 degree angle at the levator ani [12]. An additional drawback is the issue of single vs. multiple firing [13]. In order to avoid multiple firing, a conventional stapler may be inserted through a suprapubic incision subsequently over-sewn around the stapler shaft [14]. The fulcrum effect, however, will still be unresolved and the pneumoperitoneum may become unstable. An alternative would be to insert a conventional stapler through a hand port although with the disadvantage of increased cost.

Robotic Total Mesorectal Excision

According to the Cochrane review, laparoscopic low anterior resection (LAR) with total mesorectal excision (TME) for rectal cancer has several short-term advantages compared with open LAR with TME [1]. Laparoscopic LAR with TME has resulted in less blood loss (unclear impact on blood transfusion requirements), quicker return to normal diet, and less pain (measured by narcotic use). No significant differences were found in length of resection margins or number of recovered lymph nodes. Mortality and leakage rates associated with laparoscopic and open LAR with TME were comparable, both ranging between 1% and 2%. However, LAR with TME is associated with longer operative time and higher cost [15]. Overall 5-year survival rates from retrospective data for laparoscopic LAR with TME have ranged from 62% to 92% [1]. The Cochrane review included one randomized controlled trial of 403 patients, which reported local recurrence rates of 6.6% and 4.1% and disease-free survival of 75% and 78% at 5 years following laparoscopic or open LAR with TME, respectively [4]. A meta-analysis of 2,071 patients confirmed that laparoscopic LAR with TME resulted in specimens comparable to its open counterpart, but offered a lower rate of wound infection (0% vs. 14%) and earlier postoperative recovery [7]. Laparoscopic TME for rectal cancer is a technically challenging procedure due to the use of non-wristed instruments while working in the confined space of the pelvis. Recently, a hybrid technique has been advocated where robotic surgery was used along with laparoscopy to undertake LAR [16]. A case-controlled study included 12 patients either treated with laparoscopic LAR with TME or laparoscopic LAR with robotic TME by one surgeon in 1 year [16]. Laparoscopic LAR with robotic TME resulted in a median of 4.4 h operative time, 104 ml estimated blood loss (EBL), 14 lymph nodes harvested, 3.8 cm distal margin, and 4.5 days length of stay (LOS). Similarly, laparoscopic LAR with TME resulted in a median of 4.3 h operative time, 150 cc EBL, 17 lymph nodes harvested, 3.5 cm distal margin, and 3.6 days LOS [16]. Another study by the same authors was performed on 33 consecutive patients who underwent laparoscopic LAR with robotic TME from 2004 to 2007 [17]. Uninvolved circumferential margins were obtained in all cases and postoperative mortality and morbidity were 0% and 12.8%, respectively. The median operative time was 4.7 h, the conversion rate was 2.6%, and the anastomotic leakage rate was 12.1%. Average LOS was 4 days, and no local recurrences were noted at 4-month follow-up. Laparoscopic LAR with robotic TME is feasible and safe [17]; however, although the stereoscopic vision and wristed instruments are available with the robot, operative time is increased [18] and the additional cost of robotics is of concern.

The Rationale

The purpose of laparoscopic surgery is certainly not feasibility [19]. It should not be implemented as yet for hypothetical benefits to the patients such as not having an incision, magnified view of the pelvis, or minimal handling of tumor. Future research should concentrate on clinical benefits to the patient, such as accomplishing negative radial margins, sparing autonomic nerves, and avoiding ureteral injuries. The CLASICC study reported a 12% rate of positive circumferential margin in laparoscopic surgery vs. 6% in open surgery [8]. In the author’s own unpublished laparoscopic APR series, the rate of positive resection margin is 16%. We can be impressed by beautiful pictures of laparoscopic autonomic nerve identification [20], but the published data show a significantly increased rate of sexually active men reporting impotence or retrograde ejaculation after laparoscopic surgery [21]. What really would affect the future of laparoscopic surgery for rectal cancer is histopathology. Concerns in laparoscopic LAR and APR are adequate distal resection margin and a cylinder without a waist [22], respectively. We believe that the future of laparoscopic resection for rectal cancer would be short-lived unless future research is conducted focusing on clinical outcome measures rather than surrogate end points.

References

1. Breukink S, Pierie JP, Wiggers T. Laparoscopic versus open total mesorectal excision for rectal cancer. Cochrane Review 2006, Issue 4. Art. No.: CD005200.

2. Moher D, Schulz KF, Altman DG, for the CONSORT Group. The CONSORT Statement: Revised recommendations for improving the quality of reports of parallel-group randomized trials. *Ann Intern Med* 2001; 134:657-662.

3. Leung KL, Lai PB, Ho RLK, et al. Systemic cytokine response after laparoscopic-assisted resection of rectosigmoid carcinoma: a prospective randomized trial. *Ann Surg* 2000;231:506-511.

4. Leung KL, Kwok SP, Lam SC, Lee JF, Yiu RY, Ng SS, Lai PB, Lau WY. Laparoscopic resection of rectosigmoid carcinoma: prospective randomised trial. *Lancet* 2004;363:1187-1192.

5. Zhou ZG, Wang Z, Yu YY, Shu Y, Cheng Z, Li L, Lei WZ, Wang TC. Laparoscopic total mesorectal excision of low rectal cancer with preservation of anal sphincter: a report of 82 cases. *World J Gastroenterol* 2003;9:1477-1481.

6. Gao F, Cao YF, Chen LS. Meta-analysis of short-term outcomes after laparoscopic resection for rectal cancer. *Int J Colorectal Dis* 2006;21:652-656.

7. Aziz O, Constantinides V, Tekkis PP, Athanasiou T, Purkayastha S, Paraskeva P, Darzi AW, Heriot AG. Laparoscopic versus open surgery for rectal cancer: a meta-analysis. *Ann Surg Oncol* 2006;13:413-424.

8. Guillou PJ, Quirke P, Thorpe H, Walker J, Jayne DG, Smith AM, Heath RM, Brown JM. MRC CLASICC trial group. Short-term endpoints of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer (MRC CLASICC trial): multicentre, randomised controlled trial. *Lancet* 2005;365:1718-1726.

9. Van der Linden W. Pitfalls in randomized surgical trials. *Surgery* 1980;87:258-62.

10. Rhodes RS. Quality in surgery: from outcomes to process--and back again. *Surgery* 1999;126:76-7.

11. Wibe A, Møller B, Norstein J, Carlsen E, Wiig JN, Heald RJ, Langmark F, Myrvold HE, Søreide O, Norwegian Rectal Cancer Group. A national strategic change in treatment policy for rectal cancer-implementation of total mesorectal excision as routine treatment in Norway. A national audit. *Dis Colon Rectum* 2002;45:857-866.

12. Brannigan AE, De Buck S, Suetens P, Penninckx F, D'Hoore A. Intracorporeal rectal stapling following laparoscopic total mesorectal excision: overcoming a challenge. *Surg Endosc* 2006;20:952-955.

13. Ito M, Sugito M, Kobayashi A, Nishizawa Y, Tsunoda Y, Saito N. Relationship between multiple numbers of stapler firings during rectal division and anastomotic leakage after laparoscopic rectal resection. *Int J Colorectal Dis* 2008;23:703-707.

14. Lezoche E, Paganini AM, Feliciotti F. A new technique to facilitate laparoscopic resection of low rectal tumors. *Surg Laparosc Endosc* 1997;7:9-12.

15. http://investor.intuitivesurgical.com/phoenix.zhtml?c=122359&p=irol-faq#22324

16. Pigazzi A, Ellenhorn JDI, Ballantyne GH, Paz IB. Roboticassisted laparoscopic low anterior resection with total mesorectal excision for rectal cancer. *Surg Endosc* 2006;20:1521–1525.

17. Hellen M, Anderson C, Ellhorn JDI, Paz B, Pigazzi A. Short-term outcomes after robotic-assisted total mesorectal

excision for rectal cancer. *Ann Surg Oncol* 2007;14:3168–3173.

18. Delaney CP, Lynch AC, Senagore AJ, Fazio VW. Comparison of robotically performed and traditional laparoscopic colorectal surgery. *Dis Colon Rectum* 2003;46:1633-1639.

19. Millat B. Feasibility hazards. *Surg Endosc* 2002;16:1511-1512.

20. Hasegawa S, Nagayama S, Nomura A, Kawamura J, Sakai Y. Multimedia article. Autonomic nerve-preserving total mesorectal excision in the laparoscopic era. *Dis Colon Rectum* 2008;51:1279-1282.

21. Quah HM, Jayne DG, Eu KW, Seow-Choen F. Bladder and sexual dysfunction following laparoscopically assisted and conventional open mesorectal resection for cancer. *Br J Surg* 2002;89:1551-1556.

22. West NP, Finan PJ, Anderin C, Lindholm J, Holm T, Quirke P. Evidence of the oncologic superiority of cylindrical abdominoperineal excision for low rectal cancer. *J Clin Oncol* 2008;26:3517-3522.