

Laparoscopic Low Anterior Resection using Endo GIA Radial Reload Stapler: early results (case series)

Ramiz S. Mukhtar*

Mohammed Q. Abdul Jabbar**

Raid A. Aziz ***

FRCS

DGS CABS MRCS

FIBMS (CVT)

Abstract:

Background: Laparoscopic colectomy is performed in an increasing number of institutions as a minimally invasive treatment for benign and malignant large bowel disease. Laparoscopic rectal surgery enables more accurate visualization of the anatomical structure in the pelvic cavity for selected patients with tumors in the middle and low rectum.

Objectives: To determine the early outcome of patient who underwent laparoscopic low anterior resection using radial reload stapler.

Patients and methods: This is a prospective study of 8 patients with low or mid rectal cancer who underwent a laparoscopic low anterior resection between January 2017 till June 2017 at Saint Raphael hospital.

Results: Eight patients underwent elective laparoscopic low anterior resection, 5 (62.5%) of them were male and 3(37.5%) were female. In 6 (75%) patients complete rectal transaction done only radial reload stapler, while the other 2 (25%) patients complete transaction couldn't be done only by the radial reload stapler and they need one Endo GIA™ (Covidien) medium thick purple stapler. There was no anastomotic leakage, no wound infection and no mortality.

Conclusion: The primary results and early outcome of this study showed that laparoscopic low anterior resection using radial reload is a safe procedure without increasing the risk of anastomotic leak. Further analysis in a large series is needed to draw definitive conclusions.

Keywords: laparoscopic low anterior resection, rectal cancer, anastomotic leakage.

Introduction:

Laparoscopic colectomy is performed in an increasing number of institutions as a minimally invasive treatment for benign and malignant large bowel disease. Laparoscopic surgery has several advantages over open surgery including less postoperative pain, earlier post operative recovery, and shorter hospital stay(1), also Laparoscopic rectal surgery enables more accurate visualization of the anatomical structure in the pelvic cavity for selected patients with tumors in the middle and low rectum.(2) The use of laparoscopic surgery because of its advantages over open surgery, is expected to increase further in the future and become the standard therapy, replacing open surgery. However, a problem associated with the further expansion of laparoscopic surgery is that it is technically more difficult than open surgery; the training time to acquire the operative technique is longer than for open surgery and the training methods vary in different institutions. In particular, laparoscopic low anterior resection has the highest level of technical difficulty in laparoscopic colorectal surgery (3)

Laparoscopic low rectal surgery, remains a challenging form of surgery, challenges mainly occur as a consequence of narrow workspace within the bony structure of the small pelvis(4), this leads to inadequate visibility and problems positioning stapler devices, which have become the obligatory tool for both resection and anastomoses with the advent of laparoscopic surgery(4). As a consequence, multiple staple firing is often needed. Some studies suggest that this is associated with increase the risk of anastomotic leak (5,6). Therefore, a stapler device that allows good visibility and transaction with the use of only one stapler firing would be preferred in low rectal surgery (5, 7). The stapler for securing the distal rectum can be classified into linear staples and curved cutting staplers, the latter have the advantage that the knife is integrated in the device and that curve allows deeper positioning in the pelvis(8). The radial reload with tri-staple technology is a curved, low-profile stapling device specifically made to reach the ultra-low rectum, designed for the possibility of curved transaction in both Sagittal and coronal approach, resulted in better handling and reaching lower into the pelvis(4,8). The aim of the study to determine the early outcome of patient who underwent laparoscopic low anterior resection using radial reload stapler.

*Dept. of Surgery, college of Medicine, University of Baghdad. ramizmukhtar@yahoo.com

**Al-Karkh General Hospital.

*** Ibn Al-Nafees Hospital.

Patients and methods:

This is a prospective study of 8 patients with low or mid rectal cancer who underwent a laparoscopic low anterior resection between January 2017 till June 2017 at Saint Raphael hospital done by the same surgeon. No patient received a preoperative radiotherapy or chemoradiotherapy, the lower edge of the tumor was within 10cm from anal verge in all cases. The low rectum was defined as 0-5cm from anal verge and the mid rectum as 5-10cm from the anal verge, an informed consent was signed by all patient preoperatively preoperative staging and tumor assessment done by digital rectal exam, colonoscopy and CT scan of the abdomen and pelvis with oral and IV contrast. Pelvic MRI was done as needed. Patients with distant metastases and locally advanced tumor were excluded from the study.

Bowel preparation was performed on the preoperative day in the ward, where patient drank polyethylene glycol electrolyte solution (coloclean™ powder) until clear fluid was evacuated, these patients kept on clear fluid diet on the preoperative day. All patient received a prophylaxis single dose of ceftriaxone 1g IV (Rocephin™) with metronidazole 500mg IV (Flagyl) at the time of induction, all patient received a DVT prophylaxis with 3500IU SC Innohep™ at the time of induction. Surgical technique: the surgeon stand at the patient right side. The patient is placed in lithotomy position with head down and right side down tilting. Five ports insertion including camera port with two 5 mm ports and two 12 mm ports, laparoscopic exploration done first, then mobilization of the rectum to the anal hiatus of the pelvic diaphragm using a Harmonic scalpel™ (Johnson and Johnson medical Co.), starting with posterior dissection along with avascular plane, dissection is continued laterally to the left side and then to the right side and finally to the anterior side of the rectum, after a complete mobilization of the rectum with total mesorectal excision, an Endo GIA™ radial reload purple stapler with Tri-staple technology (Covidien™) was inserted through a right lower port, transaction of the rectum done with at least 2cm distal safe margin, if the radial reload couldn't transect the rectum completely, then transaction done by one Endo GIA™ medium thick purple stapler, care was taking to make the stapler line as horizontal as possible when performing the complete transaction of the rectum, the left colic sigmoidal and superior rectal arteries were identified with clipping and cutting done, then a left grid iron incision was made which was protected by with small sized ALEXIS® wound retractor system, the transected rectum was exteriorized through the left grid iron incision, excision of tumor with at least 5 cm proximal margin, then anvil was fixed at the proximal end of the descending colon, then the proximal colon returned to the peritoneal cavity. The pneumoperitoneum with CO2 gas is performed again by twisting and closing the ALEXIS®, the rod of a circular curved stapler size

32 was inserted transanally by assistant pierces the rectal wall right next to staple line. The anvil is applied to the rod, and the edge of the mesentery of the proximal colon should be positioned anteriorly so that the proximal is placed in front of the sacrum without tension. Finally, the stapler is closed thoroughly, paying attention not to tuck in adjacent tissue such as seminal vesicle or vagina, and then fired. Air leak was checked and intraoperative colonoscopy done to check the stapler line, a corrugated drain was fixed near the site of anastomosis in all patients and diverting stoma was unnecessary in all patients. Post operatively all patient kept on nil per oral at the postoperative period, at the second day post op clear fluid diet was introduced and the corrugated drain was removed at the third post operative day in all patients and they had discharged home on same day of removal of the drain.

Results:

Eight patients underwent elective laparoscopic low anterior resection, 5 (62.5%) of them were male and 3(37.5%) were female and the mean age was 61+/-1.1 years (range 52-68), their median BMI was 23.6kg/m2 (19.5-27.8). The lower edge of the tumor was within 10cm from anal verge in all cases. Six (75%) patients had upper rectal cancer and the remaining 2(25%) patients had lower rectal cancer. In 6 (75%) patients complete rectal transaction done only radial reload stapler, while the other 2 (25%) patients complete transaction couldn't be done only by the radial reload stapler and they need one Endo GIA™ (Covidien) medium thick purple stapler. Mean operative time was 126+/- 18 mins. There was no conversion to open surgery, no anastomotic leak, no wound infection and no mortality. The final histopathological exam was adenocarcinoma in all patients, Neither microscopic circumferential margin nor microscopic distal margin involvement was observed, 4 (50%) patients had Dukes B and 3 (37.5%) patients had Dukes C and only one (12.5%) patient had Dukes A.

Table I preliminary outcomes of laparoscopic low anterior resection

Parameter	(N=8)
Age	61+/-1.1
Gender(male/female)	5\3
Tumor size(cm)	3.9+/-1.1
Operative time (min)	126+/- 18
Pathological distal margin(cm)	2.6+/- 1.2
Post-operative hospital stay(days)	4
Major complications	0

Discussion:

Laparoscopic surgery in the management of rectal cancer could provide an enhanced benefit to the patients in the terms of postoperative early recovery and reduced pain (9). Long term oncological outcome of laparoscopic rectal cancer surgery is recently reported to be comparable to that of open surgery (10, 11). Thus, application of laparoscopy would be

increased for rectal cancer surgery. During anatomical dissection of the rectum, magnification and closer view of the laparoscopy site is advantageous, especially when operating in a deep narrow pelvis. However, there is some limitation when performing laparoscopic rectal surgery, especially when transecting the lower rectum. Safe anastomosis, including proper rectal transaction is essential in achieving minimally invasive surgery (12). Rectal transaction and anastomosis are the most demanding parts of laparoscopic low anterior resection (13). Multiple firing with multiple cartridges for rectal transaction have been reported as potential causes of anastomotic leakage in laparoscopic low anterior resection (5, 14). In this study the anastomotic leak was zero comparing with a recent study done by Hotta (15) et al which had used an endolinear stapler with one or maximum two stapler also showed zero leak, another study by Hamada (16) et al also showed zero leak which also used a single endolinear stapler, so the use of right stapler device to minimize the number of staplers that used to transect the rectum and skilled surgical procedure with a harmony between the surgeon and assistant are essential to decrease the risk of anastomotic leak(13,17). Conversion to open surgery didn't occur in this study, comparing with a study done by Miyajima (18)et al which was showed a conversion rate of (7.3%), one of the reasons for the low conversion rate may be that the present study included a selected group of patients with rectal cancer, patients with locally advanced tumor were excluded from the study and non of the patients were receiving preoperative radiotherapy or chemoradiation , another reason might be that most patients in this study were with normal BMI, median BMI of the patients was 23.6kg/m²

Conclusion:

The primary results and early outcome of this study showed that laparoscopic low anterior resection using radial reload is a safe procedure without increasing the risk of anastomotic leak, also appropriate patient selection is essential for laparoscopic surgery for rectal cancer. Further analysis in a large series is needed to draw definitive conclusions.

Authors' Contributions:

Dr. Ramiz Sami Mukhtar: operated all patients (main surgeon), patients follow up, literature review
 Dr. Mohammed Qasim Abdul Jabbar: assistant, data collection, study design, manuscripts writing
 Dr.Raid Adil: assistant, data collection

References:

1- H. Kayano, J. Okuda, K. Tanaka, et al, Evaluation of the learning curve in laparoscopic low anterior resection for rectal cancer, *Surg Endosc*, 2011;25:2972-2979.

2- Y. Hirano, M. Hattori, K. Douden, et al, A new laparoscopic rectal transaction method via umbilical incision using Endo GIA™ radial reload, *Indian J Surg*, 2015, published online.

3- F. Jamali, A. Soweid, H. Dimassi, et al, Evaluation the degree of difficulty of laparoscopic colorectal surgery, *Arch Surg*, 2008;143(8):762-767.

4- J. van Vugt, J. Tegels, J. Derikx, et al, First experience with the radial reload with Tri-staple™ technology in low rectal surgery, *International Journal of Surgery*, 2015;14:23-27.

5- M. Ito, M.Sugito, A. Kobayashi, et al, Relationship between multiple numbers of stapler firings during rectal division and anastomotic leak after laparoscopic rectal resection, *Int J Colorectal Dis*,2008;23:703-707.

6- C. Kang, W. Halabi, O. Chaudhry, et al, Risk factors for anastomotic leakage after anterior resection for rectal cancer, *JAMA Surg*, 2013;148(1):65-71.

7- K. Kawada, S. Hasegawa, K.Hida, et al, Risk factors for anastomotic leakage after laparoscopic low anterior resection with DST anastomosis, *Surg Endosc*,2014;28:2988-2995.

8- W. Lee, W. Yong Lee, H. Chun, et al, Curved cutter stapler vs. linear stapler in rectal cancer surgery: a pilot prospective randomized study, *Int J Colorectal Dis*, 2009;24:1327-1332.

9- J. Kang, N. Kim and K.lee, Multicenter analysis of long-term oncologic impact of anastomotic leakage after laparoscopic total mesorectal excision, *Medicine*,2015;94(29):1-8.

10-S. Yong, J. Park, B. Nam, et al, open versus laparoscopic surgery for mid-rectal or low-rectal cancer after neoadjuvant chemoradiotherapy (COREAN trial): survival outcomes of an open- label, non-inferiority, randomized controlled trial, *The Lancet Oncology*,2014; published online.

11-B. Green, H. Marshall, F. Collinson, et al, Long term follow up of the medical research council CLASICC trial of conventional versus laparoscopic assisted resection in colorectal cancer, *Br J Surg*,2013;100:75-82.

12-J. Okuda, K. Tanaka, K. Kondo, et al, Safe anastomosis in laparoscopic low anterior resection for rectal cancer, *Asian J Endosc Surg*, 2011;4:68-72.

13-H. Kuroyanagi, M. Oya, M. Ueno et al, Standardized technique of laparoscopic intracorporeal rectal transaction and anastomosis for low anterior resection, *Surg Endosc*,2008;22:557-561.

14-K. Kawada and Y. Sakai, Preoperative, intraoperative and postoperative risk factors for anastomotic leakage after laparoscopic low anterior resection with double stapling technique anastomosis, *World Journal of Gastroenterology*,2016;22(25):5718-5727.

15-T. Hotta, K.Takifuji, S. Yokoyama, et al, Horizontal rectal transaction using an endolinear stapler for

laparoscopic low anterior resection, Tech Coloproctol, 2017; published online.

16-M. Hamada, Y. Nishioka, Y. Kurose, et al, New laparoscopic double stapling technique, Diseases of the colon and rectum, 2007;50(12):2247-2251.

17-S. Yamamoto, S. Fujita, T. Akasu et al, Risk factors for anastomotic leakage after laparoscopic surgery for

rectal cancer using a stapling technique, Surg Laposc Endosc Percutan Tech, 2012;22(3):239-243.

18-N. Miyajim, M. Fukunaga, H. Hasegawa, et al, Results of a multicenter study of 1,057 cases of rectal cancer treated by laparoscopic surgery, Surg Endosc,2009;23:113-118.