Case Report

Laparoscopic low anterior resection of rectum: A case report with review of literature

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ABSTRACT

Low anterior resection (LAR) is the standard operative treatment for rectal cancer. Laparoscopic anterior resections were first attempted in the 1990s. With the passage of time, laparoscopic instrumentation, energy sources, and laparoscopic techniques underwent a significant improvement. With all the above advancements, at the turn of the 20th century, there emerged strong evidence in the literature in favor of laparoscopic therapy for rectal cancer. Large-volume multicenter studies, various randomized controlled trials, and many review analyses of large databases, for example, Cochrane; conclusively showed that laparoscopy was not inferior to open surgery in oncological completeness of the resection; in colorectal cancer. Given its cosmetic superiority, lesser post-operative pain, and earlier resumption of routine day-to-day activity, laparoscopic radical colorectal cancer surgery has become standard practice in advanced laparoscopic health-care setups all over the world. Herein, we present the case of a 77-year-old gentleman who was diagnosed with low rectal cancer, underwent a laparoscopic LAR, and is disease-free until date, on serial surveillance investigations; over a post-operative follow-up period of just over 9 years.

Key words: Advanced, Analyses, Cancer, Colorectal, Completeness, Laparoscopic, Metastases, Resection, Studies, Trials

Rectal cancer is the second most common cancer in the large intestine after proximal colon cancer [1]. It is also the third leading cause of cancer death in men and women in the United States [1]. Over the past few decades, rectal cancer incidence has increased alarmingly, with rates predicted to rise to 124.2% by 2030 among adults aged 20–34 years [2]. Colorectal cancers (CRCs) are more common in developed regions of the world, with the highest rates in Australia/New Zealand and the lowest in Western Africa [1]. According to recent data from the United States, approximately 136,830 new cases of colorectal cancer are diagnosed annually, including 40,000 rectal cancers [1]. Rectal cancer has a similar 5-year survival rate as colon cancer, and the mortality rate is 30–40% higher in men than in women, though this difference varies by age [1]. Although CRCs are more common in more developed regions, their mortality seems to be higher in less developed regions, reflecting poorer survival in these countries [1].

The rationale of reporting this case is to underscore and reinforce the important role of minimal access surgery in definitive radical resections for CRC and to add our experience to the existing literature on the topic.

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CASE REPORT

A 77-year-old gentleman presented to the surgical outpatient department with a chief complaint of fresh bleeding per rectum (PR) for 5 days. He did not give any history of weight loss, painful defecation, or something coming out PR.

On general examination, he had mild pallor and no icterus or lymphadenopathy. His pulse was 82 beats/min, blood pressure was 140/90 mms of mercury, and respiratory rate was 12 breaths/min. A per abdomen examination revealed a soft normal abdomen with no lump, organomegaly, or free fluid. A PR revealed a soft mass in the lower rectum barely felt by the fingertip which bled to touch.

He was then referred to the consultant gastroenterologist for a colonoscopy. It revealed an ulcerated eccentric mass that bled to touch, 10 cm from the anal verge (Fig. 1a). The rest of the colon was normal. Multiple biopsies were taken. Histopathology (HPE) report revealed a moderately differentiated adenocarcinoma of the rectum. His serum carcinoembryonic antigen (S.CEA) level was 1.89 ng/mL.

He was then advised surgery – laparoscopic low anterior resection (LAR) of the rectum. After due pre-operative investigational

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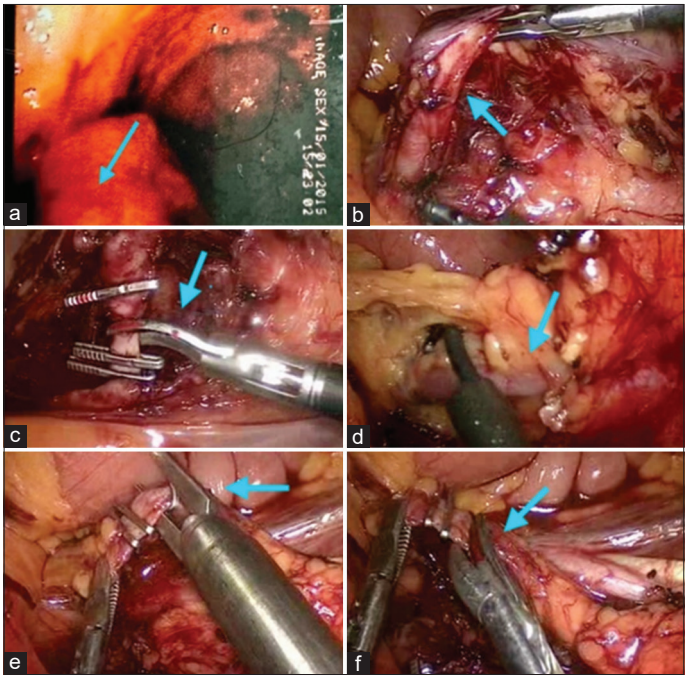

Figure 1: (a) Colonoscopy picture showing the tumor (blue arrow), (b) Operative pic showing skeletonization of the IMA (blue arrow), (c) Division of the IMA at its root between clips (blue arrow), (d) Skeletonization of the IMV (blue arrow), (e) Clipping of the proximal IMV (blue arrow), (f) Division of the IMV between clips (blue arrow). IMA: Inferior mesenteric artery, IMV: Inferior mesenteric vein

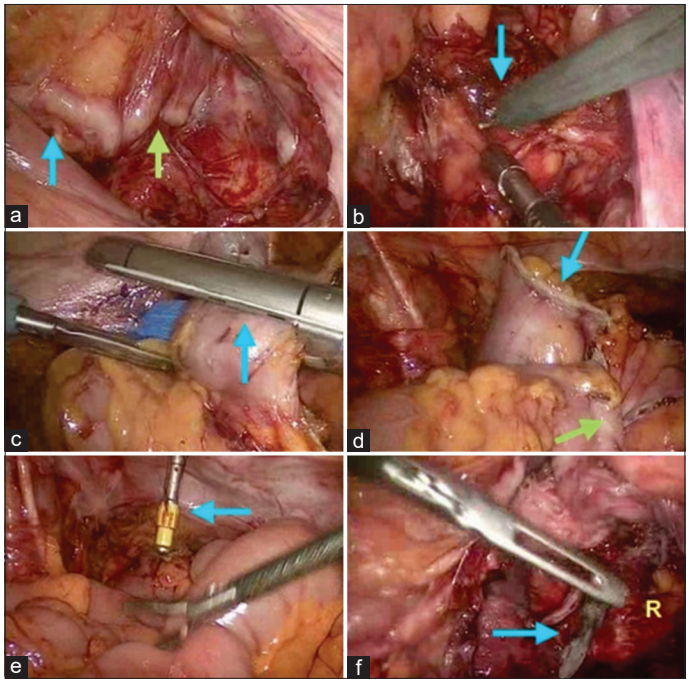

Figure 2: (a) Deep pelvic dissection revealing the right and left seminal vesicles (arrows), (b) Further progression of dissection into deep pelvis between the urinary bladder and rectum (blue arrow), (c) Proximal division of colon using linear cutter (blue arrow), (d) The proximal and distal stapled cut ends of colon (arrows), (e) The proximal cut end of colon with attached anvil of circular stapler re-introduced inside abdomen (blue arrow), (f) Pin of circular stapler (blue arrow) introduced per rectum after it pierced the distal cut end of rectum (white "R")

workup, confirmation of fitness for anesthesia, and adequate bowel preparation, he was taken up for surgery. A standard 5 trocar approach was adopted. The harmonic scalpel was used as the energy source. A medial-to-lateral approach was adopted. Accordingly, initial medial mesenteric dissection was performed to reach the root of the inferior mesenteric artery (IMA). The IMA was then divided between clips at its root (Fig. 1b and c). The dissection then progressed laterally to identify the inferior mesenteric vein, which, after skeletonization, was divided similarly (Fig. 1d-f). Once the lateral dissection was over, it then progressed toward and into the pelvis, while carefully safeguarding critical retroperitoneal structures like the ureter. In the pelvis, it proceeded in the "holy" plane in the presacral space. Anteriorly, the urinary bladder was dissected away carefully; both the seminal vesicles were identified deep into the pelvis and dissected away (Fig. 2a and b). After identifying the proximal and distal resection margins, the same were skeletonized and divided using the Endo GIA® linear cutter, to completely free the specimen (Fig. 2c and d). The lateral trocar site was then widened and the specimen was retrieved using the wound protector. The proximal cut end of the descending colon was then exteriorized and the anvil of the circular stapler was introduced into its cut end and fixed with a purse string suture. The exteriorized colon was then re-introduced inside with the anvil (Fig. 2e) and the pneumoperitoneum was re-established. The distal anorectum was then toiletted and the circular stapler was introduced through the anal opening. The stapler pin was then brought out under the camera vision (Fig. 2f). The pin and anvil were "docked" together and the stapler was fired to create an end-to-end colorectal stapled anastomosis (Fig. 3a and b). After the circular stapler was withdrawn out, a leak test was performed by introducing saline around the anastomosis. It did not reveal any leak (Fig. 3c). The donuts were checked and found to be uniform and complete (Fig. 3d). A thorough peritoneal toilet was then given and a 32 French tube drain was kept *in situ* in the left pelvis, thereby concluding the surgery (Fig. 3e). The patient was kept nil per oral for 3 days. He passed flatus on post-operative day (POD) 4 and was started on liquids orally. He was given a semi-solid diet on POD 5 and the drain and per-urethral catheter were removed on POD 6. He was discharged from the hospital on POD 7.

On his POD, 12 outpatient's department visit, all his wounds had healed well. The HPE report of the final operative specimen (Fig. 3f) confirmed a moderately differentiated adenocarcinoma of the rectum. The circumferential resection margins and the longitudinal resection margins were free of the tumor. There were no lymphovascular tumor emboli and no perineural tumor invasion. There were 12 lymph nodes in the specimen and none were involved. He was then referred to the medical oncologist, who ruled out adjuvant therapy. The patient was then put on a surveillance program wherein he was asked to follow-up with computed tomography (CT) abdomen, X-ray chest, and S.CEA reports once every 6 months, for a period of 5 years. All these were serially normal and the surveillance was stopped by the oncologist at the end of 5 years. At the time of writing this paper, 110 months

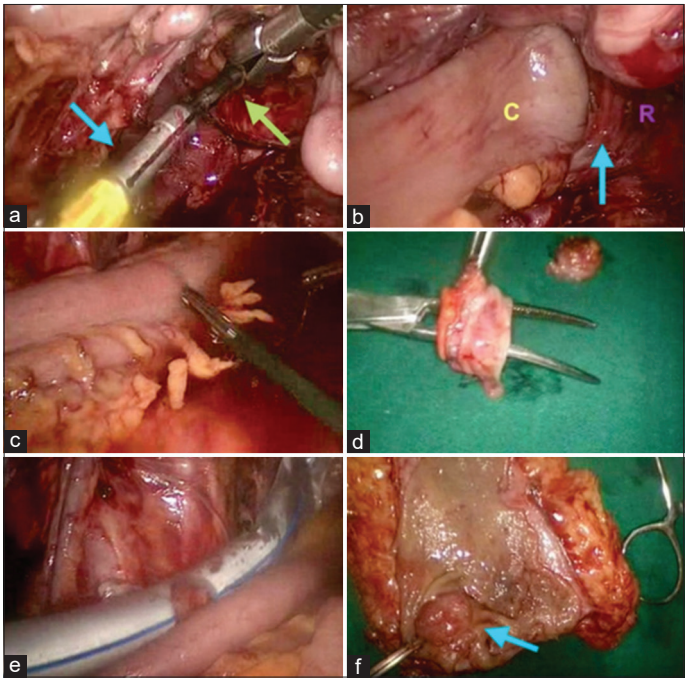

Figure 3: (a) Anvil (blue arrow) being attached to pin (green arrow), (b) Colorectal anastomosis (blue arrow) after firing of circular stapler, (c) Leak test of anastomosis, (d) Intact donuts retrieved from stapler, (e) Tube drain kept *in situ* in pelvis, (f) The lower end of the specimen with tumor (blue arrow)

after his surgery, a telephonic interview was conducted with the patient. He continues to be symptom and disease-free.

DISCUSSION

Surgery is the mainstay of treatment for patients with resectable rectal cancers. There have been different types of treatment modalities proposed for patients with rectal cancer. Surgery can be performed alone or in combination with other neoadjuvant and/or adjuvant therapies depending on the location of the tumor and stage [1]. Neoadjuvant chemotherapy and radiation therapy for locally advanced rectal cancer are a widely practiced treatment before surgical excision. Although it was initially used to improve rates of sphincter preservation and to optimize patient tolerance, closer scrutiny may allow better individualization of treatment. For several years, pre-operative radiotherapy in doses of 2500–4500 cGy has been given to patients with locally advanced rectal cancer. Although randomized studies were originally designed to reveal improvements in local recurrence, several studies also reported improved survival rates. The addition of 5-fluorouracil-based chemotherapy to radiotherapy, to radiosensitize the primary tumor and to eliminate systemic micrometastases has also improved rates of both recurrence-free and overall survival [1]. In addition to accurately staging rectal cancer and predicting the involvement of perirectal and pelvic lymph nodes, high-resolution magnetic resonance imaging (MRI) also helps plan sphincter-sparing surgery. Therefore, MRI can be considered the gold standard in the development of the best treatment strategy for rectal cancer [1].

LAR is a laparoscopic procedure used to remove rectal cancer and benign diseases by removing the rectum and restoring the continuity of the bowel through an anastomosis in the pelvis. In addition to being a standard of care for high and mid-rectal cancers, the LAR is now available to those with low-rectal cancers. The procedure can be classified into four categories based on the extent of rectal resection: (1) High anterior resection – performed for distal sigmoid and rectosigmoid tumors and the final anastomosis is above the peritoneal reflection, (2) LAR – performed for upper rectal tumors and the final anastomosis is below the level of peritoneal reflection, (3) ultra-LAR (ULAR) – performed for mid and low rectal tumors. A resection is said to be ultra low if the colorectal anastomosis is within 2 cm from the anorectal junction, (4) ULAR with coloanal anastomosis – performed for low rectal tumors where the level of division is either at the anorectal junction or below the anorectal junction (combined with partial intersphincteric resection [2]. LAR and abdominoperineal resection (APR) are two major surgical techniques used in lower and middle rectal cancers. A LAR may provide comparable local control, disease-free survival, and overall survival rates to an APR in patients with lower and middle rectal cancer who are eligible for surgery [3].

A laparoscopic LAR is a minimally invasive procedure that provides a quicker recovery and shorter hospital stay than a laparotomy. The mortality rate remains about 1% compared with open surgery (2–3%) where the main causes of death are systemic complications [4]. It has been demonstrated in a series of clinical trials, including a COST study that there is no significant difference between open and laparoscopic techniques regarding post-operative complications, which indicates that both methods are safe and viable [5,6]. In the randomized controlled trial-CLASICC, which has included 484 cases of laparoscopic and 253 cases of open colorectal cancer surgery, the incidence rates of the most frequently encountered complications were outlined [7]. There were 14% intraoperative complications, including severe hemorrhage (7%) and cardiopulmonary dysfunction (4%) as well as vascular/bladder injuries (2%) and bowel injuries (1%). Short-term (within 30 days of the procedure) post-operative complications of the LAP group were infections in the incision (13%), infections in the lung (10%), anastomotic leakage (10%), and deep vein thrombosis (0.4%) while long-term complications include bowel obstruction and persistent incision infections [7].

The only established tumor marker for colorectal cancer is a carcinoembryonic antigen. Since the liver and lungs are the most common sites of recurrence, abdominal and chest computed tomography scans are recommended. Rectal cancer has a higher local relapse than colon cancer, so endoscopic surveillance is essential. A variety of follow-up regimens have been published, but meta-analyses and randomized comparisons cannot reveal whether intensive or less intensive follow-up affects survival or recurrence detection. Optimum surveillance methods and frequency cannot be determined based on the available data. In high-risk patients and those undergoing a watch-and-wait approach, clinicians need cost-effective strategies that allow early detection of recurrence [8].

CONCLUSION

As seen in this report, laparo-therapy for the carcinoma rectum is feasible in an advanced setup which is ably complemented by requisite advanced laparoscopic surgical skills. Furthermore, as seen here, while stringently adhering to the time-honored set principles of oncosurgery, laparoscopic LAR compares favorably with open LAR vis-a-vis oncological completeness, disease-free survival, and locoregional recurrence.

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