

# Laparoscopic Assisted Versus Open Abdominoperineal Resection for Low Rectal Adenocarcinoma: A Comparison in respect of Postoperative Recovery and Complications

ABDUL MANNAN KAHN RAO

## ABSTRACT

**Background:** There are various studies delineates that laparoscopic colonic surgery have less post-operative pain, after surgery rapid recovery, shorter hospital stay, and quick resumption of daily activity when compared to open surgery. But there are only few studies comparing the Laparoscopic assisted to open abdominoperineal resection for low rectal or anal canal caners.

**Aim:** To evaluate and compare the results of laparoscopic assisted and open abdominoperineal resection (Lap-APR and Open-APR) for low rectal cancer.

**Methods:** Between 20<sup>th</sup> November 2008 to 10<sup>th</sup> September 2012, 82 patients were underwent surgery for low rectal adenocarcinoma, among them 37 patients underwent laparoscopic assisted APR, and 45 patients were underwent open APR. The operative outcomes and postoperative complications of these two groups were compared.

**Results:** There were no significant differences between Lap-APR and open-APR in patient's age and tumour stage. Post-operative recovery was better in Lap-APR group, with earlier return of bowel function ('p' Value= 0.0001), time to take water ('P'= 0.0001), time to take soft diet ('p'= 0.0035) and early mobilization ('p'= 0.0034), all these are more significant. But the operative time was longer in Lap-APR ('p'= 0.020). Perineal wound morbidity were same in both groups, but the abdominal wound infection rate was higher in Open-APR ('p'=0.0209), as Lap-APR devoid of long laparotomy wound, it only have small Trocar wounds. Two year survival was nearly same in both groups.

**Conclusion:** Lap=APR have advantages over Open-APR in rapid postoperative recovery of bowel function, early oral intake, and early mobilization. But Lap-APR has longer operative time.

**Keywords:** Laparoscopy assisted abdominoperineal resection; Open abdominoperineal resection;

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## INTRODUCTION

Abdominoperineal Resection (APR) is the surgical procedure being done for patients, with distal rectal cancer in which an anterior resection cannot be done to preserve anal sphincter<sup>1</sup> or for anorectal cancer. APR was first described by Ernest Miles in 1908<sup>2</sup>, and Jacobs was the first who, in 1991 reported the Laparoscopic colectomy<sup>3</sup>, since then Laparoscopic colorectal surgery is being increasingly practice worldwide. Recently APR was performed in not more than 14% of patients of rectal cancer<sup>4</sup>.

Laparoscopic technique for colon and rectum resection versus open technique, have less postoperative pain, shorten the postoperative ileus, lessen the hospital stay, allow rapid recovery, and quick resumption of normal daily activities<sup>5,6,7</sup>. In laparoscopic assisted APR the magnified view of narrow pelvis facilitates identification of surgical planes, and nerves<sup>8</sup>. The purpose of this study was to evaluate and compare the results of laparoscopic

and open abdominoperineal resection for low rectal adenocarcinoma, the postoperative recovery, complications, in laparoscopic and open abdominoperineal resection, and results are compared.

## PATIENTS AND METHODS

This prospective study was done on 82 patients, having low rectal cancer (within 5cm of anal verge) admitted and operated (Laparoscopic assisted APR/ Open APR), between 20<sup>th</sup> November 2008 to 10 September 2012, in Surgical unit-I of Liaquat University Hospital Jamshoro Pakistan. Of these 82 patients, 37 patients underwent laparoscopic assisted abdominoperineal resection and placed in Lap-APR group, and 45 patients underwent open abdominoperineal resection, and placed in Open-APR group. Decision about the technique (Lap-APR or Open-APR) is made by the operating surgeon with consultation with patients. All patients were provided written informed consent preoperatively.

Patients having following criteria were excluded from the study,(1) tumor more than 5cm higher up from anal verge, (2) bulky tumor or locally advanced

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Assistant Professor of Surgery: Qassim College of Medicine, Qassim University Saudi Arabia  
Correspondence to Dr. Abdul Mannan Khan Rao, E-mail: mannanchohan66@hotmail.com Cell:KSA:00966-538265189, Pak: 0092-3003062527

tumor, (3) patients having multiple cancer or synchronous proximal colonic cancer, (4) patients having ulcerative colitis, (5) patients with distant metastasis, (6) patients older than 70 years, and (7) patient having significant co morbidities (MI, DM, renal failure, chronic liver disease), and patients presented with recurrent rectal cancer, were excluded in this study.

All patients after physical examination underwent preoperative proctoscopy and complete colonoscopy and biopsy of the tumor, abdominal and pelvis ultrasonography and computed tomography to record the size of tumor and involvement of adjacent structures, and to see the secondaries in liver, Chest X-Ray to see the lungs metastasis. Complete blood count and carcinoembryonic antigen tests were conducted before surgery. Patients with tumor stage T<sub>3</sub> and regional lymph node enlargement were offered pre operative chemo radiotherapy (CCRT). Mechanical bowel preparation was carried out day before surgery with sodium phosphate oral solution. Cefotaxime sodium 2Gm and metronidazole 500mg were administered intravenously at induction of anesthesia. Urinary bladder was routinely catheterized.

All operations were done under general anesthesia and patients were placed in modified lithotomy position. In Lap-APR technique surgeon stand on right side of table, monitor and assistant on left side. For perineal part of operation, surgeon stand/sit in between the leg rest of table. Pneumoperitoneum was created by open technique and 10mm trocar was inserted below the umbilicus. Three or four working trocars were inserted under direct vision in the right and left midclavicular line at the level of umbilicus and anterior superior iliac spine. The left lower Trocar was inserted in left lower quadrant at the planed site of colostomy. The sigmoid colon and rectum was mobilized by using medial and lateral approach. Clipped and divided inferior mesenteric artery 1.5cm above its origin. The ureters, the hypogastric nerve, and the pelvic parasympathetic plexus were preserved and respected. With the help of perineal surgeon rectum and whole mesorectum was completely mobilized, the sigmoid colon was transected with linear stapler and the specimen was removed through the perineal wound. An end colostomy was constructed at the left lower trocar site. The perineal wound was closed after placing a drain in the pelvic cavity through separate stab wound.

The Open-APR was performed by midline laparotomy incision, otherwise same as Lap-APR. Operative outcomes were recorded and compared between the two groups. The results were expressed as mean± standard deviation (SD). The data were

analyzed with SPSS software version 16. The variable were compared with student 't' test for continuous parametric data and Man Whitney test (z) for continuous non parametric data. Chi-square test was used for categorical variables. P value < 0.05 was considered as statistically significant.

## RESULTS

Eighty two patients were operated for adenocarcinoma of low rectum. 37(45.12%) patients were operated by Lap-APR technique, among then 23(62%) patients were male, and 14 (38%) patients were female. 45(54.88%) patients were operated by Open-APR technique, among them 29(64.45%) patient were male, while 16(35.5%) patients were female. There was no conversion in Lap-APR group to Open-APR technique. Patient Characteristics and post operative results except complication (Table 1).

There were no significant differences between groups in age and gender. 3(8%) patients in Lap-APR and 5(11%) patients in Open-APR group received preoperative chemo-radiotherapy that is also not significant. About operative outcomes, the mean operative time was slightly longer in Lap-APR (175 minutes), while in Open-APR it is 155 minutes. The time to pass first bowel motion was significantly less in Lap-APR (mean 56.4 hours) while in Open-APR it is (mean) 68 hours. Patients in Lap-APR group starts taking water earlier then patients of Open-APR group (41±13.2 hours in Lap-APR, 54±12.2 hours in Open-APR), that is statistically more significant. After surgery patients of Lap-APR group started taking soft diet earlier then Open-APR group (4.6±1.2 days in Lap-APR and 5.5±1.7 days in Open-APR), that is also more significant. Patients of Lap-APR were mobilized earlier, 6.9±3.19 days in Lap-APR while 9.2±3.45 days in Open-APR. Postoperative hospital stay was slightly less in Lap-APR then in Open-APR group, 14.8±3.4 days in Lap-APR and 16.5±4.8 days in Open-APR.

Postoperative complications are shown in Table-2. The complication rate in both group were similar except abdominal wound infection. Only in Open-APR group 6 patients developed abdominal wound infection, that is significant. 6 male (16.2%) and 3 female (8%) in Lap-APR while 7 male (15.5%) and 5 female (11%) in Open-APR describes that their sexual function become worse. The rate of tumor recurrence was similar in both groups. Two year survival was 91.9% in Lap-APR and 91.1% in open-APR group. Local recurrence occur in 2 (6.7%) and 3(6.7%) patients of Lap-APR and open-APR group respectively. Liver recurrences occur in 4(10.8%) patients of Lap-APR and 5(11.1%) patients of open-APR.

Table 1: Patients characteristics: operative and post operative results.

	Lap Group	Open Group	'P' Value
Number of patients	37	45	-
Male/female	23/14	29/16	-
Age in years (mean ±SD)	55.76 ±9.68	53.57±10.49	0.3331
Operative time in minutes (mean ±SD)	175±78	155±63	0.2026
Time to pass 1 <sup>st</sup> bowel motion (hours mean ±SD)	56.4±10.3	68±11.5	0.0001***
Time to take water (hours, mean ±SD)	41 ±13.2	54 ±12.4	0.0001***
Time to take soft diet (days, mean ±SD)	4.6±1.2	5.6±1.7	0.0035**
First education of stoma care (days, mean ±SD)	6.7±2.7	8.4±3.6	0.020
Time to walk independently	6.96±3.1976	9.2±3.45673	0.00034**
Post operative Hospital stay (days, mean ±SD)	14.8±3.4	16.5±4.8	0.0738
Lymph nodes removed (mean ±SD)	10.4±6.5	9.7±7.3	0.6512
Stage of tumors(TNM) I/II/IIIc/IIIB	5/16/14/2	6/21/17/3	-

\*\*\*Statistically extremely significant, \*\* more significant, \* significant, SD: Standard deviation

Table 2: Complications

	Lap Group	Open Group	'P' Value
Chest infection	2(5.4%)	3(6.7%)	0.2575
Abdominal abscess	-	1(2.2%)	0.3678
Urinary retention	6(16.2%)	8(17.8%)	0.8539
Small bowel obstruction	-	2(4.4%)	0.1988
Abdominal wound infection	-	6(13.3%)	0.0209*
Wound dehiscence	-	1(2.2%)	0.3678
Perineal wound infection	8(21.6%)	7(15.55%)	0.4857
DVT	-	2(4.4%)	0.1988
Operative death	-	-	-
Male Sexual dysfunction(erectile, orgasm)	6(16.2%)	7(15.55%)	0.9361
Female Sexual dysfunction ( lubrication, orgasm, pain)	3(8.1%)	5(11.11%)	0.6532
CCRT	3(8%)	5(11%)	-
Recurrence			
Local	2(5.4%)	3(6.7%)	-
Liver	4(10.8%)	5(11%)	-
Lung	-	-	-
2 year survival	91.9%	91.9%	-

\*Significant

**DISCUSSION**

Laparoscopic assisted abdominoperineal resection First time describe by the Sackier<sup>9</sup>, in 1992. After that many studies have demonstrated the benefits and safety of laparoscopic rectal surgery for rectal cancer<sup>10</sup>. Decanini et al<sup>11</sup> described in their study Lap-APR, can be performed according to oncologic principles with proximal vascular ligation of inferior mesenteric artery.

This study demonstrates that, the Lap-APR did not jeopardize patients' oncologic outcome. Toe-Wei Ke et al<sup>12</sup>, study describe the same oncologic outcome, but some studies<sup>13,14,15</sup> reported the risk of port site metastasis in Lap-APR. In this study no port site metastases occur in any patient. Some studies<sup>5,16,17</sup> shows that Lap-APR have better immediate outcomes in terms of, fast return of bowel function, earlier mobilization and less analgesic requirement, when compared with open surgery for rectal cancer. This study also shows better results of Lap-APR in terms of, earlier return of bowel function,

and less postoperative hospital stay, when compared to Open-APR. But the mean operative time was longer in Lap-Apr, while it is short in Open-APR. Patients of Lap-APR were more comfortable, and were earlier mobilized as compare to Open-APR. Some other study also shows better earlier results of Lap-APR<sup>5,18</sup>, except longer operative time. Inomata M et al<sup>19</sup>. Study reveals no significant shortening the length of hospital stay in Lap-APR.

Male and female sexual dysfunction after Lap and Open APR has no significant differences. Quah H<sup>20</sup> study shows poorer sexual outcomes in Lap-APR when compare to Open-APR. Paraskevas et al<sup>21</sup>. Study elicited that sexual function was significantly worse one year after laparoscopic surgery.

Patients in the Lap-APR group devoid long abdominal laparotomy incision except trocar site, seem to provide the earlier mobilization and recovery, it also made easier to educate patients for stoma management. It also seems, stoma care is easier without long abdominal incision in Lap-APR group.

Open-APR has two big wounds, one long abdominal laparotomy wound, and 2<sup>nd</sup> perineal wound. In this way APR is different from other colorectal resection, in having a higher complication rate because of the perineal wound<sup>22</sup>. Although the Lap-APR devoid of laparotomy wound but the perineal wound and its related complications may not be altered by the Lap-APR. In addition to reduced abdominal wall trauma in Lap-APR, the less manipulation of abdominal contents may diminish postoperative adhesions and reduces the rate of incisional hernia<sup>20</sup>. While in Open-APR there is more chance of postoperative adhesions, intestinal obstruction, and incisional hernia.

## CONCLUSION

Lap-APR have particular advantages to patients with low rectal cancer, including rapid recovery of bowel function, early oral intake of water, semi fluid and solid diet, and early education of stoma care. Stoma care also easy in Lap-APR and short hospital stay without jeopardizing oncologic results, but at the expense of long operative time and more technical demanding procedure.

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