

# Anastomotic Leakage Following Low Anterior Resection of Rectal Cancer Considering the Role of Protective Stoma

Mozafar M<sup>1</sup>, Sobhiyeh MR<sup>1</sup>, Heibatollahi M<sup>2</sup>

## Abstract

**Background and aims:** Probable risk factors of clinical anastomotic leakage and the role of defunctioning stoma in patients undergoing low anterior resection (LAR) for rectal cancer, is still controversial. The goal of our study was to find out possible risk factors of anastomotic leakage and to locate the influence of protective stoma in the rate of anastomotic leakage.

**Materials and methods:** In this retrospective study, 44 patients underwent LAR with total mesorectal excision (TME) during the period from 2001 to 2006 were analyzed. From these 44 patients 24 were treated with protective stoma while 20 were not.

**Results:** Overall anastomotic leakage rate was similar among patients with and without protective stoma (odds ratio=0.51, P=0.2357). Male gender, Low anastomosis, Coronary Artery Disease, preoperative radiotherapy, and smoking were great risk factors for developing anastomotic leakage. We did not find any differences between handsewn and stapled anastomosis (odds ratio=0.6).

**Conclusion:** protective stoma will be helpful depending on surgeon experiences and is not recommended for all the patients routinely. Beside this, male gender, low anastomosis, coronary artery disease, preoperative radiotherapy, and smoking are the major risk factors of anastomotic leakage.

**Keywords:** rectal cancer, low anterior resection, anastomotic leakage, leakage risk factors, protective stoma

1- Department of Surgery, Shahid Beheshti University (MC), Shohada hospital  
2- Cancer Research Center, Shahid Beheshti University (MC)

Corresponding author:  
M. Heibatollahi  
Tel.: (+98) 2122729445  
Fax :(+98) 2122729445  
Email: heibatollahi@yahoo.com

IJCP 2009; 1: 29-33

## Introduction

About 42,000 Americans are diagnosed, and 8500 expire from rectal cancer yearly [1]. The prevalence of colorectal cancer in Iran has not been well studied up to now, but upon the recent epidemiological evaluations, the annual incidence of the colorectal cancer in Iran is about 5000 new cases and its mortality is about 1130 ones [2-4]. The fundamentally vital curative therapy in this regard is surgery. Next to potentially therapeutic resection, five-year survival rates for stage I, II, and III disease are respectively 80 to 90, 50 to 60, and 30 to 40 percent [5-7]. In Iran, its five-year survival rate is 45% for females and 39% in men. This is while, this five year survival rate differs significantly depending on the site of the colon which is affected; 61% for ascending colon, 57% in descending colon, 50% in sigmoid and 37% in rectum [2-4].

Tumor stage and location within the rectum largely determine the type of surgery. Superficially invasive,

small cancers may be effectively managed with restricted surgery while more deeply invasive tumors require low anterior resection or abdominoperineal resection (APR). Tumors that are adherent or fixed to neighboring structure necessitate more extensive surgery. TME in combination with LAR or APR establishes accurate method for profoundly extended rectal tumors. Most invasive rectal cancers involving the upper third of the rectum can be effectively treated by an LAR, which preserves the anal sphincter. Sphincter-saving procedures have become widespread in midrectal and some distal (lower third) rectal cancers [8]. However, postoperative morbidity and early mortality after an LAR remain unresolved. Overall, early postoperative mortality rate is between 1% and 8% [9]. Symptomatic anastomotic leakage is the most serious complication and occur nearly between 1% and 24% [9-14] and when occurs, the postoperative mortality risk is increased to between 6% and 22% [13]. Some of the factors which prone the patients to

Symptomatic anastomotic leakage are aged or weak patients, technically difficult operation and intraoperative adverse events. But in fact anastomotic leakage also occurs in patients with no obvious risk factors [15] and it is impossible to exactly suggest the risk of the leakage. The later problem motivated a majority of studies to find out the probable risk factors of leakage. Low anastomosis and male gender, CAD and smoking [13, 14 and 16] were found as the major risk factors. The lack of a defunctioning stoma [11, 17] was another likely risk factor. However, there is not general acceptance of the preventing effects of defunctioning stoma in anastomosis leakage.

Respecting uncertain proposition of leakage probability, and the danger of its occurrences, and the decrease risk of leakage mortality, some authors recommend the usage of defunctioning stoma [18, 19, 20, and 21]. This is while others believed that regarding to low rate of the leakage, necessity of a second admission for closure of stoma, longer length of hospital staying, much more healthcare costs, probable risk of hospital acquired infections and time-consuming rate of recovery from the physiological insult of anaesthesia, surgery and its complications, routine usage of defunctioning stoma would not be useful [14, 15, 22-26].

The aim of this retrospective study was to find out the possible risk factors of anastomotic leakage and to determine the anastomotic leakage rate after performance of low anterior resection with and without protective stoma.

**Patients and Method**

This retrospective study was performed in the department of surgery of Shohadaye Tajrish hospital to evaluate 44 patients undergoing elective LAR operation with primary anastomosis with or without protective stoma from 2001 to 2006. These patients after medical and mechanical bowel preparation and receiving prophylactic subcutaneous heparin and systemic antibiotic underwent low anterior resection of rectal cancer. During the surgery mobilization of the splenic flexure was also carried out in order to keep away anastomosis from any tension. The mesorectal was totally excised. LAR with protective stoma was performed in 24 patients (54.54%) and without it in 20 patients (45.45%). The decision to construct a protective stoma was determined by the surgeon. 21 of the anastomosis were hand sewn and 23 stapled. The mean distance of anastomosis from the anal verge was 5.1 cm. During the operation 2 drainage tubes were also placed into pelvic space. We only considered symptomatic leakage to our

analysis. To find out the symptoms and signs of anastomosis leakage, patients were under close supervision. Leakage signs and symptoms were considered as fecal discharge from the drain, fever, tachycardia, presacral space abscess formation or peritonitis and septicemia. Leakage was verified by clinical examination i.e. digital rectal exam, inspection of drains contents, endoscopic evaluation i.e. rigid rectoscopy or radiologic studies i.e. rectal contrast study.

Patients were subdivided into two groups, with protective stoma and without it. We compared these two groups for the rate of anastomotic leakage. We also considered the probable differences and similarities among leaked anastomosis and sealed ones including sex and age, distance of the tumor from anal verge, history of CAD and smoking, types of anastomosis sutures, preoperative radiotherapy and Dukes stages.

**Results and Discussion**

In this retrospective study we considered 44 patients who underwent elective LAR operation with primary anastomosis. Among these patients, 22 were female (50%) with mean age of 64.85 years and 22 were male (50%) with mean age of 65.95 years. Mean distance of the tumor from the anal margin was 5.1 cm. Patients were subdivided into two groups, 24 with protective stoma (54.54%) and 20 without it (45.45%). Major differences between these two groups are summarized in table 1. Among these patients, 5 showed anastomosis leakage evidences.

Table 1. Considerable differences between patients with and without a protective stoma after low anterior resection

<b>table 2</b>	<b>With protective stoma</b>	<b>Without protective stoma</b>
Male/female	11/13	11/9
Mean age	65.3	64.92
Body mass index	25	24.77
Distance from anal verge	3.6	5.6
Number of death	0	0
Hand sewn suture	10	11
Stapled suture	13	10
Preoperative radiotherapy	13	11
Dukes stages	A 4 B 10 C 6 D 2	A 6 B 11 C 5 D 0

After that, as a therapeutic intervention, 3 of these 5 treated by end colostomy operation and 2 by loop colostomy.

There was no difference in overall leakage rate between groups with and without a stoma (P-value=0.2357). In the group of patients with protective stoma, 2 (8%) and in patients without protective stoma, 3 (15%) showed anastomotic leakage evidence. There is not any positive correlation between performing a protective stoma and anastomotic leakage rate (odds ratio=0.51). This result was shown by some authors previously [14, 15, 22-25]. The mean length of hospital stay in patients without protective stoma was 7 days while in the first admission of the patients with protective stoma was 5 and in their second admission for stoma closure was also 5 days.

Among patients with anastomotic leakage, 4 were male and 1 was female. The probability of being male and developing anastomotic leakage was significantly high (odds ratio= 4.6). It was revealed by previous studies [14, 15].

Based on our results coronary artery disease (CAD) significantly increased the chance of anastomotic leakage. All the 5 patients with anastomotic leakage had history of CAD, 2 of them had previous myocardial infarction, 1 had been undergone coronary artery bypass graft operation and 2 patients had history of coronary care unit admission because of unstable angina. Only 3 of patients without anastomotic leakage possessed CAD history (100% versus 7.7%). Smoking was also a considerable risk factor (100% among patients with leaked anastomoses). These results were a verification of previous studies [16].

The mean distance of leaked anastomosis from anal verge was 3.6 cm while it was 5.6 cm in the fasten ones. This result was a confirmation of previous studies which claimed that Low anastomosis is a major risk factor for occurrence of anastomotic leakage [14-15].

The anastomoses were hand sewn in 21 patients where other 23 were stapled. Of hand sewn anastomosis, 2 and among stapled ones, 3 showed evidence of leakage (odds ratio=0.7). Apparently there is not positive correlation between types of anastomosis sewing and the probability of leakage. Cochrane Database Systematic Review Group in 2001 [27] and one RCT in 2002 [28] tried to establish the superiority of either handsewn or stapled anastomoses independently of the level of the anastomosis, but the evidence found was insufficient. We also did not find any differences between handsewn and stapled anastomosis.

In our study 24 patients had undergone preoperative radiotherapy, 3 of them presented with anastomotic leakage (odds ratio= 2.71). The association between preoperative radiotherapy and demonstration of anastomosis leakage was prominent. In some investigations [29, 30] preoperative radiation known as an early and persistent reducer in colorectal mural blood flow regardless of the anastomotic technique, therefore adjuvant radiochemotherapy considered to increase the risk of enteral complications. Otherwise other studies including Meta-analysis and Randomized Clinical Trials, believed that preoperative radiotherapy decreases the local recurrence rate of the tumor, with no significant signs of increased late morbidity [31-35]. We also concluded that preoperative radiotherapy would increase the risk of leakage drastically. Total major differences among patients with anastomosis leakage and without it summarized in table 2.

**Table 2:** Major differences between leaked anastomosis and sealed one.

<b>table 1</b>	<b>Positive anastomotic leakage</b>	<b>Negative anastomotic Leakage</b>
With protective stoma	2	22
Without protective stoma	3	17
Male	4	18
Female	1	21
Mean age	64.6	65.45
Distance from anal verge (cm)	3.6	5.6
Number of death	0	0
Hand sewn suture	2	19
Stapler suture	3	20
Preoperative radiotherapy	3	21
Dukes stages	A 1 B 2 C 2 D 0	A 9 B 19 C 9 D 2

## Conclusion

In this paper we designed a retrospective study to determine the plausible role of defunctioning stoma in the anastomosis leakage rate after LAR and to uncover the probable risk factors of this leakage.

We found that protective stoma can support the patients undergoing LAR against

compilations depending on surgeon experiences and will not be helpful for all the patients and not recommend routinely. Beside this, male gender and low anastomosis, coronary artery disease, preoperative radiotherapy, and smoking are the major risk factor of anastomotic leakage while type of sutures does not seem to play a significant role in this regard.

## References

1. Jemal A, Murray T, Samuels A et al. Cancer statistics. *CA Cancer J Clin* .2003; 53:5.
2. Ministry of health and medical education of Iran. Record of number of patients with rectal cancer in 1385 in Tehran. Center of disease management. 2005.
3. Ministry of health and medical education of Iran. Record of number of patients with rectal cancer in 1382 in Tehran. Center of disease management .2005.
4. Akbari ME and co-workers, Iran Cancer Report.1st edition.Cancer Research Center.Shahid Beheshti University (MC).2008.
5. Rich T, Gunderson LL, Lew R et al. Patterns of recurrence of rectal cancer after potentially curative surgery. *Cancer*. 1983; 52:1317.
6. Minsky BD, Mies C, Recht A, et al. Resectable adenocarcinoma of the rectosigmoid and rectum. I. Patterns of failure and survival. *Cancer* .1988; 61:1408.
7. Willett CG, Lewandrowski K, Donnelly S, et al. Are there patients with stage I rectal carcinoma at risk for failure after abdominoperineal resection? *Cancer* .1992; 69:165
8. Jessup JM, Stewart AK, Menck HR. The National Cancer Data Base report on patterns of care for adenocarcinoma of the rectum, 1985-1995. *Cancer*. 1995; 83:2408.
9. Smedh K, Olsson L, Johansson H, et al. Reduction of postoperative morbidity and mortality in patients with rectal cancer following the introduction of a colorectal unit. *Br J Surg*. 2001; 88:273-277.
10. Enker WE, Merchant N, Cohen AM, et al. Safety and efficacy of low anterior resection for rectal cancer: 681 consecutive cases from a specialty service. *Ann Surg*. 1999; 230:544-552.
11. Dehni N, Schlegel RD, Cunningham C, et al. Influence of a defunctioning stoma on leakage rates after low colorectal anastomosis and colonic J pouch-anal anastomosis. *Br J Surg*. 1998; 85:1114-1117.
12. Law WL, Chu KW. Anterior resection for rectal cancer with mesorectal excision: a prospective evaluation of 622 patients. *Ann Surg*. 2004; 240:260-268
13. Rullier E, Laurent C, Garrelon JL, et al. Risk factors for anastomotic leakage after resection of rectal cancer. *Br J Surg*. 1998; 85:355-358.
14. Matthiessen P, Hallbook O, Andersson M, et al. Risk factors for anastomotic leakage after anterior resection of the rectum. *Colorectal Dis*. 2004; 6:462-469.
15. Poon RT, Chu KW, Ho JW, et al. Prospective evaluation of selective defunctioning stoma for low anterior resection with total mesorectal excision. *World J Surg*. 1999; 23:463-467.
16. Martin K, Hayo R, Uwe P, et al. Risk factors for clinical anastomotic leakage and postoperative mortality in elective surgery for rectal cancer. *International Journal of Colorectal Disease* .2007; 22(8): 1432-1262.
17. Peeters KC, Tollenaar RA, Marijnen CA, et al. Risk factors for anastomotic failure after total mesorectal excision of rectal cancer. *Br J Surg*. 2005; 92:211-216
18. Caricato M, Ausania F, Ripetti V, et al. Retrospective analysis of long-term defunctioning stoma complications after colorectal surgery. *colorectal disease*. 2007; 9(6):559 - 561.
19. Gastinger I, Marusch F , Steinert R , et al. Protective defunctioning stoma in low anterior resection for rectal carcinoma. *British Journal of Surgery*. 2005; 92(9):1137-1142.
20. Peter M, Olof H, Jörgen R, et al. Defunctioning Stoma Reduces Symptomatic Anastomotic Leakage After Low Anterior Resection of the Rectum for Cancer. *Ann Surg*. 2007; 246(2):207-214.
21. Huser, Norbert, Michalski, et al. Systematic Review and Meta-Analysis of the Role of Defunctioning Stoma in Low Rectal Cancer Surgery. *Annals of Surgery*. 2008; 248(1):52-60.
22. Kanellos I, Zacharakis E, Christoforidis E, et al. Low anterior resection without defunctioning stoma. *Techniques in Coloproctology*. 2002; 6(3):1123-6337.
23. Mark T, Oliver M J, B. J., et al. A defunctioning stoma significantly prolongs the length of stay in laparoscopic colorectal resection. *Surgical Endoscopy*. 2007; 10.1007/s00464-008-9776-4: 1432-2218.
24. Mikael M, Olof H, Sven G, F.R.C.S, Per-Olof N, et al. Defunctioning Stoma in Low Anterior Resection With Colonic Pouch for Rectal Cancer. *Diseases of the Colon & Rectum*. 2002; 45(7): 940-945.
25. Pakkastie TE, Ovaska JT, Pekkala ES, et al. A randomised study of colostomies in low colorectal anastomoses. *Eur J Surg*. 1997; 163(12):929-33.
26. Kanellos I., Vasiliadis K., Angelopoulos S., et al. Anastomotic leakage following anterior resection for rectal cancer. *Techniques in Coloproctology*. 2004; 8: 1123-6337 (Print) 1128-045X (Online).
27. Lustosa SA, Matos D, Atallah AN, et al. Stapled versus handsewn methods for colorectal anastomosis surgery. *Cochrane Database Syst Rev*. 2001; 3: CD003144.
28. Suzana A S L, Delcio M, Álvaro N A, et al. Stapled versus handsewn methods for colorectal anastomosis surgery: a systematic review of randomized controlled trials. *Sao Paulo Med. J*. 2002; 120(5).
29. Milsom JW, Senagore A, Walshaw RK, et al. Preoperative radiation therapy produces an early and persistent reduction in colorectal anastomotic blood flow. *J Surg Res*. 1992; 53: 464-469.
30. Ooi BS, Tjandra JJ, Green MD. Morbidities of adjuvant chemotherapy and radiotherapy for resectable rectal cancer: an overview. *Dis Colon Rectum*. 1999; 42: 403-418.

31. Frykholm GJ, Glimelius B, Pahlman L. Preoperative or postoperative irradiation in adenocarcinoma of the rectum: final treatment results of a randomized trial and an evaluation of late secondary effects. *Dis Colon Rectum* .1993; 36(6):564-72.

32. Stockholm Colorectal Cancer Study Group. Randomized study on preoperative radiotherapy in rectal carcinoma. *Annals of Surgical Oncology*. 1996; 3(5):423-430.

33. Michael D, Bengt G, Wilhelm G L P. Preoperative irradiation affects functional results after surgery for rectal

cancer. *Diseases of the Colon & Rectum* .1998; 41(5): 543-549.

34. Calogero C, Marco G, Francesco F, et al. Preoperative Radiotherapy for Resectable Rectal Cancer *JAMA*. 2000; 284:1008-1015.

35. Marijnen C. A.M., Kapiteijn E., Velde C. J.H. van de, et al. Acute Side Effects and Complications After Short-Term Preoperative Radiotherapy Combined With Total Mesorectal Excision in Primary Rectal Cancer: Report of a Multicenter Randomized Trial. *Journal of Clinical Oncology*. 2002; 20(3): 817-825.