

# INCIDENCE, CONSEQUENCES, AND RISK FACTORS FOR ANASTOMOTIC DEHISCENCE AFTER COLORECTAL SURGERY: A PROSPECTIVE MONOCENTRIC STUDY

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## ABSTRACT

### BACKGROUND

Anastomotic dehiscence is the most severe surgical complication after large bowel resection. This study was designed to assess the incidence, to observe the consequences, and to identify the risk factors associated with anastomotic leakage after colorectal surgery.

### MATERIALS AND METHODS

All patients who were admitted for colorectal carcinoma or large bowel obstruction and underwent colorectal resection between January 2016 to August 2017 in a single institution were prospectively studied.

### RESULTS

Over 20 months period, 150 anastomoses over colorectal surgeries were performed. 80 patients underwent surgeries for colorectal carcinoma. 70 patients for sigmoid volvulus obstruction. Emergency procedures were performed in 70 Patients. Elective procedures were about 80 patients. Surgeries performed are 70 sigmoidectomies, 50 right hemicolectomies, 77 left hemicolectomies, 23 low anterior resections. The overall anastomotic leak rate was 4%. The mortality rate associated with anastomotic leak was 12.9%. In univariate analysis, the following parameters were associated with an increased risk for anastomotic dehiscence: 1) ASA score  $\geq$  (p=0.004). 2) Prolonged operation time (>3hrs) (p=0.02). 3) Rectal location of disease (p=0.05). 4) BMI > 25 (p=0.04).

### CONCLUSION

Anastomosis location within the rectum is over 7 times more likely to leak than an ileocolic anastomosis (right colon) and almost 4 times more likely to leak than a colocolic anastomosis (left colon). Other risk factors for leak is prolonged operating time.

### KEYWORDS

Anastomotic Leak, Colorectal Surgery, Risk Factors, Morbidity, Mortality.

**HOW TO CITE THIS ARTICLE:** Manmadha Rao V, Ashok P, Sanjay M, et al. Incidence, consequences, and risk factors for anastomotic dehiscence after colorectal surgery: a prospective monocentric study. J. Evid. Based Med. Healthc. 2018; 5(25), 1898-1901. DOI: 10.18410/jebmh/2018/396

### BACKGROUND

Anastomotic leakage is the most feared complication specific to colorectal surgery, leading to significant morbidity, increased mortality, prolonged hospital stay, and considerable extra cost. Its reported prevalence varies widely from 1 to 39%, but clinically significant leaks probably occur in 3–6% of cases, depending on the definition and the type of resection undertaken.<sup>1</sup> There is no universally accepted definition of a dehiscent colorectal anastomosis, which may present (a) as a generalized peritonitis requiring abdominal reoperation, (b) as faecal discharge from the wound and/or drain, (c) as a localized abscess, which may be amenable to computed tomography (CT) scan-guided

percutaneous drainage, and (d) as an extravasation of radiological contrast in an otherwise asymptomatic patient, which may only require surveillance.<sup>2</sup>

Several factors have been shown to have independent prognostic significance for anastomotic leakage, including diverticular disease,<sup>3</sup> intraoperative septic conditions,<sup>4</sup> male gender,<sup>5</sup> smoking/alcohol abuse,<sup>6</sup> as well as ASA score and emergency surgery.<sup>7</sup> The most significant risk factor for anastomotic leak remains, however, the site of the anastomosis, with leak rates of 2–4% in intra- vs. 8–12% in intraperitoneal anastomoses.<sup>8</sup> The risk of leakage was six times higher for anastomoses situated less than 5 cm from the anal verge than for those situated above 5 cm.<sup>9</sup>

Anastomotic leak are divided in to three grades. Grade A requires no therapeutic intervention; grade B includes active intervention without laparotomy and if laparotomy is required then it is grade C. The diagnostic methods commonly used when a leakage is suspected are CT scan, contrast enema, endoscopic examination, and reoperation. There is a high frequency of permanent stoma after a reoperation and anastomotic take down. Despite the

*Financial or Other, Competing Interest: None.*

*Submission 21-05-2018, Peer Review 26-05-2018,*

*Acceptance 08-06-2018, Published 14-06-2018.*

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*DOI: 10.18410/jebmh/2018/396*



increased knowledge of an anastomotic leakage, there is still a need for studies in an unselected cohort of patients receiving surgery for both benign and malignant diseases, to try to improve results after the anastomotic leakage has occurred.

Therefore, the aim of this prospective study was (1) to identify the risk factors associated with for anastomotic leakage and (2) to evaluate the outcome of this type of complication in a nonselected series of patients who underwent colorectal resection in a single institution over a relatively short period of time.

## MATERIALS AND METHODS

This study was carried out in king George Hospital, Andhra medical college, Visakhapatnam a tertiary health care centre, in Andhra Pradesh. This is a prospective observational study done from January 2016 to August 2017 (prospective), the total duration being 1year 8 months.

All patients who were admitted for colorectal carcinoma or large bowel obstruction and underwent colorectal surgeries. A total of 150 patients were included in the study according to inclusion and exclusion criteria. The above sample size has a confidence level of 95% and a confidence interval of 5 as calculated using the sample size calculator available at <http://www.surveysystem.com/sscalc.html>

### Inclusion Criteria

- Patients with colorectal carcinoma either in right colon, left colon, rectum.
- Patients with large bowel obstruction due to sigmoid volvulus.
- Colorectal procedure with anastomosis without stoma and faecal diversion were included in this study.
- Post-operative complications including anastomotic leak and abscess were taken.

### Exclusion Criteria

- Patients younger than 12 years of age.
- Patients with ASA score above 5.
- Patients having rectosigmoid carcinoma or low rectal cancer treated with coloanal anastomosis or end colostomy were excluded.

### Method of Data Collection

The proforma was designed on the objective of the study (enclosed annexure).case series method was employed.

Consent of the patient and an available relative will be obtained, in a language they understand, in order to examine the relevant hospital records. Consent of all patients who have already been treated will be taken during their subsequent OPD follow-ups.

The data of the study population will be collected with respect to the following topics like History, Examination, Investigations, Operative technique, Post-operative results. Patient demographics like Age, Sex - Male / Female, Body Mass Index (height in cms / weight in kg<sup>2</sup>), Premorbid conditions - Diabetes mellitus, Hypertension, ASA Score were taken.

## Statistical Analysis of Data

The collected data was analysed with the aid of calculator and presented in the form of tables, figures.

Collected data has been analysed and presented in the form of tables, figures. The analysed data has been discussed and compared with the data of other similar studies conducted elsewhere based on the objective of the present study.

## Statistical Method

- Continuous data expressed as mean  $\pm$  standard deviation
- Non parametric data will be expressed as %
- Student test will be used for comparison of continuous data
- For non-parametric data chi square test and contingency coefficient are applied.

The descriptive procedure displays univariate summary statistics for several variables in a single table and calculates standardized values. Variables are ordered in the way the variables are selected. The Frequencies procedure provides statistics and graphical displays that are useful for describing many types of variables. Chi-square tests were employed to find out to find out the difference between groups of frequencies obtained for specific statements. A 'p' value of less than 0.05 was considered statistically significant.

Over 20 months period, 150 anastomoses over colorectal surgeries were performed in 86 women (57%) and 64 men (43%) with a median age of 67 yrs. (range 17-98 yrs.).

The characteristics of patients are summarized in table 1.

Gender	
Female	86
Male	64
Age	
Mean $\pm$ SD	64.7 $\pm$ 15.3
Range	17-98
Median	67
Body Mass Index	
Mean $\pm$ SD	25.1 $\pm$ 4.8
Median	25
ASA Score	
Mean $\pm$ SD	2.3 $\pm$ 0.75
Median	2
Timing	
Emergency	70
Elective	80
Diagnosis	
Cancer	80
Obstruction	70
Table 1. Characteristics of Patients	

The median duration of stay in hospital was 11(range 2-205) days. 80 patients underwent surgeries for colorectal

carcinoma.70 patients for sigmoid volvulus obstruction. Median duration of the procedure was 180 (range, 50-640) minutes.

Emergency procedures were performed in 70 (46%) patients. Elective procedures were about 80 patients (54%). A total of 71 patients (47%) presented with an ASA Score  $\geq 3$ . Surgeries performed are 70 sigmoidectomies, 50 right hemicolectomies, 77 left hemicolectomies, 23 low anterior resections. All procedures done are by open laparotomy.

The overall anastomotic leak rate was 4% (6 leaks out of 150 surgeries). The mortality rate with anastomotic leak was 1.3% (2 persons died). 4 patients with anastomotic leak underwent reoperation and faecal diversion done by colostomy.

More number of ALs are noted in colon carcinoma resections than benign large bowel obstructions. ALs are higher in rectal carcinoma resections than right and left colon carcinoma resections whose p value is 0.05 significant.

In univariate analysis shown in table 2, the following parameters were associated with increases risk of anastomotic leak.

- 1) ASA score  $\geq 3$  (p=0.004).
- 2) Prolonged operation time ( $>3$ hrs) (p=0.02).
- 3) Rectal location of disease (p=0.05).
- 4) BMI  $>25$  (p= 0.04).

	No Leak (n=144)	Leak (n=6)	P value
<b>Gender</b>			
Female	82(95%)	4(5%)	
Male	62(96%)	2(4%)	
<b>Age</b>			
Mean $\pm$ SD	64.6 $\pm$ 15.5	66.2 $\pm$ 12.3	
Range	17-98yrs	34-89	
Median	67yrs	69yrs	
<b>Body Mass Index</b>			
Mean $\pm$ SD	25.0 $\pm$ 4.8	27.1 $\pm$ 4.9	
median	25	26	
ASA Score			
Mean $\pm$ SD	2.2 $\pm$ 0.747	2.7 $\pm$ 0.7	0.004
Median	2	3	
<b>Timing of Surgery</b>			
Emergency	68	2	
elective	76	4	
Diagnosis			
Cancer	75	5	
Large bowel obstruction	69	1	
<b>Disease Location</b>			
Right colon	49	1	0.05
Left colon	75	2	
rectum	20	3	
<b>Operating Time</b>			
$<180$ min.	96	2	0.02
$>180$ min.	48	4	
<b>Table 2. Univariate Analysis of Risk Factors for Anastomotic Leakage</b>			

<b>Colectomy Location</b>			
Right colon	49	1	0.05
Left colon	75	2	
Rectum	20	3	
<b>Anastomosis Location</b>			
Right colon	49	1	0.05
Left colon	75	2	
Rectum	20	3	
<b>Table 3</b>			

## DISCUSSION

The data presented in this paper indicate that the overall anastomotic leak after colorectal surgery is 4% and all the leak cases were managed by reoperation. Permanent stoma was created in 4 patients and 2 patients were managed conservatively as they are unfit for surgery and they died. Incidence rate in this study are similar to those reported by the authors of recent prospective study on anastomotic dehiscence.<sup>1</sup>

Anastomotic leak occurred mainly in infraperitoneal colorectal anastomosis. This suggests that infraperitoneal anastomosis was more prone for Anastomotic leak.

It is interesting to note that dehiscence rate of low anterior resection is 13% in this study which is similar to those reported by authors of prospective study.<sup>1</sup>

Reoperation was done in 4 cases and colostomy done. 2 patients were unfit for reoperation. AL was noted in median age of 69 yrs. (34-89yrs) in this study.

In this study three parameters were identified as significant risk factors. ASA score  $\geq 3$ , a prolonged operative time ( $>3$ hrs) and anastomosis below the peritoneal reflection. All the patients affected with AL are having ASA Score  $\geq 3$ . With this it was proved that patients with comorbid conditions like diabetes, hypertension, heart disease and COPD are high risk people and suffered with morbidity and mortality.

Hence surgeons has to go for low risk procedures like defunctioning stoma or end colostomy in these group. ASA Score  $\geq 3$  has strongly correlated with an increased risk for anastomotic leak.<sup>7</sup> AL has occurred in patients with median ASA Score of 3 which is similar to the report given by the authors of study.<sup>1</sup>

Prolonged operating time has frequently been identified as a risk factor. Long operating time reflects intraoperative difficulties, particularly when working low in the pelvis or an account of adhesions from previous operation. In this study those who underwent prolonged surgery has developed AL. 4 such cases are noted in this study. Though statistically not significant, always think of defunctioning stoma rather than reoperation and stoma creation.

Finally anastomosis location within the rectum is over seven times more likely to leak than an ileocolic anastomosis (right colon) and almost four times more likely to leak than a colocolic anastomosis (left colon).

Anastomotic leak after surgery for colorectal part compromises not only the immediate prognosis but in addition is associated with worse long term survival and increased rate of local recurrence after a potentially curative resection.<sup>8,9</sup>

Therefore, it is critical to identify preoperatively high-risk patients to adapt the surgical strategy.

## CONCLUSION

Anastomosis location within the rectum is over 7 times more likely to leak than an ileocolic anastomosis (right colon) and almost 4 times more likely to leak than a colocolic anastomosis (left colon). Other risk factors for leak is prolonged operating time.

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