

A Prospective Study of Risk Factors Influencing Bowel Anastomotic Dehiscence in Emergency Laparotomy

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Abstract: ***Background:** Intestinal anastomosis is one of the most frequently performed operative procedures, especially in emergency setting, and is also frequently performed in the elective setting when resections are done for benign or malignant lesions for the GIT. The aim of the study is to find the risk factors, incidence of anastomotic leak after intestinal anastomosis and the mortality rate associated with it. **Methodology:** This Prospective cross-sectional study was conducted among patients admitted in Coimbatore medical college and hospital with the history of abdominal pain and undergoing resection anastomosis in Department of General surgery for a period of one year from 2022-2023. The study participants fulfilling the inclusion and the exclusion criteria were included in the study throughout the study period. The final attained sample 50. They divided into anastomotic dehiscence and Non dehiscence group. The demographic data like name, age of the patient, history of previous hospitalization were obtained. Clinical examination, Laboratory investigations and ultrasound were done. The data collected and statistical analysis done. **Results:** Our study results showed that increase in age, Comorbidities like Diabetes Mellitus, Anemia, Hypoalbuminemia are found to be statistically significant. The most common risk factor for anastomotic dehiscence observed in patients who underwent surgery for malignant causes is increased duration of surgery. There is no association observed between site, type, method of anastomosis technique and anastomotic dehiscence. **Conclusion:** The study concludes that anastomotic dehiscence is the major cause for morbidity and mortality, like reduced survival rate, increased hospitalization, and there is a clear rise in cost of health care. Modifiable risk factors can be modified in order to reduce the cause for anastomotic dehiscence and hence the morbidity and mortality of the patients will decrease in both benign or malignant condition.*

Keywords: Anastomosis, Leak, Benign, Hospitalization, Dehiscence

1. Introduction

Bowel anastomosis is a operative procedure to establish communication between two formerly distant parts of the intestines. The procedure restores bowel continuity after elimination of a pathological condition affecting the intestines. Intestinal anastomosis is one of the most frequently performed operative procedures, especially in emergency setting, and is also frequently performed in the elective setting when resections are done for benign or malignant lesions for the GIT.

Aims and Objectives

- To identify the risk factors for anastomotic leak after intestinal anastomosis.
- To study the incidence of anastomotic leak following intestinal anastomosis.
- To study the mortality rates for bowel anastomosis.

2. Methodology

This prospective study was conducted among patients admitted in Coimbatore medical college and hospital with abdominal pain and undergoing resection anastomosis in department of General surgery for a period of one year from 2022-2023. The study participants were grouped into two groups (Group 1- anastomotic dehiscence, Group 2-Non dehiscence group). The demographic data like age of the patient, sex, history of previous hospitalization

was obtained. Clinical examination, Laboratory investigation and radiological investigations like Xray, ultrasound were done. The data collected and statistical analysis done.

Inclusion criteria:

- Age above 18 years
- Undergoing intestinal resection and primary anastomosis under emergency

Exclusion criteria:

- Less than 18 years
- Undergoing elective procedure
- Undergoing multiple anastomosis
- Undergoing diverse procedures such as colostomy
- Patient not undergoing anastomosis

Sample size: Based on the inclusion and exclusion criteria the study participants recruited during the study period was 50. The study participants were divided into two groups.

Group 1 – anastomotic dehiscence group

Group 2 - Non dehiscence group

Data Collection Method

After obtaining the Institutional Ethical Committee clearance, the study was done from the Department of General surgery. The demographic data like name, age of the patient, history of previous hospitalization were obtained. Clinical examination, Laboratory investigations

and ultrasound were done.

3. Results

Table 1: Comparison of Anastomosis Dehiscence with Baseline characteristics:

	Anastomotic dehiscence + (N=11)	Anastomotic dehiscence – (N=39)	Chi square	P value
Age				
<45years	1(9%)	23	8.55	<0.001*
>45years	10(91%)	16		
Sex				
Male	9(81.9%)	28	0.448	0.503
Female	2(18%)	11		
DM				
Yes	8(73%)	9(23%)	9.426	<0.001*
No	3(27%)	30(77%)		
Anaemia				
Yes	10(91%)	1(3%)	21.154	<0.001*
No	1(9%)	38(97%)		
Hypoalbuminemia				
Yes	7(64%)	3(8%)	16.78	<0.001*
No	4(36%)	36(92%)		
Renal Parameter				
Elevated	4(36%)	8(21%)	1.182	0.276
Normal	7(64%)	31(79%)		

Increase age, Comorbidities like Diabetes Mellitus, Anemia, Hypoalbuminemia are found to be statistically significant.

Table 2: Comparison of Anastomosis Dehiscence with Causes and Duration of Surgery

	Anastomotic dehiscence +	Anastomotic dehiscence –	Chi square	P value
Causes				
Benign disease	5 (45.5%)	38 (97%)	19.256	<0.0001*
Malignant disease	6 (54.5%)	1 (3%)		
Duration of surgery				
<2.5 hours	1 (9%)	30 (77%)	16.75	<0.0001*
>2.5hours	10 (91%)	9 (23%)		

In patients who underwent surgery for malignant causes, increased duration of surgery is one of the risk factors for anastomotic dehiscence.

Table 3: Comparison of Anastomosis Dehiscence with Type, Method of Anastomosis and Site:

	Anastomotic dehiscence +	Anastomotic dehiscence –	Chi square	P value
End to end	7(63.6%)	31(79%)	1.425	0.49
End to side	3(27.3%)	5(13%)		
Side to side	1(9.1%)	3(8%)		
Double layer closure	8(72.7%)	34(87%)		
Single layer closure	3(27.3%)	5(13%)		
Jejuno-jejunal	1(9.1%)	2(5%)	0.75	0.5
Jejuno-ileal	1(9.1%)	2(5%)		
Ileo-ileal	7(63.6%)	19(49%)		
Ileo-colic	1(9.1%)	2(5%)		
Colo-colic	1(9.1%)	14(36%)		

There is no association between site, type, method of

anastomosis technique and anastomotic dehiscence

4. Discussion

Even in the hands of a skilled and experienced surgeon, the healing of intestinal anastomosis remains complex due to various factors influencing the process. In our institution, due to limitations in equipment and expertise, hand-sewn anastomosis were the sole method used during laparotomy procedures, as opposed to stapler-based anastomosis. Our study aimed to evaluate the key risk factors associated with intestinal anastomosis in this setting.

Anastomotic leakage occurred in twenty two percent of the patients in this study, and in those experiencing leaks a mortality rate of sixty three percent was observed in this study. This compares to the 2.7% leak rate observed by Hyman et al. (1) (2007) and 4% in the study by Saha et al (2). (2007), where the associated mortality rate was 61.5%. Luján et al. (3) and Trencheva et al (4) reported leak incidences of 3.8% and 5.7%, respectively, with related mortalities of 13.3% and 5.7%. Our findings show a statistically significant difference in mortality (p=0.001).

The age of patients with anastomotic leaks in our study was averaging about 48.5 ± 14.2 years, with a median age of 46 years. This contrasts with the mean ages reported by Hyman et al. (1) (59.1 years), Luján et al. (3) (64.2 ± 18.7 years), and Trentine et al. (5) (59 years). Irvin et al. (6) also found a strong correlation between age and the risk of anastomotic dehiscence, particularly in patients older than 60 years. In our study, age was a statistically significant risk factor (p=0.003), while gender did not show a statistically significant association with anastomotic complications.

Diabetes was found to be a statistically significant risk factor (p=0.002) for anastomotic leaks in our study, consistent with Vignali et al.'s (7) research that highlighted diabetes as an independent risk factor. In contrast, a study by Turrentine et al. (2014) did not consider hypertension as a relevant risk factor.

Our study also found that patients with anastomotic dehiscence had significantly low hemoglobin levels (mean of 9.14 ± 0.92 g/dl, with all patients being anemic), which was statistically significant (p=0.000004). Studies by Hayden et al (8) have linked low hemoglobin levels (<11 g/dl, <11 g/dl, and <9 g/dl) to an increased risk of leaks, which was likely due to impaired oxygen delivery to tissues, which increased the risk of ischemia.

Peritoneal contamination during surgery was observed in eighty one percent of patients with leaks, which was statistically significant (p=0.02). Presence of sepsis, evidenced by leukocytosis or leukopenia, significantly associated with anastomotic leaks. Preoperative sepsis was a significant risk factor for leakage, as found in studies by Sakr et al (9) although Turrentine et al. did not find it to be a significant factor. Irvin et al. concluded that intra-abdominal infection did not contribute to anastomotic complications mainly of that of anastomotic dehiscence.

The serum protein mainly of that of the albumin levels were

significantly lower in patients with anastomotic leaks (87.5%, $p=0.000004$ for both), reinforcing the findings of Irvin, Yamamoto et al (10) demonstrated the association between hypoproteinemia and hypoalbuminemia with poor anastomotic healing. Low levels of albumin and protein are known to impair tissue repair and the integrity of the anastomosis.

Furthermore, we found that all anastomotic leaks occurred in surgeries that lasted more than 2.5 hours, indicating a significant relationship between prolonged operative times and the increased risk of leakage ($p=0.0004$). Studies also reported that longer operative times were linked to higher rates of anastomotic dehiscence. However, our analysis did not show a statistically significant relationship between prolonged anastomosis time and adverse sequelae. Interestingly, 87.5% of leaks occurred in cases where the anastomosis took longer than 30 minutes to complete.

The several important risk factors for anastomotic leaks including age, diabetes, hemoglobin levels, peritoneal contamination, preoperative sepsis, nutritional status, and surgical duration has been highlighted in this study. Understanding these factors is critical for improving patient outcomes and minimizing complications following intestinal anastomosis.

5. Conclusion

The study concludes that anastomotic dehiscence is the major cause for morbidity and mortality, like reduced survival rate, increased hospitalization, and there is a clear rise in cost of health care. Being aware of different risk factors, majority of which are modifiable risk factors like, diabetes mellitus, anemia, hypoalbuminemia prior to surgery, and intraoperative / per operative cause like duration of surgery, along with post operative complications like respiratory complications and dyselectrolytemia can be modified to reduce the incidence of anastomotic dehiscence and hence the morbidity and mortality of the patients, letting go the non modifiable factors like age of the patient, and disease factors whether benign or malignant condition it is.

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