

Study of various predictive factors anastomotic leak after small intestinal and colonic surgeries at a tertiary hospital

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Abstract

Background: Intestinal anastomosis is one of the most commonly conducted surgical procedures, particularly in emergency cases. Anastomotic leak (AL) is a serious complication after major gastrointestinal surgery that considerably increases the mortality and morbidity. Present study was aimed to identify and evaluate the risk factors affecting anastomotic leak and its outcome. **Material and Methods:** Present study was hospital based, retrospective, case-record based study, conducted in patients aged 18-70 years, of either gender, underwent small intestinal or colonic anastomosis. **Results:** 126 patients were considered for present study, out of which 16 patients had anastomotic leakage (AL) (12.70 %). Mean Age in AL group was 48.5±14.19 years as compared to 37.57±13.6 years in AL absent group (p= 0.034). Gender (Male/Female) distribution was comparable in both groups. According to OT scheduling (Elective OT/ Emergency OT) anastomotic leak was significant in emergency surgeries (p=0.001). Various co-morbidities such as diabetes mellites (50 % vs 2.73 %), hypertension (31.25 % vs 7.27 %), acute Renal failure (25 % vs 0.91 %), COPD (12.5 % vs 0.91 %) were common in AL group and difference was statistically significant (p= 0.043). most of AL were noted at Colo-Colic anastomosis (31.25 % vs 17.27 %), followed by Ileo-Ileal (25 % vs 70.91 %), Ileo-Transverse colon (18.75 % vs 4.55 %), Jejunum-Jejunal (12.5 % vs 2.73 %), Ileo-Jejunal (6.25 % vs 1.82 %) and Ileo-Descending colon end to side (6.25 % vs 2.73 %) and difference was statistically significant (p=0.04). Significant mortality was noted in anastomotic leakage (AL) patients. **Conclusion:** In presents study predictive factors for anastomotic leakage (AL) were emergency surgery, duration of surgery (> 2 hours), male gender, time for anastomosis (> 30 min), intraoperative blood transfusion, age ≥ 50 years, contamination of peritoneal cavity, diabetes mellites, BMI - ≥ 25 kg/m² and colo-colic anastomosis. **Keywords:** Intestinal anastomosis; Anastomotic leak; Anastomotic dehiscence; Predictive factors

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INTRODUCTION

Intestinal anastomosis is one of the most commonly conducted surgical procedures, particularly in emergency

cases, and is often done in an elective environment where resections are conducted on benign or malignant GIT lesions. Anastomotic leak (AL) is a serious complication after major gastrointestinal surgery that considerably increases the mortality and morbidity. Early leak (within 1-2 postoperative days), mostly due to technical reasons, while latent leak (after 5 post-operative days), is attributed to failure of the normal healing mechanism. Well-known risk factors for dehiscence include male gender, smoking, diabetes, obesity, malnutrition, chronic obstructive pulmonary disease, use of immunosuppressants, radiotherapy, and resection of the distal third of the rectum.¹ Several preventive measures, which were assumed to reduce the incidence of AL, including antibiotic prophylaxis, intraoperative air leak test, omental

pedicle flap, defunctioning stoma, pelvic drain insertion, stapled anastomosis, and general surgical technique are employed, still incidence is not reduced.² Management depends on the clinical presentation and the severity of symptoms. Early resuscitation to avoid septic shock is the key to avoiding multisystem organ failure and even death following AL. Highly suspicion, early recognition with an aggressive approach and intervention, prior to development of contamination and subsequent sepsis, are important.³ Present study was aimed to identify and evaluate the risk factors affecting anastomotic leak and its outcome.

MATERIAL AND METHODS

Present study was hospital based, retrospective, case-record based study, conducted in Department of General Surgery, Kakatiya Medical College, Warangal, India. Study duration was of 2 years (January 2019 to December 2020). Study was approved by institutional ethical committee. Patients aged 18-70 years, of either gender, underwent small intestinal or colonic anastomosis, were considered for this study. Patients with intestinal stoma proximal to anastomotic site, intestinal anastomosis at multiple sites, with carcinoma were not considered for study. Case details such as history, examination findings, laboratory/radiological investigations (CBC, KFT, LFT, chest X-ray, X-ray abdomen-erect and supine, ECG, 2 D echocardiography, ultrasonography, endoscopy, CT scan, MRI, tissue biopsy, etc.) were noted in case record proforma. Surgical details regarding resection and primary anastomosis (of the intestine or loop ileostomy or loop colostomy reversal done with complete stomal dismantling), by two-layer hand-sewn anastomotic technique, using a running vicryl suture for the inner

transmural layer and an interrupted silk for the outer seromuscular layer were noted. Postoperative abdominal ultrasonography was done in patients with suspicious distension, leak detected in drain, prolonged ileus, etc. Other postoperative complications, such as pneumonia, were noted. Patient records till complete treatment of anastomotic leak were noted. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

RESULTS

126 patients were considered for present study, out of which 16 patients had anastomotic leakage (AL) (12.70 %). Mean Age in AL group was 48.5±14.19 years as compared to 37.57±13.6 years in AL absent group (p=0.034). Gender (Male/Female) distribution was comparable in both groups. According to OT scheduling (Elective OT/ Emergency OT) anastomotic leak was significant in emergency surgeries (p=0.001). Various co-morbidities such as diabetes mellites (50 % vs 2.73 %), hypertension (31.25 % vs 7.27 %), acute Renal failure (25 % vs 0.91 %), COPD (12.5 % vs 0.91 %) were common in AL group and difference was statistically significant (p=0.043). most of AL were noted at Colo-Colic anastomosis (31.25 % vs 17.27 %), followed by Ileo-Ileal (25 % vs 70.91 %), Ileo-Transverse colon (18.75 % vs 4.55 %), Jejunum-Jejunal (12.5 % vs 2.73 %), Ileo-Jejunal (6.25 % vs 1.82 %) and Ileo-Descending colon end to side (6.25 % vs 2.73 %) and difference was statistically significant (p=0.04). Significant mortality was noted in anastomotic leakage (AL) patients.

Table 1: General characteristics

Risk factors	AL present (n=16)	AL absent (n=110)	P value
Mean Age (years)	48.5±14.19	37.57±13.6	0.034
Gender (Male/Female)	10/6	65/ 45	0.73
OT schedule (Elective OT/ Emergency OT)	3/13	56/ 54	0.001
Co-morbidities			0.043
Diabetes mellites	8 (50 %)	3 (2.73 %)	
Hypertension	5 (31.25 %)	8 (7.27 %)	
Renal failure	4 (25 %)	1 (0.91 %)	
COPD	2 (12.5 %)	1 (0.91 %)	
Site of anastomosis			0.04
Colo-Colic	5 (31.25 %)	19 (17.27 %)	
Ileo-Ileal	4 (25 %)	78 (70.91 %)	
Ileo-Transverse colon	3 (18.75 %)	5 (4.55 %)	
Jejunum-Jejunal	2 (12.5 %)	3 (2.73 %)	
Ileo-Jejunal	1 (6.25 %)	2 (1.82 %)	
Ileo-Descending colon end to side	1 (6.25 %)	3 (2.73 %)	
Complications			0.001
Surgical Site Infection	9 (56.25 %)	7 (8.43 %)	
Septicaemia	7 (43.75 %)	3 (3.61 %)	

Respiratory complications	4 (25 %)	2 (2.41 %)	
Acute Renal Failure	3 (18.75 %)	1 (1.2 %)	
Abdominal wound dehiscence (Burst abdomen)	3 (18.75 %)	1 (1.2 %)	
Mortality	4 (25 %)	8 (7.27 %)	0.001

In presents study predictive factors for anastomotic leakage (AL) were emergency surgery, duration of surgery (> 2 hours), male gender, time for anastomosis (> 30 min), intraoperative blood transfusion, age ≥ 50 years, contamination of peritoneal cavity, diabetes mellites, BMI - ≥ 25 kg/m² and colo-colic anastomosis.

Table 2: Predictive factors studied

Predictive factors	AL present (n=16)	AL absent (n=110)	P value
Emergency surgery	13 (81.25 %)	54 (49.09 %)	0.001
Duration of surgery (> 2 hours)	12 (75 %)	56 (50.91 %)	0.001
Male gender	12 (75 %)	65 (59.09 %)	0.001
Time for anastomosis (> 30 min)	11 (68.75 %)	45 (40.91 %)	0.001
Intraoperative blood transfusion	11 (68.75 %)	39 (35.45 %)	0.001
Age ≥ 50 years	10 (62.5 %)	37 (33.64 %)	0.001
Contamination Of peritoneal cavity	10 (62.5 %)	43 (39.09 %)	0.001
Diabetes mellites	7 (43.75 %)	3 (2.73 %)	0.001
BMI - ≥ 25 kg/m ²	6 (37.5 %)	15 (13.64 %)	0.001
Colo-colic anastomosis	5 (31.25 %)	19 (17.27 %)	0.001

DISCUSSION

Generally AL is identified by either discharge of intestinal contents through the abdominal wound or drains, or evident signs of peritonitis associated with fever, leukocytosis, or fluid collection in abdominal ultrasonography. Oral contrast studies (gastrografin follow-through), or CT scan of the abdomen and pelvis with oral and intravenous contrasts are also used to demonstrate the site of leak. The rate of leakage is generally considered to be higher for elective rectal anastomosis (12-19%) than for colonic anastomosis (11%).³ Patients with AL tend to suffer severe consequences, including peritonitis, widespread inflammation, organ failure, and septic shock. Emergency small bowel anastomoses and intra-abdominal sepsis carry a high risk of anastomotic leak despite detail to technical details during construction. Malnourished (with low serum albumin levels) patients are at a high risk for developing anastomotic leak, surgical site infection, morbidity and mortality following intestinal anastomosis.⁴ The development of post-operative anastomotic leak is one of the most concerning complications in colorectal resection surgery as it is associated with negative patient outcomes including increased risk of abscess or fistula development, greater incidence of infection or sepsis, prolonged hospital stays and a greater risk of post-operative mortality.^{5,6} Patients who experience anastomotic leak following colorectal resection surgery are also at an increased risk of cancer recurrence, impaired function of pelvic organs, and a permanent stoma.⁷ In study by Sakr A *et al.*,⁸ 224 patients (126 males) with intestinal anastomosis of a median age of 44 years were reviewed. Independent factors associated with AL were male gender (OR = 2.59, P = 0.02), chronic

liver disease (CLD) (OR = 8.03, P < 0.0001), more than one associated comorbidity (OR = 5.34, P = 0.017), anastomosis conducted as emergency (OR = 2.73, P = 0.012), colonic anastomosis (OR = 2.51, P = 0.017), preoperative leukocytosis (OR = 2.57, P = 0.015), and intraoperative blood transfusion (OR = 2.25, P = 0.037). Predictive factors significantly associated with AL were male gender, CLD, multiple comorbidities, emergent anastomoses, colonic anastomoses, preoperative leukocytosis, and intraoperative blood transfusion. Choudhuri AH *et al.*,⁹ noted that factors independently associated with increased risk of anastomotic leak were albumin <3.5 g/dl, anemia <8 g/dl, hypotension, use of inotropes, and blood transfusion. The risk for anastomotic leak was four times more in patients who required inotropic support in the perioperative period and three times more in patients who developed hypotension. Shanker V *et al.*,¹⁰ studied 80 cases, post-operative anastomotic leaks were present in 10% and associated mortality was 100%. Increasing age was associated with leakage (p=0.02) and 75% patients with leaks were male. The significant risk factors associated with anastomotic dehiscence: diabetes mellitus (p=0.05), pallor (p=0.01), low haemoglobin (p=0.003), altered TLC count (p=0.008) low serum protein (p=0.001), albumin (p=0.001) longer operative time (p=0.02). Other predisposing factors like serum creatinine, hyperbilirubinemia, elective/emergency surgeries, contamination of peritoneal cavity and time taken to perform the anastomosis were insignificant statistically. In a study by Chaphekar AP *et al.*,¹¹ 50 patients undergoing resection and anastomosis for different diseases were studied. 60 % patients were male, 86% underwent anastomosis in the emergency setting and 14% underwent anastomosis in elective setting. 92 %

patients underwent end to end anastomosis, 4% underwent end to side anastomosis and 4% underwent side to side anastomosis. The incidence of early post op complications including surgical site infections (33 %), anastomotic disruptions (22%), septicemia (30 %), acute renal failure (8 %), respiratory complications (30 %) and abdominal wound dehiscence (4 %). Patients with intra-abdominal sepsis, anemia, old age and patients treated with perioperative corticosteroids for pulmonary disease carry a substantial risk for anastomotic dehiscence and in these patients it is advised that anastomoses must be protected by a diverting stoma.¹² While colonic anastomosis would appear to be inherently more liable for complications, these may be avoided by creating a diversion stoma. A diversion stoma, itself is attended by morbidity and imposes yet another surgical procedure on the patient. However, by a careful identification of risk factors in a given patient, a diversion stoma may be judiciously performed, decreasing the overall morbidity and mortality from colonic anastomosis. Many preventative measures were employed with no clear evidence supporting the superiority of stapled anastomosis over hand-Sewn anastomosis, coating of the anastomosis, or pelvic drain. Defunctioning stoma, when justified it could decrease the leakage-related complications and the incidence of reoperation. MBP combined with oral antibiotics still recommended.²

CONCLUSION

Despite the “perfect patient,” healthy bowel, and meticulous techniques, some anastomosis continue to leak after intestinal surgery. In presents study predictive factors for anastomotic leakage (AL) were emergency surgery, duration of surgery (> 2 hours), male gender, time for anastomosis (> 30 min), intraoperative blood transfusion, age ≥ 50 years, contamination of peritoneal cavity, diabetes mellites, BMI - ≥ 25 kg/m² and colo-colic anastomosis.

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