

Evaluation of Prognostic Factors in Outcome of Bowel Anastomosis

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ABSTRACT

Serum albumin can serve as a simple and economical prognosticator of outcome in bowel anastomosis and henceforth, can help in surgeon's choice making as well as clarifying the risk to the patient. A prospective study was carried out to evaluate the risk factors which effect the result of bowel anastomosis. The objective of the study was to recognize the risk factors for anastomotic leak and study the rate of early complications and mortality of intestinal anastomosis. Study included 50 patients undergoing resection and anastomosis for various indications, both emergency and elective from the 1st December of 2016 to 30th June of 2018, at Krishna Institute of Medical Sciences who satisfied inclusion criteria. 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.

Keywords: Bowel, Prognostic, Anastomosis, Leak, Mortality

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INTRODUCTION

Bowel anastomosis is a surgical technique for the development of contact between two historically separate areas of the intestine. The treatment preserves the integrity of the intestines following the removal of the abnormal disease threatening the intestines. 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. A catastrophic complication of intestinal anastomosis is a peritonitis-causing anastomotic leak, which is associated with high morbidity and mortality. Proper operating procedure and adherence to basic standards are crucial to ensure the positive result of intestinal anastomosis. As a consequence, health in gastrointestinal surgery may rely to a greater degree on factors influencing the healing of anastomosis.

OBJECTIVES OF THE STUDY

The aims and objectives of this study were as follows:
To identify prognostic factors for anastomotic leakage following intestinal anastomosis. To study early complications (anastomotic leaks, septicemia, intra abdominal abscess, post op wound infection and dehiscence) after intestinal anastomosis. To study mortality rates for intestinal anastomosis.

REVIEW OF LITERATURE

The experience of bowel surgery until the latter part of the nineteenth century was limited to dealing with protruding intestine following abdominal injury, which was sustained during wars. Sushruta, an Indian surgeon of 6th century B.C wrote oldest known descriptions of bowel surgery. He described using a cautery over the swelling of strangulated hernias and used the mandibles of black ants to clamp the edges of bowel wounds together.¹ Albucasis (936-1013) an Arabic surgeon was probably the first person to describe the sutures made of animal guts.²

Galen (131-201) in performing several abdominal procedures as surgeon to the Roman gladiators, he observed

and described the anatomy of the small intestine. Fabricius d'Aquapendente, an Italian surgeon was reported by Duverger as describing a procedure of intestinal repair involving end-to-end anastomosis. Lanfranc of Milan used animal tracheas to connect divided segments of bowel. Pierre Franco, a French Surgeon of 16th century described his experience in surgically treating strangulated inguinal hernia. He made an incision over the swelling, divided the constricting band, inserted a goose-quill-sized cannula, and returned the bowel to the peritoneum.¹

Ramdohr, a German Surgeon in 1727, Removed two feet of gangrenous small bowel and invaginated the proximal end of the bowel into the lumen of the distal segment, securing the connection with a few sutures. Duverger in 1747 excised several inches of gangrenous bowel while suturing the two ends together over a piece of dog trachea that was passed in stools 21 days later¹. Mesothelial (serosal) and mucosal healing can occur without scarring. Any deficiency in the intestinal healing can result in life threatening anastomotic disruption and an excessive healing can result in stricture formation and stenosis of intestinal lumen.³

An upcoming concept in the perioperative nutrition is the use of immunonutrition. This involves the use of different nutrients in order to modulate the immune system. The various nutrients used include Ω -3 fatty acids, amino acids (glutamine and arginine) and RNA nucleotides. This is a novel method of intervention with aim of decreasing the infectious complications⁴.

The colonic epithelium derives almost 75% of its energy needs from these fatty acids through metabolism to carbon dioxide, ketone bodies, and lipid precursors⁵.

There is also a prompt change in the colour of viable bowel when 100% oxygen is inhaled. The intra-arterial injection of fluorescein followed by ultraviolet lamp illumination may be used to evaluate the regional perfusion. A hand-held Doppler ultrasound device in a sterile cover may also be useful in verifying the arterial supply.⁶

The segment of bowel to be removed must be isolated with an adequate resection margin. The mesentery, with its contained blood vessels should be serially clamped and

divided. The noncrushing intestinal clamps are applied at proposed site of resection and the artery clamps applied on the specimen side. The bowel can be resected using knife or diathermy.⁷

The outer posterior row is placed first. The inner row is then placed, posterior wall first, followed by the anterior wall. The anterior outer row is the last completed.⁸

Intraoperative complications such as injury to relevant anatomic structures such as ureters, spleen, bowel, and duodenum are related to the surgical technique, to blurred anatomic landmarks and layers owing to the disease (e.g., peritonitis or massive adhesions), or to the patient's habitus (e.g., obesity). Complications of surgery may be of a general or surgery-specific nature and can be classified with regard to the time of their occurrence as either early (within the first 30 days) or late (after 30 days)⁹. The morbidity rate following intestinal anastomoses ranges from 51.8%¹⁰⁻¹³. They can be divided into intraoperative and postoperative complications.

Prophylactic (intravenous and oral) antibiotics and mechanical bowel preparation are used for prevention of the infectious complications following the bowel surgery⁸. Intravenous broad-spectrum antibiotics often contain a combination of intravenous second- or third-generation cephalosporin (cefoxitin or ceftriaxone) with metronidazole. Alternatively, a combination of ciprofloxacin and metronidazole may be used. The optimal timing for administration of antibiotics is to start their intravenous administration 1-2 hours before incision and continue for up to 36 hours. Due consideration should be given to correction of malnutrition and increasing antibiotic prophylaxis for malnourished patients in elective setting.¹⁴ The incidence of the anastomotic dehiscence is 0.8-35%.^{10,12,15,16} The factors which are known to contribute for leakage of anastomosis include hypoalbuminemia^{10,16}, advanced age^{12,15}, presence of intra-abdominal sepsis¹⁷, male sex¹⁸, rectal location of the disease¹⁹, hyponatremia¹⁰, ASA grade 2 or above¹⁹, perioperative blood transfusion¹⁶ and

anaemia^{11,20}. Amit et al reported anastomotic leak rate of 35% after emergent small bowel surgery. However in the absence of the infection the leak rate following small bowel anastomosis is <1%. The leak rate following the elective colorectal surgery is usually 2.6- 14%^{12,15,16,18}.

METHODOLOGY & METHODS

This study is a prospective study involving all the patients undergoing Intestinal Resection and Anastomosis at Krishna Institute of Medical Sciences from 1st December of 2016 to 30th June of 2018. Data was collected from detailed history, clinical examination and investigations (both hematological as well as radiological) on the patients. A total of 50 patients undergoing resection and anastomosis for various diseases and indications were studied.

OBJECTIVES

To identify the risk factors for anastomotic leak after intestinal anastomosis. To study the incidence of early complications (anastomotic leak, intra- abdominal abscess, sepsis, surgical site infection and wound gaping) following intestinal anastomosis. To study mortality rates for bowel anastomosis. All the patients (aged above 18yrs) admitted to surgical wards and undergoing intestinal resection and primary anastomosis during study period at Krishna Institute of Medical Sciences, Karad. Patients aged below 18yrs. Patients undergoing an initial diversion procedure and simple closure of stoma later. Patients undergoing gastrointestinal and biliary-enteric anastomosis.

RESULTS

The total number of cases observed and studied was 50. The study included the patients undergoing both emergency and elective surgeries with various indications for resection and anastomosis of bowel during the study period. These patients were considered for the study using the inclusion and exclusion criteria as mentioned above.

Table 1: Distribution of type of anastomosis in the study population

Type	Frequency	Percent
EEA	46	92%
ESA	2	4%
SSA	2	4%
Total	50	100%

In the table 1, out of 50 total patients, 46 patients (92%) underwent end to end anastomosis, 2 patients (2%) underwent end to side anastomosis and 2 patients (4%) underwent side to side anastomosis.

Table 2: Incidence of anastomotic leak in old age group

Age 60 & above	AL		Total
	No	Yes	
Yes	13	05	18
No	26	6	32
Total	39	11	50

Table no. 2 shows, number of patients aged 60 years and above in this study is 18(36%). The rate of anastomotic leak is 27.77% (5 patients) and p value is 0.459(<.05).

Table 3: Incidence of anastomotic leak in anaemic patients

ANAEMIA	ANASTOMOTIC LEAK	Total
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	No Leak	Leak	
Yes	9	6	15
No	30	5	35
Total	39	11	50

As shown in table 3, a total of 15 patients (30%) had anaemia in this study. The anastomotic leak rate in anaemic patients is 40% (6 patients) and p value is 0.044 (<.05).

Table 4: Complications observed and number of patients affected

Sr. No.	Complications	No of patients	Percentage
1.	Surgical Site Infection	13	26%
2.	Anastomotic disruption	11	22%
3.	Septicaemia	7	14%
4.	Acute Renal Failure	3	6%
5.	Respiratory complications	5	10%
6.	Abdominal wound dehiscence (Burst abdomen)	2	4%

Postoperative morbidity was observed in 15(30%) patients. Most frequently observed complication was the Surgical Site Infection (26%). The observed complications were as in table no. 4.

DISCUSSION

This is a prospective study carried out on all the patients undergoing Intestinal Resection and Anastomosis at Krishna Hospital and Medical Research Centre, Karad. A dangerous complication of intestinal anastomosis is anastomotic leak causing peritonitis, which results in high morbidity and mortality rates. The factors which add to anastomotic leak include hypoalbuminemia¹⁶, advanced age, presence of intra-abdominal sepsis¹⁷, rectal location of the disease⁵⁰, ASA grade 2 or above¹⁹, perioperative blood transfusion¹⁰ and anaemia^{8,13}. The rate of anastomotic leak observed in this thesis is 22%. The reported rate of anastomotic leak ranges between 0.8 to 35%. Hypoalbuminemia, intra-abdominal sepsis, anemia, old age and peri operative steroid use were the prognostic factors which were found to be statistically significant. Hypoalbuminemia is very crucial for development of anastomotic leak. Most common procedure in our study was emergent small bowel resection and anastomosis (60%). Amit et al¹⁰ reported a mortality rate of 17.1% in their prospective study on patients undergoing emergent small bowel resection. H Westapel et al²¹ reported that the mortality rate of 18% and it increased to 30% in patients with no history of previous abdominal surgeries. Only 4 of our patients gave history of previous abdominal operations. 2 patients developed abdominal wound dehiscence in this study and all of them had low serum albumin levels. In all, 8 of 50 patients were re-operated (16%). The indications for surgery in 2 of them was anastomotic dehiscence and 6 were operated for drainage of intra abdominal abscess. The strong point of this thesis is its prospective nature. Limitations include the small sample size, non uniformity of surgical indications and lack of randomization.

CONCLUSIONS

Intestinal anastomosis carries with it considerable mortality and the morbidity. Emergency small bowel anastomoses and intra-abdominal infection have a great risk of anastomotic leak despite attention to technical details during the procedure. Anastomotic leak rate is unaffected by the type

of anastomosis performed. Malnourished (those with low serum albumin levels) patients are at a greater risk for developing anastomotic leak, SSI, morbidity & mortality following bowel anastomosis. Serum albumin levels can be used as a simple, reliable and economical prognostic marker in predicting the outcome of bowel anastomoses. This helps the surgeon in operative decision making as well as explaining the prognosis and operative risk to the patient. Patients with intra-abdominal sepsis and patients treated with perioperative corticosteroids for pulmonary disease carry a significant risk for anastomotic dehiscence. Therefore in this patient category, it is recommended that anastomoses should be protected by a diverting stoma. In the emergency setting, malnourished patients (after attending the primary pathology) should be ideally considered for creation of a temporary stoma to tide the crisis over and closure of stoma considered in second setting. However if an anastomosis is deemed necessary, these patients should be observed thoroughly for any signs of leak postoperatively and should be intervened at the earliest. Considering enteral nutritional optimization before elective surgery may be useful in reducing the morbidity and mortality rate.

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