

A STUDY OF FACTORS AFFECTING HEALING OF GASTROINTESTINAL TRACT ANASTOMOSISAnjani Jalaj¹, Amit Ojha², Vikram Singh Mujalde³, Rajesh Badal⁴, V. J. Jalaj⁵**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: Aim of this prospective study to identify the factor which affects the morbidity and mortality of gastrointestinal anastomosis. This prospective study was conducted in G.R. Medical College from November 2012 to October 2013. Our study plan was approved by Ethical Committee of our institute 80 patients were included in this study who underwent gastrointestinal anastomosis whether elective or emergency irrespective of age and gender. A detailed history and relevant preoperative investigation like complete blood picture, liver function test, kidney function test, electrolyte were taken and intra-operative information was collected like peritoneal cavity contaminated or non-contamination, technique of anastomosis and indication of gastrointestinal anastomosis as well as post-operative information were also collected like pelvic collection wound dehiscence, burst abdomen, fecal discharge from the wound site. All these data were compared and analyzed with respect to their effect on the healing of wound and gastrointestinal anastomosis. The result revealed that age<20years, gender and technique, elective or emergency gastrointestinal anastomosis, diabetes mellitus, and tuberculosis had no effect on the healing of wound and gastrointestinal anastomosis whereas >60 years of age anaemia, hypoproteinemia, hyperbilirubin and malignancy, uremia and peritoneal contamination had impaired the healing of wound and anastomotic leak and there were statistically significant P value 0.04, 0.05, 0.04, 0, 05, 0.05, 0.04, 0.04. 0.003 Respectively.

KEYWORDS: Hand Swing gastrointestinal anastomosis, Anastomotic Leak, Wound dehiscence.

INTRODUCTION: The intestinal anastomosis is a surgical procedure to establish communication between two formerly distant portions of the intestine. The procedure restore intestinal continuity after removal of a pathological condition affecting the bowel. Intestinal anastomosis is one of the most commonly performed surgical procedures, especially in emergency setting and is also commonly performed in elective setting when the resection are carried out for benign or malignant lesions of the gastrointestinal tract.

Intestinal anastomosis can be performed by a hand-sewn technique using absorbable and non-absorbable sutures or stapling device, suture anastomosis (hand-sewn technique) is the commonly used option because of the availability and affordability of suture material and familiarity with procedure. While stapling device for anastomosis has provided an alternative option to perform a rapid anastomosis with higher cost, limited availability and less familiarity are the main drawbacks of the stapling device

The principles of the good reliable anastomosis should have adequate exposure and access, adequate blood supply of both stump, prevent sepsis or gross fecal Contamination, suture and stapler should be properly placed and approximation of all layer of bowel wall, no tension of anastomosis, and prevent distal obstruction, the patient should be well nourished and large bowel should be

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mechanically well prepared.^[1] Suturing of the bowel has been described in Sushrut's ayurveda regarding the repair of the lacerated bowel by using the "Jaws of ants" and Ablucasis was the first surgeon who made first time this.

Duverger (1739) was the first to perform an end to end anastomosis by suturing the edges of all layer of intestine. The actual understanding of healing process came up with the work of Traver (1812), Jobert (1824) and Lambert (1828). Jobert first described through and through inverting suture for intestinal anastomosis.^[2] Czerny (1880) recommended two layer technique in colorectal anastomosis the first layer was inner through and through and the second layer usually interrupted and was an outer seromuscular Lambert stitch.

In this study we have used two layer anastomosis inner through and through with vicryl, while outer interrupted seromuscular Lambert suture with silk and one layer interrupt inverting suture with P.D.S. Halsted (1887) emphasized the importance of submucosa in intestinal anastomosis because it is the strongest layer of the bowel, suture should be taken and considered as risk factor for anastomosis leak.^[3]

Our knowledge of gastrointestinal healing has advanced and we have greater understanding of the impact of local and systematic as well as demographic factors on the anastomotic healing. The most common systematic factors are nutritional status of the patient like anaemia, hypoalbuminaemia, hyperbilirubinemia^[4,5] and local factor like peritoneal contamination, high or low anastomosis, technique of anastomosis, demographic factors like age and sex of the patient^[6]

Nevertheless, anastomotic leakage and dehiscence with high morbidity and mortality, 22% hospital mortality in patient with leak as compared with 7.1% without leak.^[7] The anastomotic complication are also associated with increased hospital stay rose from 25.4 days for patient without anastomotic leakage to 45.7 days for those with leakage respectively.^[8] Altogether these facts illustrate the considerable financial and physical consequence of anastomotic leakage. Therefore in this dissertation, I have design the study of factors affecting the healing of gastrointestinal tract anastomosis.

MATERIAL AND METHODS: It is prospective study which were included 80 patients who underwent hand-sewn gastrointestinal anastomosis, The inclusion criteria of the study was all patients who underwent gastrointestinal anastomosis whether elective or emergency irrespective of age and gender and those patients were excluded who created stoma proximal to the anastomosis.

A detailed history of all patients was taken along with the relevant preoperative investigations like hemoglobin, blood sugar level, renal and hepatic function, serum albumin levels and serum electrolyte, then patients were prepared for emergency or elective exploratory laparotomy while in elective exploratory laparotomy mechanical bowel preparations were done and following intra-operative information was collected from the patients like peritoneal cavity (contaminated or non-contaminated) types of anastomosis (end to end anastomosis, side to side anastomosis, end to side anastomosis), technique of anastomosis (single layer interrupted suture, double layer suture) and indication of gastrointestinal surgery there after post-operative following information were collected like post-operative pelvic collection, wound dehiscence, burst abdomen, fecal discharge from the wound site and collected data were analyzed to their effect on the healing of gastrointestinal anastomosis.

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RESULT: 80 patients were included in the study, patients age group of 10 to 75 years of both sex (Table no.1 shows Age distribution). In the study double layer was commonly used (93.75 %), double layer closure was done in all cases by continuous suture in first layer with vicryl and interrupted suture with silk for second layer while single layer closure were 6.25 % done by interrupted suture by vicryl (Table no.2 shows Techniques used in anastomosis). Elective operations (65 %) were commonly performed as compared to emergency (35 %) operations (Table 3 shows surgery performed emergence or elective).

The most common procedures were done end to end ileoileal anastomosis (48.75 %). In the study large number of cases for which resection anastomosis was done for enterostomy (42.5 %) who were previously performed for perforation, obstruction or other pathology (Table no.4 shows Disease for which resection and anastomosis was done).

The most common post-operative complication was wound infection (22.5 %) which consists of superficial, deep and wound dehiscence. Delayed gastrointestinal motility was seen in 15 cases (18.75 %), common cause was hypokalemia and 5 case motility delay due to use of hyoscine, (Table no. 5 shows postoperative complication).

The patients stay in hospital 7-12 days (66.86 %) and >21 days (8.10 %).

In the present study we found that age has effect on the healing of gastrointestinal anastomosis with anastomotic leak which was significantly higher in the patients > 60 years (P value 0.04) while no significant effect in < 20 years.

Gender has no significant effect on healing of gastrointestinal anastomosis. Techniques of gastrointestinal anastomosis had no significant healing and anastomotic leak in single layer anastomosis and double layer anastomosis P value was respectively 0.88 and 0.91.

In this study we had also found there was no correlation with anatomic leak whether performed in elective gastrointestinal anastomosis or emergency gastrointestinal anastomosis (P value 0.63 and 0.78 respectively is not significant) so as per the study bowel preparation is not mandatory for gastrointestinal anastomosis.

Anaemia and hypoalbuminia had significant effect on gastrointestinal anastomosis and leak rate higher as well as significant statistical P value 0.05 and 0.04 respectively in these patients. Hyperbilirubinemia, uremia, malignancy, had also effect the healing of gastrointestinal anastomosis and there p value 0.05, 0.003, 0.04, were respectively while diabetes mellitus and tuberculosis were found no leak.

(Table no. 6 shows Factor affecting anastomotic healing and its P value).

DISCUSSIONS: The result was analyzed and compared with published literature. In the present study it was found that age has an effect on the healing of gastrointestinal anastomosis with the anastomotic leak rate found to be significantly higher (33 %) in the patients aged more than 60 years with significant P value at may be related to the decreased cellular regenerative power in the elderly age group.

Sex has no significant effect of healing of gastrointestinal anastomosis and leak rate was not significant in the two genders. The present study found that technique of gastrointestinal anastomosis had no significant effect on the healing of the gastrointestinal anastomosis with leak rate not significantly different.

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It was found that single layer anastomosis (P 0.88) and double layer anastomosis (P value 0.91). This was in accordance with the studies done by Cowley et al, they found that single layer technique is better and easier than standard two layer method.^[9,10,11,12,13]

A meta-analysis study conducted by platted showed that there was limited evidence in literature to support the use of mechanical bowel preparations in patients undergoing colorectal surgery.^[19] same in our study we have not done mechanical bowel preparation in emergence exploratory laparotomy and there was not significant p value in emergence (0.78) and elective (0.63) procedure so leak rate not depend on the bowel preparation but some authors have emphasized on bowel preparation which enhances the anastomotic integrity.^[14]

In this study have also found leak rate 60% (3 out of 5 case) in those case where intra-abdominal sepsis with fecal contamination of peritoneal cavity during laparotomy which increase the incidence of anastomotic leak and wound dehiscence due to impairs the intestinal reparative collagen and protein synthesis which impairs healing process of the bowel surgery.^[15,16]

In the study anemia and hypoalbuminemia is preoperative marker of malnutrition because they have decreased healing capacity as well as decreased tensile strength of intestinal anastomosis associated with malnourishment.^[17,18,19]

CONCLUSION: On the basis of study, following recommendation can be made the choice of technique should depend on the surgeon's preference and prevailing condition and also Minimal local tissues reaction, minimal collagenase activity, minimal 'foreign body' reaction and ideal apposition of all bowel layer especially sub mucosa warrant that minimal risk of anastomotic dehiscence will take place. Malnutrition should be corrected by preoperative nutritional support. Hyperbilirubin, uremia, and infection should be treated by broad spectrum antibiotic.

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Age (yrs)	No. Of Cases	%
10-20	14	17.5
21-30	22	27.5
31-40	12	15
41-50	14	17.5
51-60	09	11.25
>61	09	11.25

Table 1: Age wise distribution (n=80)

Method of Anastomosis	No. of cases	Percentage
Single Layer	05	6.25
Double Layer	75	93.75

Table 2: Techniques used in anastomosis (n=80)

Operation Done	Cases	%
Emergency	28	35
Routine	52	65

Table 3: Surgery performed whether as emergency or elective

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Diseases	Cases	%
Enterostomy	34	42.5
Multiple Perforation (small intestine)	06	7.50
Intestinal Obstruction	21	26.25
Gastric outlet Obstruction	03	3.75
Obstructed Hernia	05	6.25
Trauma	01	1.25
Malignancy	08	10
Intussusception	02	2.50

Table 4: Disease for which resection and anastomosis was done

Post- Operative Complication	Cases	%
Fecal Discharge (clinical Evidence of Anastomotic Dehiscence)	06	7.5
Wound Infection (superficial, deep, wound dehiscence)	18	22.5
Delayed Bowel Motility	15	18.75
Pelvic Collection	05	6.25

Table 5: Post- Operative Complication

Factors	Cases (%) n=80	Anastomotic leak rate (%)	P value
Age <20 yrs	14[17.5%]	00	0.64
Age 20-60 yrs	57[73.75%]	3[5.07%]	0.91
Age>60 yrs	9[11.25%]	3[33.3%]	0.04
Male	52[65%]	2[3.84%]	0.63
Female	28[35%]	4[14.28%]	0.49
Single layer anastomosis	5[6.25%]	01[20%]	0.88
Double layer anastomosis	75[93.75%]	05[6.66%]	0.91
Emergency Surgery	28[35%]	4[14.28%]	0.49
Routine Surgery	52[65%]	2[7.14%]	0.63
Albumin <3.0 gm%	13[16.25%]	4[30.7%]	0.04
Albumin >3.0 gm%	67[83.75%]	2[2.97%]	0.40
Hb<10gm%	4[05%]	2[50%]	0.05
Hb>10gm%	76[95%]	5[6.57%]	0.93
Serum Bilirubin>1 mg%	5[6.25%]	3[60%]	0.05
Diabetes Mellitus	1[1.25%]	00	0.10
Uremia	5[6.25%]	3[60%]	0.003
Malignancy	8[10%]	3[37.55]	0.04
Fecal contamination/pus	5[6.25%]	3[60%]	0.003
Tuberculosis	5[6.25%]	00	0.79
Hypokalemia	17[21.25%]	2[11.76%]	0.92

Table 6: Factors Affecting Anastomotic Healing and p value

AUTHORS:

1. Anjani Jalaj
2. Amit Ojha
3. Vikram Singh Mujalde
4. Rajesh Badal
5. V. J. Jalaj

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of General Surgery, G R Medical College & J A Group of Hospitals, Gwalior, M. P.
2. Assistant Professor, Department of General Surgery, G R Medical College & J A Group of Hospitals, Gwalior, M. P.
3. Assistant Professor, Department of General Surgery, G R Medical College & J A Group of Hospitals, Gwalior, M. P.
4. Resident, Department of General Surgery, G R Medical College & J A Group of Hospitals, Gwalior, M. P.

5. Professor, Department of General Surgery, Cancer Hospital, Research Institute, Gwalior, M. P.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Anjani Jalaj,
G. R. Medical College &
J A Groups of Hospitals,
Gwalior, M. P.
Email: drjalaj@yahoo.co.in

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