



## Comparison of single layers and double layers anastomosis of gut and its various outcomes

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**ABSTRACT: Aims/objective:** The aim of this study is to compare single layers and double layers anastomosis of gut and its various outcomes.

**Methods:** This was a single-center prospective descriptive follow up study conducted by the department of Surgery from January 2018 to December 2020. One hundred and thirty two cases were divided into two different groups and studied. In which 49 underwent double layers anastomosis while in 83 cases, single layer anastomosis performed. Association between categorical variables was calculated by Chi-square test and association between quantitative variables by student's t test. The level of significance was set at  $P < 0.05$ .

**Results:** Most of the patients (30%) were within the age range of 40-49 years. The most common indication of surgery was resection and anastomosis in case of obstruction due to sigmoid volvulus, followed by typhoid and tubercular intestinal perforation. Advantage of single layer anastomosis is more than double layer anastomosis.

**Discussion:** single layer anastomosis is associated with less time taking, cost effective, less number of wound infections, better leak tolerance, wound dehiscence and burst abdomen resulting in reduced hospital stay and morbidity.

**Key words:** anastomosis; wound closure; single layer; double layer, silk, polygalactin 910

### I. INTRODUCTION:

Anastomosis is a surgical procedure where two hollow viscera are approximated together to establish continuity. It may be following removal of disease segment or as a bypass; can carry out between viscera of same system or different system. It may be done as an emergency as well as elective procedure as in case of malignancy.

Anastomosis are of various types which may be inverted or everted ,[1,2] can be end to side or side to side, or end to end ; it may be in one layer or in two layers; may be hand sewn or stapled, suture line may be continuous or interrupted ; suture may be absorbable or non absorbable, monofilament or polyfilament. Ideal anastomosis should achieve adequate blood supply on anastomotic site, leak proof, tension free suture, having meticulous haemostasis. one aspect which remain controversial that suture should be in one layer or in two layers. Out of all technique double layer suture introduced by Czerny [3] and it become popular and still in practice. First inner layer is continuous suture with absorbable suture material to approximate inner layer of bowel with good haemostasis and second outer layer is seromuscular with interrupted non absorbable suture. Gambee [4] practised single layer for the purpose of end to end anastomosis of bowel . Anastomotic leak can increase mortality and morbidity and double the length of hospital stay.

Factors that influence of wound healing are systemic factors such as age, malnutrition, vitamin deficiency, anemia, malignant disease, uraemia, jaundice, diabetes, general infections , radiation, cytotoxic drugs, distal gut obstruction, steroids and local factors are tissue tension, hematoma formation, necrotic tissue, local infections, foreign body, poor blood supply due to vascular disease, faulty technique of anastomosis, local irradiation [5,6]. Various anastomotic techniques have been described in the literature and wide variety of suturing techniques have been compared. [7, 8]It is still difficult to achieve desired results in a number of cases especially emergency cases, and malignancies.

The aim of this study is to compare single layers anastomosis of gut with silk and double



layers anastomosis of gut with inner layer by polyglactin 910 and outer layers by silk and its various outcomes and advantages as well disadvantages.

## II. MATERIALS AND METHODS

### Study design

This was a single-center prospective descriptive follow up study conducted by the department of Surgery Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India, from January 2018 to December 2020. One hundred and thirty two patients who underwent exploratory laparotomy and resection and anastomosis were included in the study. The protocol was approved by the Institution's ethics committee. According to the principles of the declaration of Helsinki 1975, written, informed consent was obtained from all the participants.

### Patients

Patients were selected from those attending the emergency as well as out-patient department of the institute. The age of the patients varied from 1 to 74 years with most of the patients falling within the age range of 40-49 years. A total of 132 patients in which 81 male and 51 female candidate undergoing exploratory laparotomy and resection and anastomosis were included in the study. Exclusion criteria were patients with anastomosis of stomach, duodenum as well as anastomosis done by stapler. A total of 136 patients were enrolled, and 4 excluded as they are died within week due to pre-existing septicemia.

### Methods

The patients were selected randomly, irrespective of socioeconomic status and nature of the pathology. Out of these 132 patients, 49 were randomized to have the intestinal anastomosis with double layers; inner layers with polyglactin 910 and outer layers by interrupted full thickness with 3-0 silk and the remaining 83 with single layer interrupted 3-0 silk. Each suture advanced approximately 5 mm gap.

After obtaining written informed consent, eligible subjects were evaluated, on the basis of predesigned standard proforma which included patient information i.e., history of the patient, routine general physical and systemic examination. The following investigations were done: complete haemogram and ESR, liver function test (LFT), RFT, blood sugar, chest and abdominal radiograph, ultrasonography (USG) and computed tomography (CT) scan whenever indicated. The imaging studies were done within 2 hours of admission.

All patients were given first dose of antibiotic just before the incision. The same

antibiotic was continued in the post operative period also and changed later on based on the culture report. Exploratory laparotomy was carried out and anastomosis of gut done in each cases. Necessary procedure was carried out according to the operative findings.

The required closure was performed accordingly. The time taken for construction of anastomosis began with the first stitch and the ended with cutting of excess material from last stitch. The net cost of suture material calculated at the end of the procedure. The wound was primarily closed and dressed with sterile surgical dressing. The primary dressing was removed after 24 hours and daily dressing was done with saline and 5% povidone iodine solution. Swab cultures from the wound were sent for microbiological culture and antibiotic sensitivity. Patient were then started on antibiotics according to the culture and sensitivity report if they showed any systemic sign of infection (e.g. fever, sinus tachycardia, raised total leucocyte counts > 11000 cells per cubic millimeter).

Wounds in group 1 i.e. double layers anastomosis were done using continuous polyglactin 910. Inner layer anastomosis was done with 3-0 full thickness suture and outer layer with silk 3-0. Outer layer anastomosis done with interrupted Lambert technique. The two interrupted sutures were applied 5mm apart. In group 2, i.e. single layer anastomosis, wounds were closed with silk 3-0. In single layer anastomosis interrupted full thickness suture except mucosa was applied.[9] Each bite included 4-6mm of seromuscular wall except on mesenteric border where larger bite taken to ensure adequate seal. All suture were water seal tight. Hollow tube drain put in all case. Anastomotic leak considered as gastrointestinal content came through drain.

The following parameters were evaluated in both the groups- operative time, cost of suture material used, anastomotic leak in various condition, wound infection, paralytic ileus, wound dehiscence and the length of hospital stay. Patients were then followed up for the period of 10 days for development of complication, time of recovery and subsequently on monthly basis upto 6 months and the following features were noted and compared in the two groups- paralytic ileus, and burst abdomen.

### Statistical analysis

The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0. Categorical variables were presented in number and percentage while continuous variables were represented in mean and standard deviation.



Association between categorical variables was calculated by Chi-square test and association between quantitative variables was by student's t test. The level of significance was set at  $P < 0.05$ .

### III. RESULTS:

Most of the patients (29.55% ) were within the age range of 40- 49 years (table 1). In both the groups, the majority of the patients were male, 50 in single layer anastomosis and 31 in double layers anastomosis (table 2). In group 1 total 49 patients taken into consideration while in group 2 total 83 patient taken into consideration.

Out of 11 patients with gross faecal soiling got anastomotic leak in 4 cases, while in 121 patients with minor faecal soiling or no soiling got anastomotic leak in only 3 cases. Out of 96 patients underwent emergency surgery 6 patient (6.25%) got anastomotic leak and in routine 36 cases only one (2.78 %) got anastomotic leak.

In routine operation of 36 patients, average duration of hospital stay was 9.2 days in the ward postoperatively. While in 96 emergency cases average duration of hospital stay was 9.7 days. Total number of anastomosis under tension was 18 and leakage was 27.77% while in 114 anastomosis with no tension, leakage was 1.75%. [10]

Comparison of various parameters like duration of hospital stay in both group, number of emergency and routine case, cost effectiveness, wound dehiscence, leakage, tension, post operative complication and operative time in both groups is given in table 3. [11] The most common indication of resection and anastomosis was intestinal obstruction due to sigmoid volvulus, followed by typhoid and tubercular intestinal perforation (table 5). Table 4 shows relation of shock sepsis and peritonitis with anastomotic leak.

### IV. DISCUSSION:

Most common type of anastomosis is inverted suture technique. It is done commonly in emergency as well as elective procedure. It can be end to side or side to side, or end to end ; it may be in one layer or in two layers; may be hand sewn or stapled, suture line may be continuous or interrupted ; suture may be absorbable or non absorbable, mono filament of polyfilament. But in our study end to end anastomosis preferred. Ideal anastomosis should achieve adequate blood supply on anastomotic site, leak proof, tension free suture, having meticulous haemostasis. One aspect which remains controversial that suture should be in one layer or in two layers. Out of all technique double layer suture introduced by Czerny and it become popular and still in practice. First inner layer is

continuous suture with absorbable suture material to approximate inner layer of bowel with good haemostasis and second outer layer is seromuscular with interrupted non absorbable suture.

This prospective comparative study was undertaken to compare the ideal technique and suture for gut anastomosis. This study includes 132 patients who underwent exploratory laparotomy in the department of surgery Srikrishna Medical College and Hospital, Muzaffarpur, Bihar. In developing countries like India, infections are still a major cause of mortality and morbidity.

Intestinal obstructions and gastrointestinal perforation are the major indication of surgical exploration and resection and anastomosis in developing nations including India. The most of the patients in the present study were in fourth decade of life with 66% being between 30-60 years. This includes productive age group and the morbidity associated with anastomotic leak increases hospital stay.

Total 36 patients considered for routine anastomosis while 96 patients for emergency operation. Total 59 patients considered for emergency and 24 for routine procedure for single layer anastomosis while 37 patients considered for emergency and 12 for routine procedure for double layers anastomosis. The average time taken for single layer anastomosis is 21.74 minutes while for double layers anastomosis is 30.42 minutes. This is beneficial as patient is kept under anaesthesia for shorter duration. Anastomotic leak in single layer anastomosis was 4.82% while in double layers anastomosis was 6.12 % which was not very significant because multiple factors like shock, sepsis, anemia, general condition of patient, infected peritoneal cavity are responsible for anastomotic leak. [12] In this study mean cost of suture material for single layer anastomosis was 234.00 rs while double layer anastomosis was 415.00 rs.

Several studies have been carried out and published which have investigated the optimal suturing technique and ideal suture material for intestinal anastomosis especially in elective settings [13]. Trials carried out in the western have shown no significant difference in the risk of anastomotic leak between single layer versus double layers anastomosis in emergency set up on Indian population [14]. The present study shows single layer anastomosis with silk 3-0 is better than double layer anastomosis.

In conclusion it can be stated that single layer anastomosis with silk 3-0 having less time taking, cost effective , less number of wound infections, better leak tolerance , wound dehiscence



and burst abdomen resulting in reduced hospital stay and morbidity.[15]

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**Table 1 -5**

Age (in years)	Number	Percentage
<20	17	12.88
20-29	13	9.85
20-39	21	15.91
40-49	39	29.55
50-59	26	19.70
60-69	15	11.36
>70	1	0.75

**Table 1:** Comparison of age of the patient taken for anastomosis

		Group 1		Group 2	
		Number	Percent	Number	Percent
Mean age		49	40.20	83	41.70
Sex	Male	31	63.27	50	60.24
	Female	18	36.73	33	39.76
	Total	83	62.88	49	37.12

**Table 2:** Comparison of age, sex.

Different parameters		Group 2		Group 1	
		Number	Percent	Number	Percent
Procedure	Routine	24	66.67	12	33.33



	Emergency	59	61.46	37	38.54
Time taken (min.)	Routine	24		12	
	Emergency	59		37	
	Mean time	21.74 Range (18-30)		30.42 Range (26-35)	
Duration of hospital stay (days)	Routine	24		12	
	Emergency	59		37	
	Mean duration	8.81 days		10.71 days	
Cost effectiveness	Number	83		49	
	Suture used	2-3 pieces		1 vicryl 1 silk	
	Mean expenditure	234.00 rs		415.00 rs	
Leakage	Number	83		49	
	Leakage	4	4.82	3	6.12
Prolonged ileus post operatively	Number	83		49	
	Number of patient develop ileus	9	10.84	10	20.41
Patient develop Wound dehiscence	Total number	83		49	
	Wound dehiscence	8	9.64	5	10.20
Showing tension during anastomosis	Total Number of anastomosis	83		49	
	Anastomosis in tension	15	18.07	3	6.12
	Leakage	4	26.66	1	33.33
Follow up complication	Total number	83		49	
	SAIO	3	3.61	3	6.12
	Leakage	4	4.82	3	6.12

**Table 3:** Comparison of various parameter and complication of single layer and double layers anastomosis

Types of patient	Number of anastomosis	Leakage	Percentage
With shock	15	5	26.67
Without shock	117	3	2.56
With peritonitis	13	5	38.46
Without peritonitis	119	2	1.68
With sepsis	14	4	28.57
Without sepsis	118	3	2.54

**Table 4 :** Showing the relation of shock, sepsis, peritonitis, with anastomotic leak

Primary disease	Number of anastomosis	Percentages
Sigmoid vulvolous of colon	60	45.45
Intestinal perforation	29	21.97
Acute intestinal obstruction	26	19.70
Carcinoma colon	5	3.78
Others	12	9.10

**Table 5:** Showing the relation of primary disease of Gastrointestinal tract with Gastrointestinal anastomosis