



A COMPARATIVE STUDY OF SINGLE LAYER BOWEL ANASTOMOSIS VERSUS DOUBLE LAYER BOWEL ANASTOMOSIS

Surgery

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ABSTRACT

INTRODUCTION: Gastrointestinal anastomosis has been excited interest in our day to day surgical practice and anastomosis aims to make a sound alignment of bowel through which contents will pass in as early as possible. Patients undergoing resection anastomosis for various causes like bowel obstruction, incarcerated hernias, benign and malignant tumours of the small and large bowel are not uncommon.

AIM: To compare the efficacy, safety and cost effectiveness of single layered vs double layered intestinal anastomosis.

Material and methods: the prospective comparative study comprises the patient who underwent resection and anastomosis of intestine. They were assigned in groups to undergo either single layered extra mucosal anastomosis (group A) or double layered intestinal anastomosis (group B). Primary outcome measured in the form of average time taken for anastomosis, mean duration of hospital stay, post operative complication, return of bowel sound postoperatively in both groups and compare the duration of NG tube kept in situ in both groups.

RESULTS: This comparative study included 78 cases, comprising of two groups 37 in group A and 41 in group B was conducted from 1st July 2018 to 30th June 2019 in Gauhati Medical College and Hospital, Guwahati, Assam. With respect to duration of intestinal anastomosis, In group A (single layer) the mean duration was 19.92 minutes to perform a anastomosis, in group B (double layer) the mean duration was 29.05 minutes to perform a double layered anastomosis per operatively. The p value was <0.0001 and was highly significant. Considering duration of the anastomosis extra mucosal single layer continuous intestinal anastomosis appears to represent the optimal choice for most surgical situations and in shorter duration. In comparative study of ours complication rate in the form of anastomotic leak, abdominal abscess and pelvic collection overall complication in the form of anastomotic leak was noted in 13 patients. Anastomotic leak was observed in 6 patient who underwent single layered bowel anastomosis whereas 7 patients in the group of double layered bowel anastomosis had leak. The p value was 0.92 which was not significant. To conclude complication of intestinal anastomosis in our study no evidence was found that single layered intestinal anastomosis leads to fewer postoperative leaks than double layer and either single layer or double layer is superior. In our study the mean duration of nasogastric tube kept in sit in Group A was 2.243 days and in Group B it was 2.415 days. The p value was 0.1092 which was not significant. There was no difference in duration of nasogastric tube kept in situ post operatively in between two study. The mean duration for return of bowel sound in Group A was 2.5 days and in Group B it was 2.9 days and the p value was 0.006 which was not significant, so in our study there was no difference in return of bowel sound in between two.

CONCLUSION: From this study, it is seen that duration to perform single layer anastomosis is significantly lesser, whereas there is no significant difference in postoperative anastomotic complication, duration of hospital stay and duration of NG tube kept in situ.

KEYWORDS

INTRODUCTION

Sushruta "The Great Indian Surgeon" he described the use of black ants in Susruta Sahita 100BC for intestinal anastomosis¹. The word anastomosis comes from the Greek 'ana', without, and 'stoma', a mouth, reflecting the join of a tubular viscus (bowel) or vessel (usually arteries) after a resection or bypass procedure². Gastrointestinal anastomosis has been excited interest in our day to day surgical practice and anastomosis aims to make a sound alignment of bowel through which the contents will pass in as early as possible. Patients undergoing resection anastomoses for various causes like bowel obstruction, incarcerated hernias, benign and malignant tumours of the small and large bowel are not uncommon. The art of bowel anastomosis dates back into the 19th century. Nicholas Senn's review (1844–1908, Chicago) performed in 1893 detected approximately 60 different techniques for intestinal suture, which he attributed to the "ancient and modern methods," followed by an additional 33 "recent methods" of suturing bowel³. Within the past 200 years, gastrointestinal anastomosis has been transformed from a life-threatening venture into a safe and routinely performed procedure. Among these advances was the transition to scientifically-based medicine, chiefly the knowledge of the importance of serosa apposition introduced by Antoine Lembert (1802–1851) in 1826 and the concept of asepsis proposed by Lord Joseph Lister (1827–1912) in 1867–4–5. Additional modern advancement in bowel anastomosis included the advent of the stapling device. Although the Murphy Button described in 1892 was the first popular stapling prototype⁴, further progress was not remarkable until the early 1960's when the Institute for Experimental Apparatus and Instruments in Moscow developed a group of instruments capable of performing gastrointestinal tract anastomosis⁶. However, these instruments were cumbersome and required individual staples to be inserted by hand before each use. Several further engineering feats, including Ravitch's introduction of a modified form of the Russian stapling device and the advent of biofragmentable anastomosis rings in 1985 led to the resurgence of sutureless anastomosis around the world (4–5). Even

today, intestinal anastomosis can be performed in a variety of ways; the specific technique is usually a function of surgeon preference. Failure of an anastomosis with leakage of intestinal contents is one of the most significant surgical complications. Reported failure rates range from 1 to 24%, depending on what type of anastomosis was performed and whether the operation was an elective or an emergency procedure⁷. An anastomotic leak increases the morbidity and mortality associated with the operation: it can double the length of the hospital stay and increase the mortality by threefold⁸. Signs and symptoms suggestive of an anastomotic leak include postoperative (usually between days four to seven) abdominal pain or peritonitis, fever, leucocytosis, and tachycardia, all of which can point to development of systemic inflammatory response syndrome (SIRS) or sepsis. In the elderly, chest pain and new-onset arrhythmias may be the first sign of a leak. An abdominal X-ray showing free air or a CT scan with pneumoperitoneum and significant free fluid or inflammatory changes around the anastomosis are suggestive of an anastomotic failure. A localized anastomotic leak that is not associated with peritonitis or significant systemic sepsis can be managed with percutaneous or open drainage of the abscess, however anastomotic leaks associated with peritonitis or systemic manifestation of sepsis require a laparotomy and either revision of the anastomosis if feasible or faecal diversion proximally or at the site of the anastomosis.

Factors contributing to anastomotic failure include location and systemic factors. As a rule, for any given technique the location of the anastomosis does not significantly influence the overall leakage rate. There are two exceptions to this general rule. First, low anterior rectal anastomosis is associated with higher leakage rates ranging from 12–19%⁹. Second, oesophageal anastomosis is associated with leakage rates of about 3% when stapled technique is used¹⁰. Systemic factors including sepsis, anaemia, diabetes mellitus, previous irradiation or chemotherapy, malnutrition, vitamin deficiencies, steroid use, and certain disease conditions like Crohn's disease are associated with poor anastomotic

healing and increased anastomotic leak rates. Septic shock can lead to impaired tissue perfusion, decreased collagen synthesis, and eventual anastomotic disruption. Severe malnutrition has also been shown to decrease tissue collagen and thus decrease bursting pressure. Resections for Crohn's disease appear to carry a significant risk of anastomotic dehiscence from 2–12%–11. Smoking was found to be associated with an increased risk of anastomotic leakage, as was heavy alcohol consumption–12. Inverting the cut edges of bowel in colorectal surgery is also of importance. In one study, the rate of faecal fistula formation was far higher in the group that had everted suture anastomosis (43%) than in the group with inverted suture anastomosis (8%)–13. In animal studies, everted anastomosis have increased leaks and adhesion formation–14. Recent studies have also suggested that hypothermia can result in vasoconstriction, tissue hypoxia, and reduced bacterial killing all of which can lead to increased infection and leakage rates–15. For elective anastomosis of the colon and rectum, it is traditional to cleanse the large bowel before surgery. The rationale being that decreasing the bacterial load in the large bowel facilitates anastomotic healing and minimizes the consequences of anastomotic leakage. Recent studies have questioned this approach, and there is increasing evidence that bowel preparation may not be essential and that it may be harmful. A Finnish randomized prospective study published in 2000 was first to indicate that patients with bowel preparation had no benefit in leak, infection, or restoration of bowel function rates–16. Subsequent studies have shown that rates of both anastomotic leakage and wound infection were significantly higher in the patients receiving bowel preparation compared to those that did not–17. This may be related to the change in native intestinal flora after bowel preparation.

The two most commonly used anastomotic techniques are (A) handsewn sutured anastomosis and (B) stapled anastomosis. Prospective, randomized trials have not demonstrated any differences between stapled and hand-sewn anastomosis in terms of in-leakage rates, length of hospital stay, or overall morbidity–18. However, controversy remains regarding which of the two methods of creating an anastomosis that yields better clinical outcomes. Intestinal segments can be sewn together with various suture materials. The ideal suture material is one that causes minimal inflammation and tissue reaction while providing maximum strength during the lag phase of wound healing. Popular choices include polyglactin, polydioxanone, and silk. There is little difference between absorbable and nonabsorbable sutures concerning the strength of the anastomosis. Either continuous and interrupted sutures can be used in performing an intestinal anastomosis. No randomized trials have addressed the question of whether interrupted sutures have a significant advantage over continuous sutures; however, retrospective reviews have not demonstrated any advantage of one method over the other–19. Double-layered anastomosis typically consists of an inner layer of continuous or interrupted absorbable sutures and an outer layer of interrupted absorbable or nonabsorbable sutures. Single-layered anastomosis consist of one layer of interrupted or continuous absorbable sutures. A 2006 meta-analysis analysing 670 patients concluded that there was no evidence that two-layer anastomosis yielded a lower rate of postoperative leakage than single-layer anastomosis–20.

In double layered closure where mucosa and seromuscular layers are sutured separately through haemostatic there is more chance of strangulation of mucosa due because of damage of submucosal vascular plexus–20. In single-layer technique, only the seromuscular layer of the gut wall is approximated. This technique incorporates the strongest layer (submucosa) of gut and causes minimal damage to the submucosal vascular plexus, anatomy is maintained and hence less chances of necrosis and superior to double-layered closure.

MATERIALS AND METHODS

Study setting: The study was conducted in the Department of General surgery, Gauhati Medical college and Hospital, Guwahati, Assam.

Study design: Prospective Comparative study.

Study period: The study was carried out from 1st July 2018 to 30th June 2019.

Study population: All patients who underwent intestinal resection and anastomosis at GMCH, Department of general surgery during the period from 1st July 2018 to 30th June 2019.

Sampling design: 78 candidates who fulfilled the required inclusion criteria were recruited and included for the study during a period of 12 months from 1st July 2018 to 30th June 2019.

Sample size: A total of 78 participants were randomized. 37 patients were allocated to single layered anastomosis (Group-A) and 41 patients to double layered anastomosis (Group-B). The patients in each group

were well matched for age, sex and diagnosis.

Method of collection of data:

- After admission data for my study is collected by direct interview of the patient and the patient's relative accompanying the patient and obtained a detailed history.
- Thorough clinical examination.
- Clinical findings and relevant diagnostic investigations performed over the patient.

INCLUSION CRITERIA:

All patients between age of 12-80 undergoing resection anastomosis of bowel at our hospital for causes like bowel perforation, obstruction, strangulated hernia, tumours.

EXCLUSION CRITERIA:

- Paediatric age group(<12years) and patients above 80 years.
- Biliary-enteric anastomosis, gastric anastomosis, oesophageal anastomosis.
- All pregnant women are excluded from the study.
- Patients who refuse to participate in the

Study variables:

- The mean time taken to perform anastomosis (in minutes).
- The duration of nasogastric tube kept in situ (in days).
- Return of bowel sounds on the postoperative day(mean in days).
- Complications like anastomotic leak, abdominal abscess, pelvic collection, persistent vomiting, abdominal distention(total no. of cases).
- The mean duration of hospital stay post-operatively(in days).

Data management and statistical analysis:

1. Data entry and analysis was done using SPSS software version-25(IBM). Descriptive study like mean, standard deviation were used. Inferential statistics like Chi-Square test and ANOVA were used to analyse the statistical difference amongst the groups.
2. A p value of less than 0.05 was taken as statistically significant.

Ethical approval:

The study was carried out only after obtaining approval from Ethics Board, Gauhati Medical College and Hospital, Guwahati(GMCH).

Method of anastomosis:

Primary outcome measures included average time taken for anastomosis in minutes, incidence of postoperative complications (such as anastomotic leak, intra-abdominal abscess, pelvic collection, persistent vomiting, abdominal distension), mean duration of hospital stay. Secondary outcome measures assessed and included duration of nasogastric tube kept in situ (in days), duration for return of bowel sounds postoperatively (mean in days).

The affected segment of bowel was resected as per the standard technique. All anastomoses were of end-to-end type. The single layered anastomoses were performed by using continuous 3-0 polydioxanone suture beginning at the mesenteric border and taking all layers of bowel wall except the mucosa into the bite. The double layered anastomoses were performed using interrupted 3-0 silk Lembert sutures for outer layer and continuous 3-0 polyglycolic acid suture for the transmural inner layer. Stitch advancement was approximately 5 mm. Each bite included 4 to 6 mm of the seromuscular wall; the larger bites were taken at the mesenteric border to ensure an adequate seal. Only enough pressure was applied to the suture while approximating the bowel ends so as to make the anastomosis watertight and at the same time avoid ischemia.

Intraoperative findings, hemodynamics and complications if any, were noted. Time taken for the anastomosis was recorded from the beginning with the placement of first stitch and ending with cutting of extra suture material from the last stitch of anastomosis.

All patients received similar standard postoperative care. Patients were followed up till two weeks post-surgery. The time taken for postoperative return of bowel function was assessed. The nasogastric tube was removed when there was no emesis or abdominal discomfort²¹. Any immediate or delayed complications were recorded. Anastomotic leak was defined as radiographic demonstration of a fistula (contrast enhanced linear tract from bowel to cutis) or non-absorbable material draining from a wound after oral administration, or visible disruption of the suture line during re-exploration. Intra-abdominal abscess without visible discharge was seen in patients as fever, persistent abdominal pain,

tachycardia, and raised leucocytes count and was confirmed on ultrasound of the abdomen. The total length of hospital stay (in days) was calculated from the day of operation.

RESULTS AND OBSERVATIONS

Patient demographics

During the period of one year, a total of 78 patients who met the inclusion criteria were included in the study. There are 54(69.2%) males and 24(30.8%) females. The mean age($\pm$ SD) of the patients is 41.12 $\pm$ 13.89). Based on the type of anastomosis, they are divided into two groups. Group A (patients undergone single layered anastomosis) 37(47.4%) group B (patients undergone double layered anastomosis) 41(52.6%).

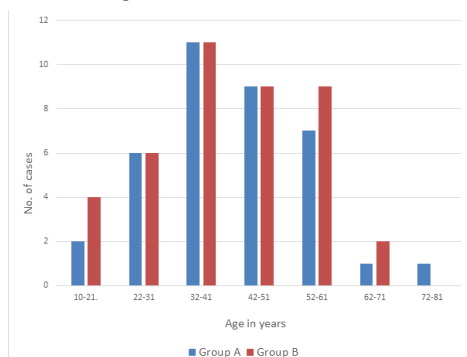
Demographics and characteristics of patients across the two groups

78 patients included in the study, 37 underwent single layered anastomosis and 41 underwent double layered anastomosis. The mean age for group A and group B are 41.89 $\pm$ 13.25 and 41 $\pm$ 13.25.

Table-1: AGE DISTRIBUTION BETWEEN GROUPS

Age group	Frequency (%)	Group A (%)	Group B (%)
12-21	6(7.7)	2(5.4)	4(9.8)
22-31	12(15.4)	6(16.2)	6(14.6)
32-41	22(28.2)	11(29.7)	11(26.8)
42-51	18(23.1)	9(24.3)	9(22)
52-61	16(20.5)	7(18.9)	9(22)
62-71	3(3.8)	1(2.7)	2(4.9)
72-81	1(1.3)	1(2.7)	0(0)
Total	78(100)	37(100)	41(100)

In Group A maximum number of patients were in group 32-41 and same number in Group B also.

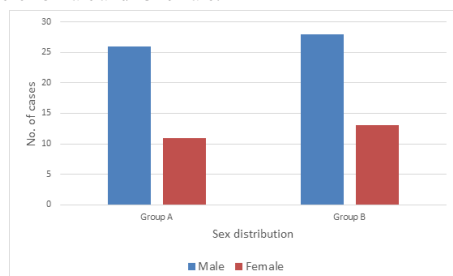


Graph 1-Age Distributions

Table-2: SEX DISTRIBUTION

Group	Male	Female	Total
A	26	11	37
B	28	13	41

In our study, in Group A there were 26 male and 11 female. In Group B there were 28 male and 13 female.

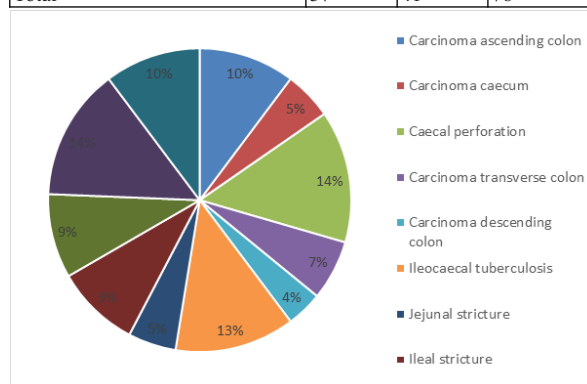


Graph 2-Sex Distributions

Table-3: disease Group

Disease	Group A	Group B	Total cases
Carcinoma ascending colon	3	5	8
Carcinoma caecum	2	2	4
Caecal perforation	5	6	11
Carcinoma transverse colon	3	2	5

Carcinoma descending colon	2	1	3
Ileo- caecal tuberculosis	5	5	10
Jejunal stricture	2	2	4
Ileal stricture	3	4	7
Jejunal perforation	4	3	7
Ileal perforation	5	6	11
Strangulated Hernia	3	4	7
Total	37	41	78

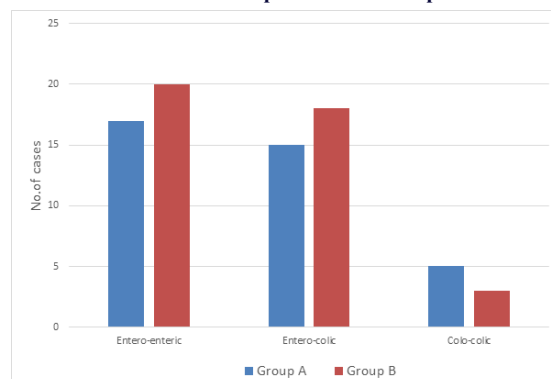


Graph 3-Disease Group

Table-4: ANASTOMOTIC SITE

Anastomotic site	Group A	Group B
Entero enteric	17	20
Entero colic	15	18
Colo colic	5	3
Total	37	41

The maximum number of anastomosis performed in both group were entero-enteric 17 in Group A and 20 in Group B.

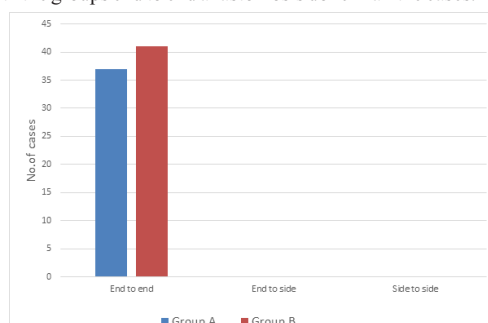


Graph 4-Anastomotic site

Table-5: TYPES OF ANASTOMOSIS

Types of Anastomosis	Group A	Group B
End to End	37	41
End to side	0	0
Side to Side	0	0
Total	37	41

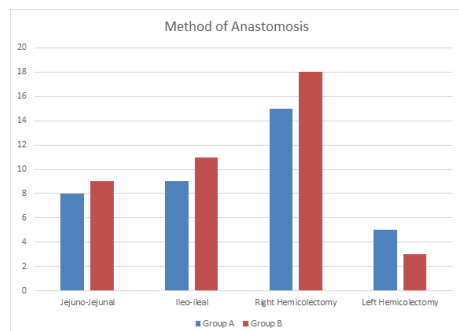
In both the groups end to end anastomosis done in all the cases.



Graph 5-Types of anastomosis

Table-6:METHOD OF ANASTOMOSIS

Site of anastomosis	Single layered(n=37)	Double layered(n=41)	Total(n=78)
Jejuno-jejunal	8	9	
Ileo-ileal	9	11	
Right Hemicolectomy	15	18	
Left Hemicolectomy	5	3	
Total	37	41	78



Graph 6-Method of Anastomosis

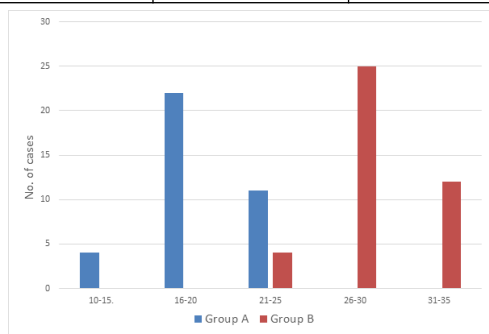
Table-7:Duration of Anastomosis

Duration of anastomosis	Total	Group A	Group B
10-15	4	4	0
16-20	22	22	0
21-25	15	11	4
26-30	25	0	25
31-35	12	0	12
Mean		19.92±2.6	29.05±2.9

The mean duration to perform single layer is 19.92±2.6(±SD) minutes and 29.05±2.9(±SD) minutes in double layer.

Table-8:COMPARISON OF THE MEAN TIME TAKEN TO PERFORMANASTOMOSIS

GROUP-A	GROUP-B	P-VALUE
19.92±2.6	29.05±2.9	0.0001



Graph 7-Duration of Anastomosis

In this comparative study, in Group A the minimum time required to perform anastomosis was between 10 to 15 minutes in 4 patient and maximum time was between 21 to 25 minutes in 11 patients and maximum patients were in 16 to 20 minutes 22.

In Group B the minimum time required to perform anastomosis was between 21 to 25 minutes in 4 patients, maximum time required was between 31-35 in 12 patients and maximum patients 25 in 26 to 30 minutes.

P value was <0.0001

Table-9:COMPARISON OF THE DURATION OF NASOGASTRIC TUBE KEPT INSITU:

GROUP-A	GROUP-B	P-VALUE
2.135±0.7875	2.341±0.5982	0.2622

The duration of nasogastric tube kept in situ post-operatively in Group-A was 2.135±0.7875(±SD) days and 2.341±0.5982(±SD) days in

double layer and the difference is not significant.

Table-10:COMPARISON OF THE RETURN OF BOWEL SOUND IN POST-OPERATIVELY:

GROUP-A	GROUP-B	P-VALUE
2.486±0.6065	2.927±0.7546	0.006

The bowel sound return in Group-A was on 2.486±0.6065(±SD) post-operative day and in Group-B on 2.927±0.7546(±SD) post-operative day, and this difference is not significant

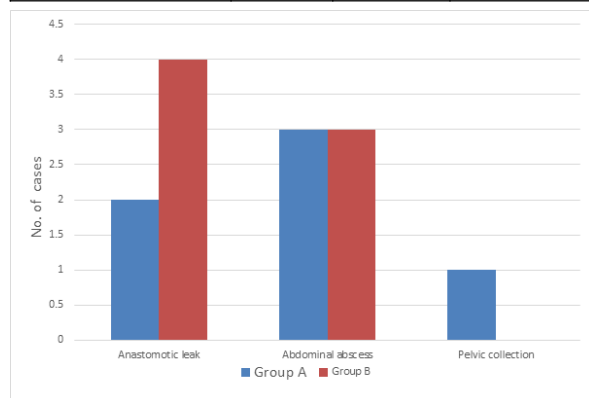
Table-11:COMPARISON OF THE DURATION OF HOSPITAL STAYS POST-OPERATIVELY:

GROUP-A	GROUP-B	P-VALUE
8.38±1.831	9.02±2.593	0.2046

The duration of hospital stay post-operatively in Group-A was 8.38±1.831(±SD) days and in Group-B it was 9.02±2.593(±SD) days and comparatively this is insignificant.

Table-12:COMPARISON OF COMPLICATIONS:

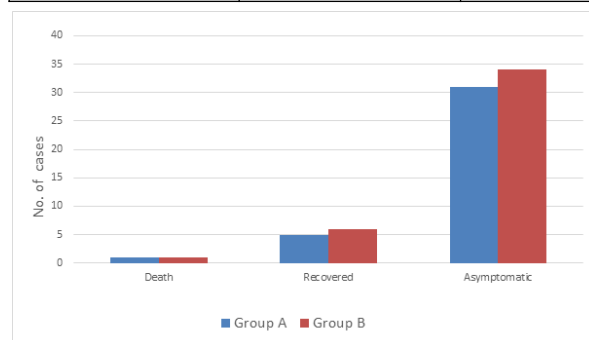
Types of anastomosis	Group A	Group B	P-VALUE
Anastomotic leak	2	4	0.4720
Abdominal abscess	3	3	0.8978
Pelvic collection	1	0	0.3240
Total	6	7	



Graph 8-Complications

Table-13:Final outcome:

Outcome	Group A	Group B
Death	1	1
Recovered	5	6
Asymptomatic	31	34



Graph 9-Final Outcome

In this study 1 patient in Group A and 1 patient in Group B who developed anastomotic leak died due to septicaemia rest all recovered including abdominal abscess and pelvic collection.

DISCUSSION

In present study assessed the efficacy & safety of single layered anastomosis in comparison with double layer anastomosis after intestinal resection and anastomosis. The study included two groups single layer and double layer. Single layered had 37 cases and double

layered 41 cases were allotted to either group randomly requiring single layer and double layer anastomosis. The efficacy of both groups were compared in terms of duration to perform anastomosis, post-operative complications, duration of nasogastric tube kept in situ and return of bowel sound on post-operative day.

Comparison of mean age in present study with Ayub et al study²³, Niyaz Ahmed et al study³⁵, SibabrataKar et al³³ and Pathak et al study³⁴, K Saravanan et al study⁴⁰.

Groups	Present study	Ayub et al study	Niyaz Ahmed et al study	SibabrataKar et al study	K. Saravanan et al study	Pathak et al study
Group A	41.89	37.5	41.40	42.96	44.26	45.13
Group B	41.00	40.2	41.72	42.63	43.12	48.60

In present study mean age group A was 41.89 years and in B was 41.00 years. In Muhammad Ayub et al study mean age in group A was 37.5 and in group B was 40.2 years, Niyaz Ahmed et al study it was 41.40 years in Group-A and 41.72 years in Group-B and in SibabrataKar et al study it was 42.96 years in Group-A and 42.63 years in Group-B. K. Saravanan, AMuthukumar study it was 44.26 years in Group-A and 43.12 years in Group-B.

Comparison of the duration of anastomosis of Khan et al study³⁰, and Burch et al study²⁶, Dandi PP et al study³³, Dora RK et al study⁴⁰, Pathak et al study³⁴.

Groups	Present study	Khan et al study	Burch et al study	Dora RK et al study	Dandi PP et al study	Pathak et al study
Group A	19.92	20	20.8	20.87	19.6	17.59
Group B	29.05	35	30.7	32.77	29.5	30.16

In our study mean duration required to perform single layer is 19.92 minutes and for double layer 29.05 minutes. The difference in average time is statistically significant as p value is 0.0001HS in present study and comparable to all other studies compared in.

Comparison of complications of Shashirekha et al study³⁹, T.Shah et al study³², S. Askarpour et al Study²⁹, Irvin et al study²⁴, Ordorica et al study²⁷ and present study

Groups	Present study	Shashirekha et al study	T.Shah et al study	Askarpour et al study	Irvin et al study	Ordorica et al study
A	6 (16.21%)	11 (17.34%)	8 (21.1%)	8 (12.7%)	5 (17%)	6 (14.3%)
B	7 (17.07%)	11 (17.34%)	6 (15%)	13 (20.6%)	5 (16%)	7 (15.8%)

In our study complication is 6(16.21%) in Group-A and 7(17.07%) in Group-B and on comparing both group statistically it come out insignificant (p value 0.9204) that is similar complication between 2 groups and similar to all other studies compared in our study.

Comparison of anastomotic leak in Khan et al study³⁰, Muhammad Ayub et al study²³, Rahul Saboo et al Study³¹, Pathak et al study³⁴, Shobhit K. Nemma et al study³⁸ and present study.

Groups	Present study	Khan et al study	Muhammad Ayub et al study	Rahul Saboo et al study	Pathak et al study	Shobhit K. Nemma et al study
Group A	2 (5.4%)	1 (6.67%)	2 (4.7%)	3 (10%)	3 (9.37%)	2 (5%)
Group B	4 (9.7%)	2 (13.33%)	4 (8.3%)	2 (6.7%)	2 (6.67%)	5 (12.5%)

The anastomotic leak rate in our study in group A is 2(5.4%) and group B was 4(9.7%). The anastomotic leak between 2 groups is not significantly different (p value 0.472) and similar to other studies compared in.

Comparison of duration of nasogastric tube kept in situ post-operatively in present study and SibabrataKar et al study³⁵.

Groups	Present study	SibabrataKar et al study
A	2.243±0.07151	1.91±0.75
B	2.415±0.0779	2.32±1.02

Duration of nasogastric tube kept in situ in Sibabrata Kar et al in group A 1.91±0.75(±SD) and group B was 2.32±1.02(±SD). In our study in group A it was 2.243±0.07151 group B it was 2.415±0.0779, and there was no significant difference between two groups (p value 0.1092) and results are similar to Sibabrata Kar et al study.

Comparison of return of bowel sound post-operatively in present study and SibabrataKar et al study³⁵, P.K.Baviskar et al study²⁸, S.Chittmittrapap et al study²⁵

Groups	Present study	SibabrataKar et al study	P.K.Baviskar et al study	S.Chittmittrapap et al study
A	2.486±0.6065	2.42±1.11	3.68±0.61	3.16±0.9
B	2.927±0.7546	3.1±1.34	3.96±0.66	3.46±1.0

In Sibabrata Kar et al bowel sound return in group A return on 2.42±1.11(±SD) day and in group B on 3.1±1.34(±SD) day and in P.K.Baviskar et al study bowel sound return in Group-A on 3.68±0.61(±SD) day and in Group-B on 3.96±0.66(±SD) day. In our study in group A it was 2.486±0.6065(±SD) and in group B 2.927±0.7546(±SD). There was not significant difference in between two studies and our study is comparable to other studies compared in.

Comparison of duration of hospital stays post-operatively in present study, Burch et al study²⁶, Niyaz Ahmed et al study³⁷, P.Dandi et al study³³, Bhargava GS et al study³⁶, Sibabrata Kar et al study³⁵, K Saravanan et al study⁴¹.

Groups	Present study	Burch et al study	Niyaz Ahmed et al study	P. Dandi et al study	SibabrataKar et al study	Bhargava GS et al study	K Saravanan et al study
A	8.38	7.9	7.32	8.24	5.9	9.7	8.2
B	9.02	9.9	7.92	8.48	7.29	11.8	12.1

The duration of hospital stay post-operatively in our study in Group-A is 8.38 days and Group-B is 9.02 days and this is statistically significant in between two groups. The present study is comparable to all studies compared in.

CONCLUSION

This prospective comparative study included 78 cases of various clinical conditions of small and large bowel requiring resection and anastomosis. The study had two groups, single layer and double layer comprising 37 and 41 cases respectively. Each group was evaluated and compared with respect to duration required to perform anastomosis, anastomotic complications, outcome associated and the duration of hospital, nasogastric tube kept in situ and return of bowel sound post-operatively. Though a large number of patients need to be studied to do a dogmatic conclusion, based on the results obtained in the present study following conclusions can be drawn:

- Duration required to perform a single layer intestinal anastomosis is significantly lesser when compared to double layer.
- There is no significant difference in anastomotic complications between two groups.
- There is no significant difference in duration of hospital stay in two groups.
- There is no difference in duration of nasogastric tube kept in situ post-operatively in between two groups and also return of bowel sound in both the groups was similar.

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