

Prospective Study of Extramucosal Single Layer Interrupted Suture *versus* Conventional Two Layer Repair of Intestinal Anastomosis

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ABSTRACT

BACKGROUND

The traditional double layered intestinal anastomosis incorporates large amount of ischemic tissue in the suture line causing luminal narrowing and fistula formations. Single layered anastomosis done through continuous extra mucosal suturing has shown to be safe and causes fewer complications.

OBJECTIVE

To Compare Post-operative anastomosis leakage, duration, required to perform single and double layered intestinal anastomosis, cost effectiveness of suture material used in single and double layered intestinal anastomosis.

METHODS

The patients selected for this study were admitted with various clinical conditions requiring resection and anastomosis of small or large bowel. A total of 100 patients was included in the study. The patients were alternatively allotted single-layered intestinal anastomosis group and double layered group.

RESULTS

Mean duration required to perform anastomosis in Group A is 18.23 ± 3.35 minutes and in Group B are 29.70 ± 2.74 minutes. The difference between the mean duration required for anastomosis between the two groups were statistically significant ($p < 0.0001$). Single layered intestinal anastomosis was found to be more economical compared to double layer as the total number of suture packs required in double-layered anastomosis (Vicryl and silk) was 2, whereas in single-layer anastomosis only one pack of vicryl was used. Cases in Group A and Group B developed anastomotic leak and the difference was statistically insignificant.

CONCLUSION

Our study concluded that there is statistically significant difference between the single layer anastomosis and double layer in

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terms of time taken to perform anastomosis, cost effectiveness of single layer anastomosis, however there is no difference in recovery of bowel function, postoperative anastomotic leak.

KEYWORDS

Anastomotic leak; Double layer anastomosis; Extra mucosal technique; Single layer anastomosis

INTRODUCTION

Gastrointestinal anastomosis has been excited interest in our day to day surgical practice and aim of anastomosis is to make a sound alignment of bowel through which the contents will pass in as easily as possible.

Patients undergoing resection anastomosis for various causes like bowel obstruction, incarcerated hernias, benign and malignant tumours of small and large bowel is not so uncommon. Bowel anastomosis after resection of bowel may be either end to end anastomosis or side to side or side to end anastomosis depending on surgery and the operating surgeon. Different techniques of intestinal anastomosis are single, double layered closure, staples, glue, laser welding [1].

In double layered closure where mucosa and sero-muscular layers are sutured separately though there is

more chance of strangulation of mucosa because of damage of submucosal vascular plexus [4].

In single layer technique, only sero-muscular layer of the gut wall is approximated as shown in (Figure 1). 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 [5,6]. Anastomotic leak is a major complication of gastrointestinal anastomosis and may lead to peritonitis, intra-abdominal abscess, fistula, necrosis and stricture. There are number of factors which may contribute to anastomotic leak and suturing technique is itself a strong independent factor. Anastomosis leak is a major complication and incidence may vary from 1.3 to 7.7%, and usually leads to increase morbidity, prolonged hospital stay, increases the economic burden and even may lead to mortality [3].

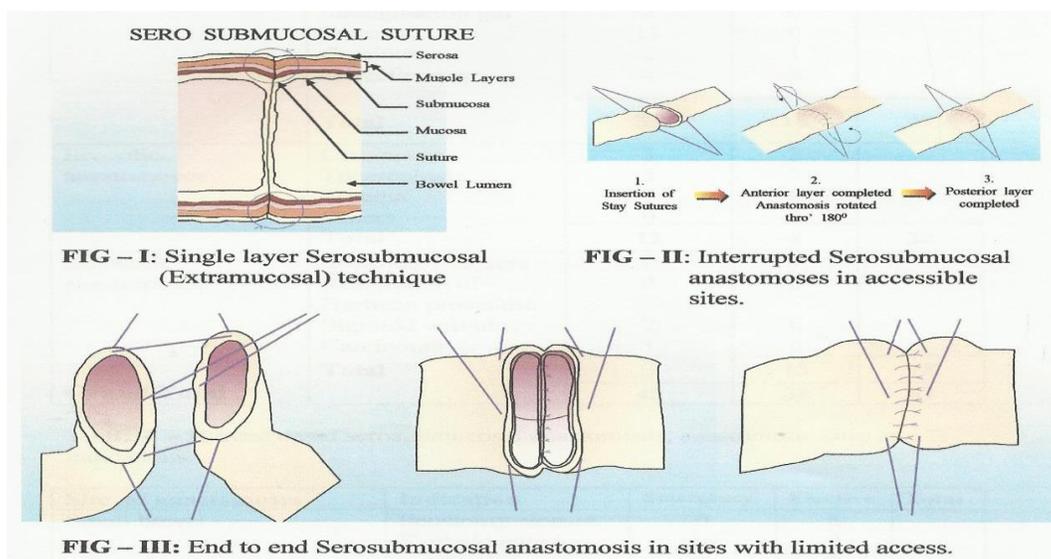


Figure 1: Single layer Serosubmucosal technique.; **Figure 2:** Interrupted Anastomoses in accessible sites.; **Figure 3:** End to end serosubmucosal anastomosis in sites with limited access.

OBJECTIVES OF THE STUDY

Aim

To study of extra mucosal single layer interrupted suture versus conventional two-layer repair of intestinal anastomosis

Objectives

- To compare the stricture formation in bowel in single layer and double layer technique.
- To study the retain of bowel function.
- Post-operative anastomosis leakage.
- To compare duration required to perform single and
- Double layered intestinal anastomosis.
- To compare cost effective of suture material used in single and double layered intestinal anastomosis.

Inclusion criteria

1. Patients undergoing resection and anastomoses of small bowel and large bowel at our hospital for causes like intestinal obstructions due to bowel ischemia, strangulated hernia, traumatic bowel injury, bowel tumours etc.
2. Age more than 18 years and less 60 years.

Exclusion criteria

- Oesophageal, gastric and duodenal anastomosis.
- Age less than 18 years and more than 60 years.
- Severe anaemia (<6 gm/dl)
- Coagulopathy
- Hypoalbuminemia
- Chronic Kidney Disease
- Multiple organ dysfunction Syndrome (MODS).
- Diffuse peritonitis- As intestinal tissue is more friable and difficult to hold suture
- SMA thrombosis

MATERIALS AND METHODS

This study was conducted from June 2018 May 2020 on all the patients, who were admitted and operated in Department of surgery, SSG Hospital, Vadodara.

Duration of Study

two year, (1st June 2018 to 1st May 2020)

Type of Study

Hospital based prospective study

Sample Size

A total of 100 patients was studied and divided into 2 groups, A and B requiring SGIA and DGIA respectively, comprising of 50 patients in each group.

Standardization

All single layer anastomosis was done with Vicryl 2-0 pack which had a suture material of 90 cm length. For double layer, 2-0 Vicryl was used taking through all layers and sero-muscular layer with 2-0 Mersilk pack which had suture material measuring 90 cm.

Methods

All the patients with various intestinal pathologies were closely observed and followed from the time of admission till 1 months after their discharge from the hospital. Patients in the paediatric age group (<18 years) were excluded since single layer intestinal anastomosis is routinely performed in this group and therefore not suitable for this comparative study.

The diagnosis of the primary intestinal pathology was made on the basis of a detailed history, clinical examination, laboratory investigations, wherever applicable. The diagnosis was confirmed during the operation and those patients requiring an intestinal anastomosis were included. Both emergency and elective operations requiring intestinal anastomosis were included in this study.

The patients were alternatively allotted into two groups; group A requiring single-layered intestinal anastomosis, while group B requiring double-layered anastomosis. Informed written consent was obtained and the procedure and its outcome were well explained. The time recorded for construction of the anastomosis began with the placement of the first stitch and ended with cutting the excess material from the last stitch. Abdominal tube drain, one each, was placed in Morrison's pouch and pelvis. Post-operatively results were assessed by clinical evaluation, stressing upon the return of gut function assessed by the day of return of bowel sounds, flatus and the day on which oral intake exceeded one litre over 24 hours.

Surgical site infection was defined as a purulent discharge in, or exuding from, the wound, or a painful, spreading erythema indicative of cellulitis irrespective of the bacteriological assessment.

Anastomotic leak was defined as faecal discharge in the drain or from the wound or a visible disruption of the suture line during postoperative period or during re-exploration. Intra-abdominal abscess without visible discharge was seen in patients as fever, persistent abdominal pain, tachycardia, and raised leucocyte count and was confirmed on ultrasound of the abdomen.

Removal of the drain was usually done on 4th-5th postoperative day, depending on the post-operative recovery and amount of collection in the drain (<25ml over 48 hours). Suture removal was done between the 12th to 14th postoperative day after confirming adequate wound healing. Hospital stay was counted from the day of

operation as there were a number of patients and hospital related factors which lead to a delay in the operation from the date of admission. To assess mortality, the 30-day in hospital mortality was taken into account. After discharge, the patients were followed up for 1 month and were evaluated for gastrointestinal complaints and other complaints, if any.

Results

Total number of 92 patients were taken into the study and were then divided into cases and controls. 46 patients were taken into each group.

Age, Sex and Location of Anastomosis

It was age, sex distribution; and location of anastomosis done in both groups, shown in (Table 1).

	Group-A (single Layer)	Group-B (double Layer)
Number of Anastomosis	50	50
Mean Age (years)	45.97 ± 12.60	41.6 ± 12.09
Sex (M/F)	35/15	35/15
Location of anastomosis		
Jejunioileal	2	2
Ileoileal	32	34
ileocolic	13	10
Colo colic	3	4

Table 1: Shows age, sex distribution; and location of anastomosis done in both groups.

Duration of anastomosis

From table 2 it is clear that single layer anastomosis was performed faster than the two-layer anastomosis and was proven statistically significant by p value <0.05.

Post-Operative Clinical Evaluation

Events	Group-A		Group-B		P Value
Appearance of Bowel Sounds (in hours)	48.20 (2.008 days)	12.56 (0.52 days)	52.68 (2.19 days)	17.35 (0.72 days)	0.1424
Duration (in minutes)	18.23	3.35	29.70	2.74	<0.0001
Passage of Flatus (in hours)	49.87 (2.08 days)	16.26 (0.68 days)	54.71 (2.28 days)	17.42 (0.726 days)	0.1541

Table 3: Shows patients in single layer group and double layer group had no significant different in post-operative bowel recovery as p value>0.05.

Postoperative Complications

Complication	Group A (Single Layer)	Group B (Double Layer)
Anastomotic Leak	1	2
Stricture	0	0

Table 3: Shows no significant different in post-operative complication in both groups as p value>0.05.

Suture material used and cost

On an average 1.12 packs of vicryl were used in single layer amounting to 711.2 rupees ± 112.14 rupees and 1.01 vicryl and 1.53 silk packs were 1.02 used costing 829.54 ± 77.69 rupees (p<0.0001).

DISCUSSION

The present study assessed the efficacy and safety of single layered anastomosis in comparison with double layer anastomosis after intestinal resection and anastomosis. Male predominance is due to the higher incidence of trauma and other emergency operations, that were performed during the study, which were more common in the male population.

The study included two groups, single layer and double layer; each group had 50 cases altogether 100 cases. Cases were allotted to either group alternatively, requiring single layer anastomosis and double layer anastomosis for various clinical conditions of small and large bowel. Anastomosis was done at different levels of intestine and depending up on the position of the viscera. The efficacy of both groups was compared in terms of duration required to perform single and double layered intestinal anastomosis, cost of suture material used, study post-operative complications like anastomotic leak, stricture formation in single and double layered intestinal anastomosis.

In the present series mean age in group A (single layer) was 45.97 years and in group B (double layer) was 41.6 years. The mean duration required to construct a single layer anastomosis was 18.23 minutes and 29.70 minutes

for double layered anastomosis. The difference in average time is statistically Significant as p value is<0.0001.

Single layered intestinal anastomosis was found to be more economical compared to double layer bowel anastomosis as the total number of suture packs required in double-layered anastomosis (polyglactin and silk) was 2, whereas in single-layer anastomosis only one pack of polyglactin was used.

The difference in the post-operative recovery seems to be statistically insignificant, it was more correlated with underlying pathology, intra-operative bowel handling and electrolyte imbalance.

There is no significant difference in anastomotic leak between two groups. There was no stricture formation as the adequate Chittel manoeuvre was done and patency was checked by passing the content through anastomosis and two finger tests.

CONCLUSION

1. Duration required in single layer intestinal anastomosis is significantly lesser as compared to the double layer intestinal Anastomosis.
2. The Less suture material is required to construct a single layer GIA compared to the two-layer GIA, therefore single layer is more cost effective.
3. There was no significant difference in postoperative bowel recovery in Single layer anastomosis when compared to double layer.
4. There was no statistical significance in anastomotic leak. There was zero stricture formation in both groups.

5. Considering the simplicity of the single layer intestinal anastomosis technique, it may be reliably incorporated into surgical training & can be recommended a method of choice for intestinal anastomosis in both elective and emergency operations.
6. This study requires larger study group to consolidate these finding.

FUNDING AND CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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