



Prospective Study of Extramucosal Single Layer Interrupted Suture vs. 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 effective 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 were 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 min and in Group B is 29.70 ± 2.74 min. 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 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; Extramucosal 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 tumors 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 sub mucosal vascular plexus [2].

In single layer technique, only sero-muscular layer of gut wall is approximated. This technique incorporates the strongest layer (submucosa) of gut and causes minimal damage to the sub mucosal vascular plexus, anatomy is maintained and hence less chances of necrosis and superior to double

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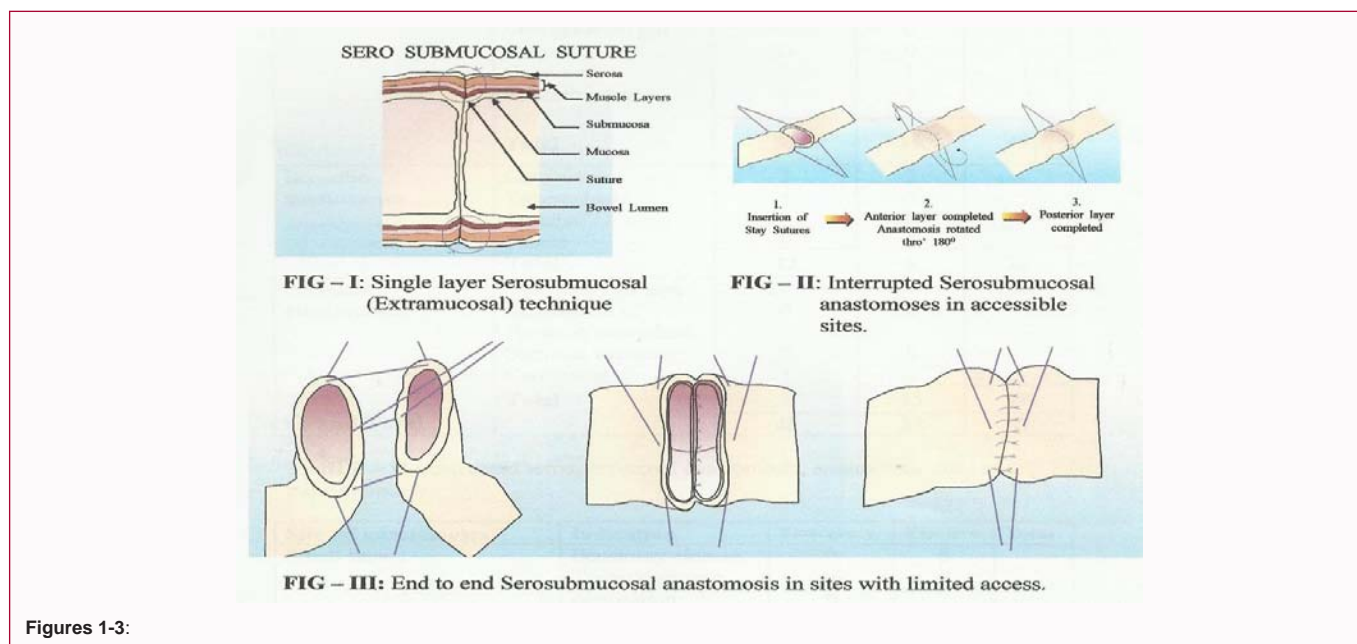
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Figures 1-3:

layered closure [3,4]. 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 [5] (Figures 1-3).

Objectives of the Study

Aim

To study of extra mucosal single layer interrupted suture vs. conventional two-layer repair of intestinal anastomosis [6].

Objectives

- To compare the stricture formation in bowel in single layer and double layer technique [7].
- 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 anastomosis of small bowel and large bowel at our hospital for causes like intestinal obstructions due to bowel ischemia, strangulated hernia, traumatic bowel injury, bowel tumors etc.

2. Age more than 18 years and less 60 years.

Exclusion criteria

1. Oesophageal, gastric and duodenal anastomosis.
2. Age less than 18 years and more than 60 years.

3. Severe anemia (<6 gm/dl)

4. Coagulopathy

5. Hypoalbuminemia

6. Chronic Kidney Disease

7. Multiple Organ Dysfunction Syndromes (MODS).

8. Diffuse peritonitis- As intestinal tissue is more friable and difficult to hold suture

9. SMA thrombosis

Materials and Methods

This study was conducted from June 2018 to 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 were 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 month after their discharge from the hospital. Patients in the pediatric 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 [8].

The diagnosis of the primary intestinal pathology was made on

Table 1: Age, Sex and Location of Anastomosis.

	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 2: Duration of Anastomosis.

	Group-A	Group-B	P Value
	Mean ± S.D.	Mean ± S.D.	
Duration (In Minutes)	18.23 ± 3.35	29.7 ± 2.74	<0.0001

the basis of a detailed history, clinical examination, and 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 [9].

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 liter over 24 h.

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 leukocyte count and was confirmed on ultrasound of the abdomen.

Removal of the drain was usually done on 4th to 5th postoperative day, depending on the post-operative recovery and amount of collection in the drain (<25 ml over 48 h). Suture removal was done between the 12th to 14th postoperative days 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

Table 3: Post Operative Clinical Evaluation.

Events	Group-A		Group-B		p value
	Mean	± S.D.	Mean	± S.D.	
Appearance of Bowel Sounds (in hours)	48.2 (2.008 days)	12.56 (0.52 days)	52.68 (2.19 days)	17.35 (0.72 days)	0.1424
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

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 [10].

Results

Age, sex and location of anastomosis (Table 1 and 2).

Suture material used and cost

On an average 1.12 packs of vicryl were used in single layer amounting to 711.2 ± 112.14 rupees and 1.01 vicryl and 1.53 silk packs were used costing 829.54 ± 77.69 rupees (p<0.0001) (Table 3 and 4).

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 [11,12].

In 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 and 29.70 min 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 [13], 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

Table 4: Postoperative complications.

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

groups.

There was no stricture formation as adequate Chittell manoeuvre was done and patency was checked by passing content through anastomosis and two finger tests.

Conclusion

(1) Duration required in single layer intestinal anastomosis significantly lesser as compared to the double layer intestinal anastomosis

(2) 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 in surgical training & can be recommended as method of choice for intestinal anastomosis in both elective and emergency operations [14].

(6) This study requires larger study group to consolidate these finding.

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References

- Zinner MJ, Ashley SW. *Maingot's abdominal operations*. 12th ed. New York: McGraw-Hill's; 2013:585-795.
- Brooks DC, Zinner MJ. *Surgery of the Small and Large Bowel*. In: Zinner MJ, editor. *Maingot's abdominal operations*. 10th ed. Stamford: Appleton and Lange; 1997:1309-10.
- Travers B. *Enquiry into the process of nature in repairing injuries of the intestine*. London: Longman, Rees, Orme, Brown, and Green: 1812.
- Ceraldi CM, Rypins EB, Monahan M, Chang B, Sarfeh IJ. Comparison of continuous single layer polypropylene anastomosis with double layer and stapled anastomoses in elective colon resections. *Am Surg*. 1993;59(3):168-71.
- Whang EE. Small intestine. In: Brunnicardi, Billian A, Dunn D, Hunter, Pollock RE. *Schwartz manual of surgery*. 8th ed. New York: McGraw-Hill; 2005:702-32.
- Burch JM, Franciose RJ, Moore EE, Biffl WL, Offner PJ. Single-layer continuous versus two-layer interrupted intestinal anastomosis: A prospective randomized trial. *Ann Surg*. 2000;231(6):832-7.
- Hautefeuille P. Gastrointestinal suturing. Apropos of 570 sutures performed over a 5-year period using a single layer continuous technic. *Chirurgie; memoires de l'Academie de chirurgie*. 1976;102(2):153-65.
- Khan RAA, Hameed F, Ahmed B, Dilawaiz M, Akram M. Intestinal anastomosis: Comparative evaluation for safety, cost effectiveness, morbidity and complication of single versus double layer. *Professional Med J*. 2010;17(2):232-4.
- Burson LC, Berliner SD, Strauss RJ, Katz P, Wise L. Telescoping anastomosis of the colon: A comparative study. *Dis Colon Rectum*. 1979;22(2):111-6.
- Sajid MS, Siddiqui MR, Baig MK. Single layer versus double layer suture anastomosis of the gastrointestinal tract. *Cochrane Database Syst Rev*. 2012;1.
- Maurya SD, Gupta HC, Tewari A, Khan SS, Sharma BD. Double layer versus single layer intestinal anastomosis: A clinical trial. *Int Surg*. 1984;69(4):339-40.
- Kar S, Mohapatra V, Singh S, Rath PK, Behera TR. Single layered versus double layered intestinal anastomosis: A randomized controlled trial. *J Clin Diagn Res*. 2017;11(6):PC01-4.
- Garude K, Tandel C, Rao S, Shah NJ. Single layered intestinal anastomosis: A safe and economic technique. *Indian J Surg*. 2013;75(4):290-3.
- Flores ORM, Blanchet BE, Zermeño NJ, Retana RR, Mercado JMT, Villanueva VL, et al. Intestinal anastomosis in children: A comparative study between two different techniques. *J Pediatr Surg*. 1998;33(12):1757-9.