

Single-Layer Versus Double Layer Intestinal Anastomosis of Small Bowel at Nepalgunj Teaching Hospital

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ABSTRACT

Background: Resection and anastomosis of small bowel is one of the common surgical procedure encountered in routine and emergency cases. There are various techniques of anastomosing the resected intestine. **Objectives:** To know the efficacy of single layer anastomosis over double layer anastomosis in terms of anastomotic leakage, wound infection, mortality and time consumed. **Methods:** A comparative cross sectional analytical study was carried out at department of General Surgery at Nepalgunj Medical College Teaching Hospital, Kohalpur, Banke, Nepal from January 2013 to December 2013. Altogether 62 patients who underwent resection and anastomosis of small bowel were considered for this study. Patients who were included in this study were equally divided into two groups. Group A (n=32) underwent single layer anastomosis and group B (n=30) were subjected to double layer anastomosis. In both the groups anastomotic leakage, wound infection, mortality and time consumed were recorded and compared. **Results:** Altogether 62 patients were included in the study. The study showed anastomotic leakage 3 (9.37%) in Group A and 2 (6.67%) in Group B. Wound infection was 6 (18.75%) in Group A and 4 (13.33%) in Group B and mortality was observed in only 1 (3.12%) patient in Group A due to uncontrolled sepsis. There was no statistical difference between the two groups in anastomotic leakage, wound infection and mortality as shown by respective p (0.696, 0.562, 0.329) values. However the time required for single layer bowel anastomosis was less in comparison to double layer bowel anastomosis. **Conclusion:** Based on our data, the technique of single layer of bowel anastomosis does not increase the rate of anastomotic leakage, wound infection and mortality however time required for anastomosis is less as compared to double layer anastomosis. Therefore this study concludes that there is no added benefit of double layer of anastomosis over single layer bowel anastomosis.

Key words: anastomotic leakage, double layer anastomosis, single layer anastomosis

INTRODUCTION

Bowel anastomosis is common procedure in both elective and emergency general surgery. It has been stated that “the key to a successful anastomosis is the accurate union of two viable bowel ends with complete avoidance of tension”. Thus, the most important factors in the creation of a bowel anastomosis are: meticulous technique; good blood supply; and no tension. The choice of anastomotic technique may be influenced by the diameter of the bowel ends, oedema, accessibility and site of anastomosis, contamination, available time and equipment and underlying pathology¹.

The basic principles of the intestinal suture were established more than 100 years ago by Travers Lambert and Halsted². Two-layer anastomosis was done by Larry in the 19th century³ whereas the single-layer continuous anastomosis was first described by Hautefeuille in 1976⁴.

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In double-layer anastomosis; using a running absorbable suture for a transmural inner layer and interrupted silk sutures for an outer inverted seromuscular layer has been standard for most surgical situations. In single layer method as it incorporates the toughest layer of gut and causes minimal damage to submucosal vascular plexus, it leads to accurate opposition with minimal tissue damage and luminal narrowing. Several recent reports have advocated use of single layer method for intestinal anastomosis with advantage of shorter time for construction, lower cost and lower complications of anastomotic leakage⁵.

The aim of present study was to know the efficacy of single layer over double layer anastomosis in terms of anastomotic leakage, time consumed for the completion of anastomosis, wound infection and mortality.

MATERIALS AND METHOD

A comparative cross sectional analytical study was carried out in the department of surgery from January 2013 to December 2013 at Nepalgunj medical college teaching hospital, Kohalpur after Institutional Review Committee approval and well informed consent. Altogether 62 patients requiring small bowel anastomosis both in elective and emergency cases were included. Patients with immunosuppression (patient on steroid or anticancer drug, HIV patient), anemia, jaundice, age

< 12 years and > 80 years were excluded from the study. The patients were divided in two groups i.e. Group A (n=32) and Group B (n=30). Group A patients were subjected to single layer anastomosis whereas group B patients underwent double layer anastomosis. In both the groups injection ceftriaxone sodium 1 gm was given at the time of induction.

Single layer anastomosis was done by extramucosal interrupted suture with polygalactin round body 2-0. The posterior layer was stitched first by passing the needle from serosa to submucosa without piercing the mucosa. Needle was then passed through the other end in the submucosa to come to the surface through the serosa and knots were tied over the serosal surface. In double layer intestinal anastomosis, first layer was continuous through and through with polygalactin round body 2-0 followed by outer Lambert suture with silk round body 2-0. In both the groups, sutures were placed at a distance of 5 mm. After completion of anastomosis the abdominal cavity was irrigated with normal saline adequately followed by placement of two abdominal drains; one at the site of anastomosis and another in pelvis in both the groups. Detail parameters were noted in both the groups with reference to the time taken for the completion of anastomosis, anastomotic leak and wound infection.

Anastomotic leak, time taken and wound infection were defined as

- a. Anastomotic leak defined as per Muller et al⁶.
 - i. Established faecal fistula to the skin
 - ii. Fever above 38°C or septicaemia in patients with radiological or endoscopic leak.
 - iii. Presence of intraperitoneal abscess or symptoms and signs of peritonitis in the presence of an anastomotic leakage.
- b. Time taken: begins with placement of first stitch and ends when excess suture from last stitch will be cut.
- c. Wound infection defined as discharge of serosanguinous or frank pus from the wound site within 30 days.

All patients of both the groups were followed up for one month. The following data were recorded in each group age, sex, time taken for anastomosis ,anastomotic leak and wound infection. Computer program SPSS 15 was used for data collection and analysis. P value < 0.05 was considered statistically significant.

RESULTS AND OBSERVATION

There were altogether 62 patients who fulfilled the inclusion criteria and were divided into two groups (Group A and Group

B) randomly. Group A consisted of 32 patients who underwent single layer bowel anastomosis and Group B consisted of 30 patients who were subjected to double layer bowel anastomosis.

In Group A, the age of patient ranged from 15 to 78 years with a mean age of 45.13 (SD 18.12) years. In Group B the age of patient ranged from 16 to 77 years with a mean age of 48.60(SD 19.26) years. The sex distribution of the patients in Group A was 21 male and 11 female. Thus male to female ratio was 1.9:1. The sex distribution of the patients in Group B was 22 male and 8 female. Thus male to female ratio was 2.75:1. Thus male were more common in both the groups.

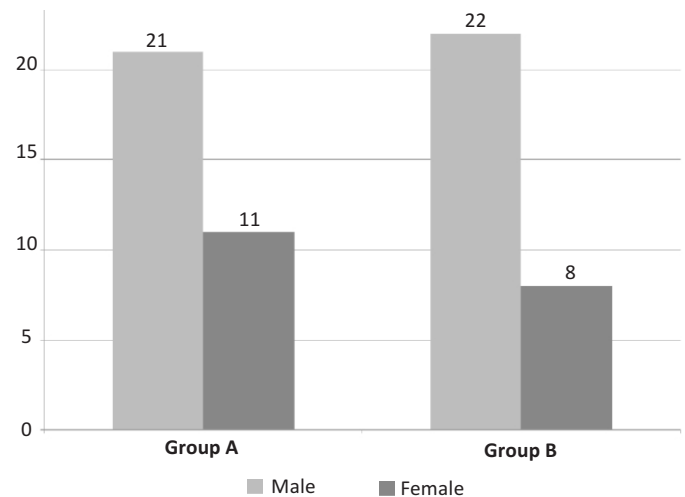


Figure 1: Sex distribution in Group A and Group B

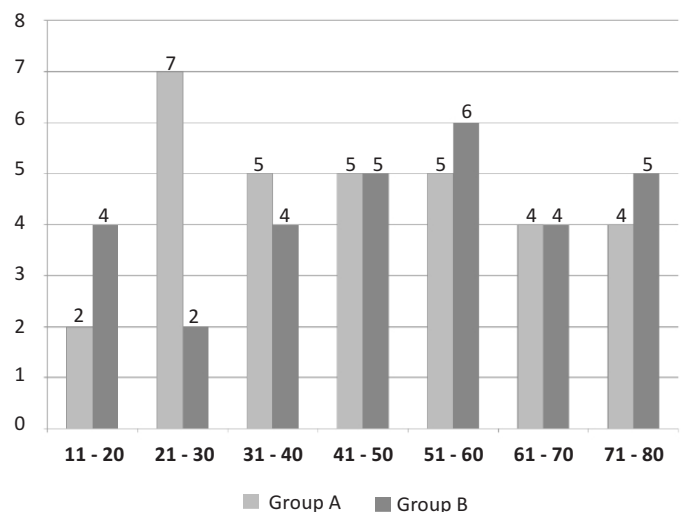


Figure 2: Age distribution in Group A and Group B

The most common cause for resection and anastomosis in both the groups was strangulated hernia with 14 (43.75%) patients in Group A and 13(43.33%) in Group B. Other causes for which resection and anastomosis were done is as shown in figure 3.

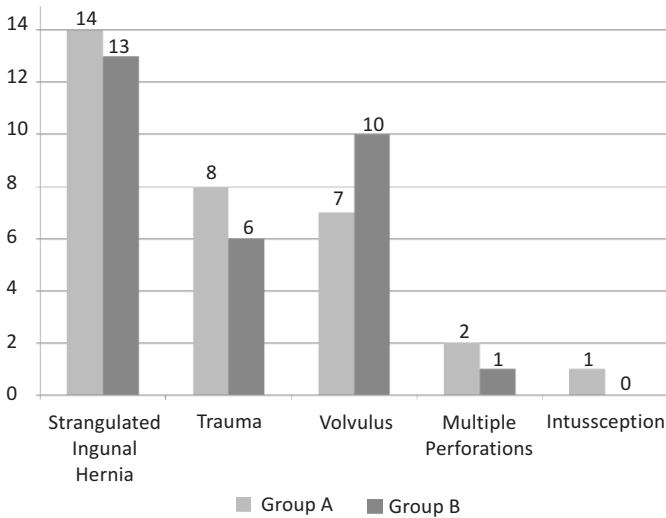


Figure 3: Indication for resection and anastomosis

Anastomotic leakage was 3 (9.37%) in group A and 2 (6.67%) in Group B. Though anastomotic leakage was more common in Group A but statistically it was insignificant ($p=0.696$). Out of 32 patients in Group A, 1(3.12%) patient died of uncontrolled sepsis. All other patients were managed conservatively with total parenteral nutrition followed by non residual diet.

Out of 32 patients in Group A, 6 (18.75%) had wound infection where as 4 (13.33%) Patients in Group B had wound infection. Though wound infection was slightly more common in Group A patient, it was statistically insignificant ($p=0.562$). All the patients in both the groups were managed by dressing and antibiotics as per culture and sensitivity report.

The average time required for completion of anastomosis in Group A was 17.59 ± 1.16 minutes and for Group B it was 30.16 ± 1.28 minutes. The mean time required for anastomosis was significantly lower in Group A than Group B. As the amount of suture used in double layer suture (Group B) was more than single layer suture (Group A), so was the cost.

Variables	Group		p-value
	A (n=32)	B (n=30)	
Anastomotic leakage	3(9.37%)	2(6.67%)	0.696*
Time required (minutes)	17.59 ± 1.16	30.16 ± 1.28	0.001^ [^]
Wound infection	6(18.75%)	4(13.33%)	0.562*
Mortality	1(3.12%)	0	0.329*

*Chi square test, ^ student's t test

Table I: Anastomotic leakage, time required for anastomosis in minutes, wound infection and mortality

DISCUSSION

The goal of resection and anastomosis of the small intestine is to remove an irreversibly injured or abnormal segment of intestine, contain contamination, and rejoin the open bowel ends in a manner that will optimize healing and restore luminal and mural integrity.

The technique of double layer anastomosis has been used traditionally for more than 100 years which was originated by Travers, Lambert and Halsted². Two-layer anastomosis was done by Larry in the 19th century³. A double layer anastomosis consists of an inner layer of continuous through and through absorbable suture and outer layer of interrupted seromuscular layer. The technique of single layer anastomosis was first introduced by Hautefeuille⁴ in 1976 in which single layer extramucosal interrupted or continuous sutures are applied. It has potential advantage such as reduced operating time and cost. However the utility of any method of intestinal anastomosis depends upon safety of the technique i.e. lack of anastomotic leakage, luminal narrowing.

Historically, double layer method has been method of choice however many reports have advocated the use of single layer anastomosis method for anastomosis because of lower rate of leak, time and cost effectiveness⁵.

In this study anastomotic leakage in single layer group occurred in 3(9.37%) and in double layer group it was 2(6.67%) which was statistically insignificant ($p=0.696$). Similar findings were noted in the study conducted by Ayub et al.⁷, Burch et al.⁸ and Maurya et al.⁹.

In our study the mean time required in constructing the single layer anastomosis was 17.59 ± 1.16 minute and for double layer anastomosis it was 30.16 ± 1.28 . The time required for constructing double layer was more than single layer and it was statistically significant ($p < 0.001$ in student t test). Our result was consistent with the finding of Max et al.¹⁰, Law et al.¹¹ and Khan et al.¹². As the amount of suture used in single layer anastomosis is less than double layer anastomosis, it is more cost effective and benefit for developing countries like ours.

In Group A, 6 (18.75%) and in Group B 4 (13.33%) patient had wound infection. Though wound infection was more common complication in Group A, it was statistically insignificant. ($p=0.562$). The overall wound infection rate was 16.13%. Our finding was consistent with the finding of Khan et al.¹³ and Matheson NA¹⁴. There was 1(3.12%) mortality in Group A and none in Group B but it was statistically insignificant ($p=0.329$).

CONCLUSION

Our study concludes that single layer anastomosis has similar risk of anastomotic leakage, wound infection and mortality; however the time required for constructing single layer anastomosis is significantly less than double layer anastomosis.

As the suture material consumed in single layer anastomosis is less than double layer anastomosis so single layer anastomosis is more cost effective as well. For these reasons, the single layer anastomosis can be better choice than double layer anastomosis.

RECOMMENDATION

Single layer anastomosis can be safely practiced as complications are similar to double layer anastomosis but has definite advantage over double layer anastomosis in terms of cost and time. So our study recommends single layer anastomosis as method of choice for small bowel anastomosis in both elective and emergency operations.

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