ORIGINAL ARTICLE

Comparison of the Mean Hospital Stay between Single and Double Layer Intestinal Anastomosis in Pediatric Surgical Patients

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ABSTRACT

Background: In pediatric surgical practice the intestinal anastomosis is one of the commonest surgical procedures. There are two common techniques for intestinal anastomosis either single layered or double layered. Anastomotic stricture formation is the potential complication of double layered intestinal anastomosis. Currently the single layer extra mucosal anastomosis is popular.

Methodology: Sixty patients were involved in randomized controlled trial study who had undergone end to end intestinal anastomosis for any benign pathology. Patients of age one month to 14 years of both genders were selected for the study. In group-A patients, intestinal anastomosis was done in single layer while in group-B patients; double layer intestinal anastomosis was done. All patients were followed for 3 months postoperatively.

Results: Patients mean age was 5.57±4.00 and 5.40±3.46 years in group-A and B, respectively. Regarding site of anastomosis, Ileum involved in 24 patients (80.0%) in group-A and in 25 patients (81.7%) of group-B. Similarly, jejunum involved in 6 patients (20.0%) of group-A and 5 patients (18.3%) of group-B. Comparison of hospital stay (days) revealed that mean hospital stay was 4.57±0.72 days in single layered group and it was 6.10± 0.84 days in double layered group. P value between two groups was statistically significant (p<0.001).

Conclusion: This study concludes that complication rates of single-layered intestinal anastomosis are quite less. Apart from that hospital stay is significantly reduced in this technique which lowers the overall cost as compared to double-layered technique.

Key words: Intestinal anastomosis, Mean hospital stay, doubles layered technique.

INTRODUCTION

The restoration of intestinal continuity is very important when a piece of the intestine is resected for benign or malignant conditions. This restoration of continuity is known as intestinal anastomosis and there are different techniques to perform this procedure in a variety of ways.[1]The procedures for anastomosis of gut was introduced more than 100 years back, with the passage of time these procedures underwent various modification.[2] Lembert in 1926 described the technique of intestinal anastomosis in which serosa was opposed with each other. Senn described two layered interrupted anastomosis and Halsted described one layer anastomosis[3].

Different stapling devices are available for gut anastomosis, but their usage is limited in our setup because of high cost and availability issues. Traditionally, gut anastomosis done in double layer technique incorporate huge amount of intestinal tissue in the stitch line which ultimately leads to increased pressure at stitch line and more chances of luminal tightening. Another objection of double layered anastomosis is that in most of cases it fails to oppose clean serosal surfaces with each other as a result big quantity of ischemic tissue get incorporated within the stitch line and result in anastomosis leakage[4,5].

Continuous suturing technique or extra mucosal interrupted suturing is used in single layered intestinal anastomosis. It. has been claimed that continuous absorbable single layer technique is better to other techniques but data is inadequate[6]. In the same way, interrupted extra mucosal, single layered method is consider to be better for being completed in less duration. Moreover cost for this procedure is much less but similar in terms of safety in two layered technique.[7] Many clinical studies have recommended that double layer closure does not provide any added benefit rather it could lengthen the hospital stay, in addition to increase operative time and more complications especially anastomotic leakage[4,5,8].

As no local data available on this topic, so the rationale to conduct this study was to evaluate the mean hospital stay between single and double layer intestinal anastomosis in local pediatric population. Sheikh Zayed Hospital is the only tertiary care institute in this area which has been draining a large population, so this study will also help to overcome the patient's burden by early discharge and rapid beds availability.

METHODOLOGY

This study was conducted in Pediatric Surgery department, Sheikh Zayed Hospital, Rahim Yar Khan which is a tertiary care hospital in southern Punjab. Large numbers of pediatric surgical patients are drained from upper Sindh and Baluchistan. The time duration of our study was one year between January 2016 to December 2016 in which randomized controlled trial (RCT) was conducted. Total 60 patients (30 in each group) who had undergone end to end intestinal anastomosis for any benign pathology of age 1 month to 14 years of both genders were chosen for the

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study. Patients with history of prior intestinal anastomosis, esophageal, gastric and biliary anastomosis, anastomotic leakage, malignant disease and malnutrition were excluded. Sample size was calculated with 5% level of significance, 80% power of study and taking mean hospital stay after single layer intestinal anastomosis as 5.2±1.0 days and double layer intestinal anastomosis as 7.5±1.8 days.

It was mandatory to get written informed consent from each patient's parents or close relative before starting this study. All attendants were logically explained regarding aims & objective, methodology, predictable benefits, and dormant hazards of the study. Lottery method was used to distribute patients in different groups. Mixed up slips (half-slips contained letter 'A' and other half-slips were contained letter 'B') were placed in a container and patients were asked to pick one slip.

Patients in group A, single layer intestinal anastomosis was done while in group B patients, double layer intestinal anastomosis was made. All these surgical procedures were performed by the senior surgeon with at least 5 years post-fellowship experience. Regular follow up was done for all operated patients by the researcher for any complaint/complication till discharged from the hospital. Mean Hospital stay was recorded in every patient from day of operation to day of discharge in both groups. SPSS version 22.0 was used to analyze all the data. Means and standard deviation was calculated for quantitative variables. The qualitative variables were accessible as frequency and percentage. The mean hospital stay of both groups was compared with student "t" test and p-value ≤ 0.05 was considered as significant.

RESULTS

In our study, mean age of the patients was 5.57±4.00 and 5.40±3.46 years in group-A and B, respectively (Table-1). In group-A, 21(70%) patients and in group-B, 19 patients (66.7%) were males while 9 patients (30.0%) in group-A and 11(33.3%) in group-B were females. Mean interval of disease was 2.33±1.49 months in group-A and 2.03±1.18 months in group-B. Mean BMI in group-A was 17.01±0.66 kg/m^{2}and in group-B mean BMI was observed 17.00±0.70 kg/m^2.

Regarding site of anastomosis, Ileum involved in 80.0%(24 patients) in group-A and in 25(81.7%) patients of group-B. Similarly, jejunum involved in 6(20%) patients of group-A and 5 patients (18.3%) of group-B (Table 2).

Comparison of hospital stay (days) revealed that mean stay at hospital was 4.57±0.72 days in single layered group and it was 6.10± 0.84 days in double layered group. It was noted that difference between two groups was statistically significant (p<0.001) (Table 3).

Table 1: Distribution of cases by age

Age (years)	Group A	Group B
1-5	17(56.7%)	18(60%)
6-10	8(26.6%)	7(23.3%)
11-14	5(16.7%)	5(16.7%)
Total	30(100%)	30(100%)
Mean	5.57±4.00	5.40±3.46

Table-2: Distribution of cases by site of anastomosis

Site of anastomosis	Group A	Group B
Ileum	24(80%)	25(81.7%)
Jejunum	6(20%)	5(18.3%)
Total	30(100%	30(100%)

Table 3: Comparison of hospital stays (days)

Group	Mean A	S.D.
A	4.57	0.72
B	6.10	0.84

P value 0.0001

DISCUSSION

Double layered intestinal anastomosis was started by Travers and Lembert in early 19th century. They advocated that inner layer of anastomosis leads better approximation of mucosa as a result chances of leakage is minimal. Moreover second layer was achieved with approximation of serosal surface of gut. Since that time technique is same for gut anastomososis in two layers, only change is the suture material for inner layers[9].

Single-layered anastomosis with interrupted technique was first described by Hautefeuille.[10] Healing of anastomosis without leakage is the main criteria to check the efficacy of any technique. Leakage of gut anastomosis has always catastrophic consequences on patients' wellbeing as well as cost of care. It is very important to know that anastomosis technique is more important regarding anastomotic leakage as compared to other predictors like diabetes mellitus, usage of steroids, excessive blood loss, and malnutrition[10].

There are many factors which make Single-layered anastomosis more preferred. As a general rule adequate blood supply is mandatory for an anastomosis to hold up. In this technique, blood supply of two cut edges is less compromised because less mesentery is cleared off and therefore healing of anastomosis is excellent. Contrary to that in double layered technique, the inner layer is believed to be haemostatic and there is apparent damage to the sub mucosal vascular plexus which may lead to the strangulation of the mucosa and ultimately leakage. So the single layered anastomotic method is far better as mucosa is spared because of extra mucosal suturing technique and vascular plexus in sub mucosal plane is minimally damaged[11].

Narrowing of lumen is another complication of double layered technique. Because of two layers of anastomosis in the double-layered technique, more tissue is inverted and a chance of narrowing of lumen is high. While in single layered procedure this complication is significantly avoided, as only one layer of sutures is included[12].

Usage of non absorbable, monofilament suture material in a continuous manner is another factor to be discussed. According to Hautefeuille[10] the ischemia of suture line may be avoided in the continuous suturing technique as there is no point devoid of blood supply. Similar findings were observed by Bailey et al[13] in which continuous single-layer stitch line is something like a circular coiled spring, which expands and contract depending on the intraluminal pressure, that is why chances of bowel stenosis is rare in this technique.

The present study compared the mean hospital stay between single and double layer intestinal anastomosis in pediatric patients undergoing intestinal anastomosis. In this study, mean hospital stay time was 4.57±0.72 days in single layered group and it was 6.10± 0.84 days in double layered group. Statistically significant difference ($p<0.001$) was found between two groups. Habash MM et al[14] has shown a significant difference in mean hospital stay between single layer intestinal anastomosis with double layer intestinal anastomosis i.e. 5.2±1.0 days versus 7.5±1.8 days respectively.

The difference in the mean length of hospital stay that reached statistical significance level is due to an intrinsic difference between the two methods as lumen is always larger in single- layer anastomosis. So there is early return of normal gastrointestinal function and ultimately shorter hospital stay in single layer method, however further studies would be required to confirm this speculation[15,16].

CONCLUSION

This study concludes that single-layered intestinal anastomosis technique is superior because of less risk of complications, shorter hospital stay and low cost. Therefore, we suggest single-layered intestinal anastomosis as a safe and cost effective technique which should be preferred in our surgical settings because of easy learning curve.

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