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Original Research Article

Small intestine anastomosis by full thickness, single layer and interrupted suture technique: results of a comparative study

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ABSTRACT

Background: Since the dawn of surgery intestinal anastomosis has remained a controversial topic in respect to suture material, anastomotic technique, distance between stitches and borders. Technique of anastomosis is an important determinant in process of anastomosis healing. Despite a large amount of work done on anastomosis techniques, a clear superiority of one technique over another has not been established.
Methods: Patients of ileostomy reporting to surgery department for stoma closure were used for study. 80 patients of ileostomy reporting for stoma closure were used as material for the study and randomized in two groups. In single layer group, using 3-0 silk suture, we performed small intestine anastomosis applying single layer of interrupted sutures taking full thickness bite. In double layer group, anastomosis was performed anastomosis by applying first layer of full thickness sutures and second layer of seromuscular sutures. The results were compared in terms of operative time, post operative complications, mortality, hospital stay and cost of the suture material.
Results: The mean age of the patients was 33.55 yr in group A (single layer) and 35.85 yr in group B (double layer). Total 7 patients developed anastomotic leak. 5 (12.5%) patients were with double layer anastomosis and 2 (5%) patients were in single layer group. The difference in anastomosis leak in two groups was statistically insignificant (p = 0.232). The mean duration of whole procedure in group A (single layer) was 52.5min and 71.5min in group B (double layer). The difference in mean duration of the procedure was found to statistically significant (P = 0.00).
Conclusions: We concluded the single layer technique to be a safe, efficient and more cost effective as compared to double layer technique.

Keywords: Full thickness sutures, Interrupted technique, Intestinal anastomosis

INTRODUCTION

Since the dawn of surgery intestinal anastomosis has remained a controversial topic in respect to suture material, anastomotic technique, distance between stitches and borders. Leak and disruption of anastomosis is a common cause of post operative mortality and morbidity. Gut anastomosis heals by same mechanism like that of wound healing.[1] 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".[2] The sound process of healing of anastomosis depends mainly on anastomosis technique, which is most important determinant. An insecure intestinal anastomosis is an unacceptable iatrogenic hazard. The breakdown of suture line or inappropriate anastomosis may result into hemorrhage, leakage, stenosis, diverticula formation and ultimately faecal fistula with serious septic complications leading to death. Use of single or double layer hand-sewn technique of anastomosis has always remained a controversial issue.[3] Despite a large amount of work done on both single and double layered methods,

it is still unclear which method is better in terms of safety and efficacy. Numerous studies in the literature comparing anastomosis techniques have failed to demonstrate a clear superiority of one over another.[4] A number of recent studies in this field have suggested further trials to investigate the efficacy and safety of applying these methods.[5-7] Therefore we used full thickness single layer technique for small intestinal anstomosis and compared the results with double layer interrupted technique with the aim to reduce operative time and cost.

METHODS

This study was conducted at surgery department of GGS Medical College, Faridkot, Punjab during a period from 2015 to 2017. The study was conducted after approval from ethical committee. Patients of ileostomy reporting to surgery department for stoma closure were used as study population.

Out of these, 80 patients were included in the study and randomized in two groups by opening sealed envelop indicating technique of anastomosis. In group A anastomosis was performed by single layer interrupted full thickness technique and in group B anastomosis was performed by double layer interrupted suture technique, each group comprising 40 patients.

Inclusion criteria

Patients from all age groups who had undergone ileal stoma formation for acute surgical conditions and reporting for stoma closure after 6-8 wks interval were included in the study after detailed history taking.

Exclusion criteria

The patients who had history of stoma formation for chronic diseases, malignancy, tuberculosis, ongoing inflammatory pathology or having co-morbid conditions e.g. cardiac disease, asthma, hepatic failure, renal failure, low serum protein levels and patients on steroids, immunosuppresents, radiotherapy were excluded from the study. Also, those patients who were not willing to participate in study were excluded.

Methodology

Preoperatively all patients were subjected to detailed physical examination and barium study of distal intestinal loop besides routine investigations including total and differential serum protein. For preoperative bowel preparation, patients were kept fasting for 6 hrs and standard regimen of polyethylene glycol and antibiotic prophylaxis was followed. Procedure was performed by either elliptical incision around the stoma or midline laparotomy incision, depending upon the type of ileostomy procedure and extent of adhesions. Silk 3-0, round body suture was used for both the techniques. In group A, anastomosis was performed in single layer taking full thickness bite of mucosa, submucosa, muscularis and serosa. In group B anastomosis was performed in two layers i.e. first full thickness layer of mucosa, submucosa, muscularis and serosa and second one seromuscular layer. At the end of the procedure a tube drain was inserted in peritoneal cavity in all patients. Postoperatively all the patients received third generation cephalosporins and metronidazole and standard post operative care. Results were recorded in terms of operative time (in minutes), postoperative complications till one month period of follow up after discharge, morbidity, mortality, hospital stay and cost effectiveness. Data was statistically analyzed using chi square test and independent variables t test.

RESULTS

In present study, the mean age of the patients was 33.55 yr and 35.85 yr in group A (single layer) and in group B (double layer) respectively. In Group A (single layer) there were 31 (77.5%) males and 9 (22.5%) females. In group B (double layer) there were 29 (72.5%) males and 11 (27.5%) females. The mean duration of whole procedure in group A (single layer) was 52.5 min and 71.5 min in group B (double layer). The difference was found to statistically significant (P = 0.00). The suture material used in both the groups was silk 3-0 with round body needle. The average length of suture required for constructing the anastomosis was found to be 91.2cm and 243.2cm for group A and group B respectively. The average cost incurred on suture material was rupees 332.8 for double layer anastomosis and rupees 124.8 for single layer anastomosis.

Table 1: Post-operative complications and mortality.

Complication	Group a (single layer) n (%)	Group b (double layer) n (%)	P value
Anastomotic Leak	2 (5)	5 (12.5)	0.232
Enterocutaneous Fistula	0 (0)	0 (0)	-
Peritonitis	2 (5)	5 (12.5)	0.216
Stricture/Stenosis	0 (0)	0 (0)	-
Mortality	0 (0)	2 (5)	0.552
Mean duration of the procedure (min.)	52.5 min	71.5 min	0.00
Mean hospital stay (in days)	9.1 days	9.6 days	0.413
Mean cost of suture used (in rupees)	INR 124.8	INR 332.8	

In our study total 7 patients developed anastomotic leak. Out of these 7 patients, 5 (12.5%) patients were in the group with double layer anastomosis, whereas 2 (5%) patients were in single layer anastomosis group. The difference in anastomosis leak in two groups was statistically insignificant (p = 0.232). There was no mortality in single layer anastomosis group, where as two patients died of peritonitis in double layer group (p= 0.552; insignificant). None of the patients in the study, developed enterocutaneous fistula or stenosis. The mean duration of hospital stay was 9.1 days in Group A (single layer) and 9.6 days in Group B (double layer). This difference was statistically insignificant (p = 0.413).

DISCUSSION

Basic principles of intestinal anastomosis were established more than 100 year ago by Travers, Lembert and Halsted and have since then undergone little modifications.[8] Technique of anastomosis is an important determinant in process of anastomosis healing. In hand-sewn technique of anastomosis, single layer vs. double layer has always remained a controversial issue. Historically two-layers of sutures were used routinely, it was believed that the second seromuscular layer was important to invaginate the mucosa of cut ends, but a single layer of interrupted extramucosal sutures is now favoured by majority of the surgeons.[9] In present study we used a different technique i.e. full thickness interrupted single layer for small intestinal anastomosis and the results were compared with conventional double layer interrupted technique and were interpreted in light of other similar studies. In our study majority of the patients were in young age group (mean age group A:33.55 yr; Group B: 35.85yr) and proportion of male patients was more as compared to females in both study groups. We observed a statistically significant difference in mean operative time of two techniques. i.e. 21min (p=0.00). Mean duration of complete operative procedure for single layer technique was 52.5min. and 72.5min. for double layer technique. This finding is in agreement with the study conducted by Yasir et al and Yogendra et al who found significant difference in the intra operative duration in both the techniques.[3,10] The most dreaded complication of intestinal anastomosis i.e. leak and peritonitis occurred in 7 patients out of total 80 (8.75%). Anastomosis leak occurred in 2 patients (5%) of single layer group and 5 patients (12.5%) of double layer group, however the difference in two techniques was statistically insignificant (p=0.232). Other studies conducted by Ordorica-Flores et, Garude et al and Abdella MR et al also reported insignificant difference of anastomosis dehiscence in two techniques.[11-13] In single layer group we applied full thickness interrupted sutures and anastomosis dehiscence occurred in 5% patients which is comparable to the figure 3.1% and 5.3 of the studies conducted by Burch JM et al and Garude K et al respectively, who applied extramucosal interrupted sutures.[6,12] None of the patients developed stenosis in either group. In group B (double layer), one patient died of peritonitis after anastomosis leak. In our study, difference in mean hospital stay of two groups was statistically insignificant (group A: 9.1 day, group B: 9.6 days, p=0.413). In a similar study, Sajid MS et al have also reported no significant difference in hospital stay of patients with single layer anastomosis and double layer anastomosis.[5]

Another important aspect of the study was cost of the suture material used for anastomosis. In this study, on an average 3.2 suture packets were used for double layer anastomosis and 1.2 suture packs for single layer anastomosis and cost of suture material used was almost double for the double layer technique as compared to single layer technique i.e. INR 332.8 vs INR 124.8. Other similar studies have also reported the lower cost of suture material for single layer technique than double layer technique. In a study conducted by Bhargav GS et al, cost of anastomosis material for single layer technique (Rs. 385/-) was nearly half of that (Rs. 712/-) for double layer technique.[14,15]

CONCLUSION

Anastomosis of small intestine can be safely performed by applying single layer of full thickness and interrupted sutures. This technique is cost effective and efficient as compared to double layer technique.

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