

A comparative prospective study of handsewn versus stapled anastomosis in lower gastrointestinal surgeries

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ABSTRACT

Background & Objectives: Though abdominal surgery has been practiced for many centuries, the optimal technique for anastomosis of small bowel and large bowel remains controversial. This study was conducted with objective to compare the outcome of stapled and handsewn technique of anastomosis of the lower gastrointestinal tract. **Materials & Methods:** This prospective study was done in the Department of General Surgery and Surgical Gastroenterology, College of Medical Sciences, Bharatpur in the period between 1st October 2014 to 30th September 2015. A total of 50 patients who underwent resection and anastomosis for various conditions of small bowel and large bowel were alternatively placed in handsewn and stapled group. Both the groups were compared in terms of mean time required to perform the intestinal anastomosis, mean operating time, postoperative complications like anastomotic leak rate and wound infection rate, and the time of postoperative hospital stay. **Results:** The mean duration to perform the intestinal anastomosis was 32.04±4.51 minutes in the handsewn group and 11.00±1.91 minutes in the stapled group (p<0.001). The mean operative time was 147.12±20.91 minutes in the handsewn group versus 132.52 ± 15.71 minutes in the stapled group (p<0.05). The mean duration of postoperative hospital stay was 9.04±2.77 days in the handsewn group versus 8.44 ± 2.32 days in the stapled group (p>0.05). There was no significant difference in the anastomotic leak rate and surgical site infection rate among the two groups. **Conclusion:** Stapling technique can significantly reduce the time for the anastomotic procedure and also the duration of the operation. However, there was no difference in the rate of anastomotic leak and wound infection between the handsewn and stapled anastomosis. Therefore, stapled anastomosis can be considered a better option over handsewn bowel anastomosis.

Key words: Anastomosis; anastomotic leak; handsewn anastomosis; stapled anastomosis

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INTRODUCTION

In the last 200 years, intestinal suturing is being performed for various surgical problems like intestinal obstruction, peritonitis from a perforated bowel or gastric outlet obstruction or malignancy of the gastrointestinal tract. These conditions require intestinal resection and anastomosis.¹ The two standard method to construct an anastomosis is the use of stapler or conventional suturing methods.² Failure of an intestinal anastomosis with leakage of its contents is still, regrettably, a common surgical experience. Reported anastomosis failure rates

range from 1.5% to 2.2% depending on the type of anastomosis and whether the surgery was an elective or an emergency procedure.^{3,4} A leaking anastomosis significantly increases the length of the hospital stay, in turn, increases the morbidity and mortality associated with the process. Stapled anastomosis are thought to have a lower rate of leakage, both clinically and radiologically.⁵ Conversely, some reports argued that overall leak rate is similar with hand-sewn anastomosis.⁶ Staplers are capable of cutting and stapling at the same time avoiding the need for clamping. Circular staplers

have proven to have better access in low pelvic surgery, sparing many patients from the permanent colostomy. The higher cost of staplers is offset by a reduction in operating time.⁷

Though a lot of studies are conducted on different anastomotic techniques either handsewn or stapler for bowel anastomosis, there is, however, no consensus as to the superiority of stapling technique over handsewn method for bowel anastomosis. In this study, we compared surgical stapling technique with manual suturing in gastrointestinal anastomosis and the postoperative outcomes related to such procedures in our hospital.

MATERIALS AND METHODS

This Comparative prospective study was conducted in Department of General Surgery and Surgical Gastroenterology, College of Medical Sciences, Bharatpur, Chitwan after approval from "Ethical Committee of the College of Medical Sciences and Teaching Hospital" from 1st October 2014 to 30th September 2015. A total 50 number of patients who met the inclusion criteria and who gave written consent were alternately placed in the hand sewn group and stapler anastomosis group. The inclusion criteria were: patients with disorders of small bowel or large bowel requiring resection and anastomosis, patients with blunt or penetrating trauma abdomen involving small bowel or large bowel requiring resection and anastomosis and age more than 18 years. The exclusion criteria were: patients who did not give written informed consent, patients with American Society of Anesthesiologists (ASA) III or ASA IV, patients in severe sepsis with hemodynamic instability and age less than 18 years. A pretested proforma was used to collect relevant information from all the selected patients. The patients were alternatively placed either to the handsewn group or to the stapler group: 25 in the handsewn group and 25 in the stapled group. In elective cases, bowel preparation was done with polyethylene glycol the night before surgery. In an emergency case, bowel preparation was not done. Medications including preoperative antibiotic were administered 30 minutes prior to surgery in both groups. Intraoperatively, in both groups, the affected segment of bowel was divided between two clamps, resected then the bowel ends were approximated. In handsewn group, the intestinal anastomosis was done in two layers. In stapler group, after resection of the intestine Gastrointestinal anastomosis(GIA), thoraco-

abdominal(TA) and End-end anastomosis (EEA) circular staplers of various sizes were used for anastomosis.

Each case was analyzed with respect to duration required to perform intestinal anastomosis alone, total operative time, postoperative complications, and the duration of postoperative hospital stay. All patients were kept nil per oral and on intravenous fluids till the retrieval of bowel sounds followed by sips and liquids and then on the soft diet within a span of 3 to 5 days as per hospital protocol.

Anastomotic integrity was assessed by the presence or absence of anastomotic leak. Anastomotic leak was confirmed with either the development of entero-cutaneous fistula or appearance of bowel contents from drains or systemic sepsis in association with peritonitis or confirmed by reoperation. Other postoperative complications were also noted and tackled accordingly. All patients were observed till their complete postoperative hospital stay and followed up for a period of one month.

Statistical analysis

The filled questionnaire were entered into Microsoft Excel. After double checking of the completeness of the data, data was analyzed by using SPSS 20.0 software (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics of the qualitative data were represented as mean and standard deviation. In the inferential statistics to find the significant association between handsewn anastomosis group and stapled anastomosis group, categorical variables were expressed as frequencies and percentages of an appropriate denominator. They were analyzed by chi-square test but if the count was less than five in respected count Fisher's exact test were used. Normally distributed continuous variables were expressed as mean \pm standard deviation (SD). Independent t-test was used for analysis of normally distributed, descriptive continuous variables, which were expressed as mean \pm SD. When the data were not distributed normally then Mann-Whitney U test were used to compare qualitative variables. Differences were considered statistically significant if the p value was equal to or less than 0.05 with a 95% confidence interval.

RESULTS

During the period of one year, (1st October 2014 to 30th September 2015) a total of 50 patients placed alternately; 25 in handsewn group and 25 in stapler

Table 1: Postoperative complications

Complication	Handsewn		Stapled		p-value
	Number	Percentage	Number	Percentage	
Anastomotic Leak	2	8	1	4	1.00*
Surgical Site Infection	4	16	3	12	1.00*

*Using Fischer's exact test

Table 2: Postoperative hospital stay

Contents	Handsewn (in days)	Stapled (in days)	p-value
Postoperative hospital Stay	9.04±2.77	8.44±2.32 days	0.366*

*Using Mann-Whitney U Test

anastomosis group were studied. All 50 patients were followed up for one month. There was no mortality in the early postoperative up period.

In the handsewn group, the mean age of the patient was 49.60±14.69 years while in the stapled group it was 50.40 ± 15.65 years and this was not found to be statistically significant (p=0.853). In handsewn group, 80% were males and 20% were females whereas in stapled group, 88% were males and 12% were females. This finding was not statistically significant (p = 0.72). In the handsewn group carcinoma colon was the most common diagnosis (24%) followed by strangulated hernia (16%). While in the stapler anastomosis carcinoma colon and strangulated hernia were the most common diagnosis (24% each).

In the handsewn group, 48% of patients underwent entero-enteric anastomosis, 44% had enterocolic anastomosis, and 8% had colo-colic/colorectal anastomosis. In stapled group, 52% of patients underwent entero-enteric anastomosis, 24% had enterocolic anastomosis and 24% patients had colo-colic/colorectal anastomosis.

In the current study, the duration of anastomosis was longer in the handsewn group. The mean duration of anastomosis in the handsewn group was 32.04±4.51 minutes and in stapled group was 11.00±1.91 minutes and this was found to be statistically significant (p=<0.001). Also the mean duration to perform the operation in the handsewn group was 147.12 ± 20.91 minutes and in stapled group was 132.52 ± 15.71 minutes and this was also statistically significant (p = 0.008). Postoperative complications in the two groups were as shown in table 1.

Two (8%) patients in the handsewn group and one (4%) patient in stapled group had an anastomotic leak. The finding was not statistically significant (p>0.05). Also In this study, four (16%) patients in handsewn group and three (12%) patients in stapled group had superficial surgical site infection. The data was not statistically significant (p>0.05). Postoperative hospital stay in the two groups was as shown in table 2. The mean duration of hospital stay in the handsewn group was 9.04±2.77 days and in the stapled group was 8.44±2.32 days and this difference was not statistically significant.

DISCUSSION

Various surgical conditions require the resection of bowel segments and the creation of reliable anastomosis. Traditionally, a handsewn anastomosis was created with a wide variety of suture materials. Although surgical stapling devices have existed since the early 20th century, their use in routine gastrointestinal surgery has not been widespread until approximately 30 years ago, when their design became much more efficient and convenient. Today, stapled anastomosis is an integral part of most major abdominal operations.⁸ Still, the interest in the results from comparisons between handsewing and stapling has been progressively growing.

In the current study mean age of the patients was 49.60±14.69 years in the handsewn group and 50.40 ± 15.65 years in stapled group. Liu et al.⁹ in his study titled "Comparison of hand-sewn and stapled anastomoses in surgeries of gastrointestinal tumors based on clinical practice of China" among 499 patients found the mean age of patients 57.50 ±

10.05 years in hand sewn group and 59.05 ± 10.18 years in stapled group.

Liu et al.⁹ in his study among 499 patients comparing handsewn and stapled anastomoses for GI tumors and Hassanen et al.¹⁰ in his prospective study comparing stapled and handsewn anastomosis of the large bowel due to abdominal trauma among 39 patients found male predominance. Likewise, in our study majority (80% in handsewn group and 88% in stapled group) of patients who underwent resection and anastomosis for various conditions of small bowel or large bowel were male.

In our study handsewn anastomosis took 11 minutes longer compared to stapled anastomosis. The mean duration of anastomosis in the handsewn group was 32.04 ± 4.51 minutes and in stapled group was 11.00 ± 1.91 minutes which was statistically significant ($p = <0.001$). These findings were comparable with the findings of Hassanen et al.¹⁰ (hand sewn anastomosis was 30 ± 6.3 minutes and stapled anastomosis was 15 ± 12 minutes with a mean difference of 15 minutes in the prospective study comparing stapled and handsewn anastomosis of the large bowel due to abdominal trauma among 39 patients)

The mean duration to perform the operation in our study was longer in the handsewn group (147.12 ± 20.91 minutes in the handsewn group and 132.52 ± 15.71 minutes in stapled group). Damesha et al.¹¹ in his comparative study of 50 patients who underwent resection and anastomosis in gastrointestinal operations also found the mean operating time to be longer in handsewn group (145 min in the handsewn group and 125 minutes in the stapled group).

Catena et al.¹² compared 201 randomized cases that underwent stapled or handsewn intestinal anastomoses. In his study, the leakage rate was 8.4% in the handsewn group and 7.5% in the stapled group. Demetriades et al.¹³ evaluated 207 patients who underwent handsewn or stapled anastomosis in penetrating colon injuries mentioned the incidence of anastomotic leak as 6.3% in the stapled group and 7.8% in the handsewn group ($p = 0.69$). The authors concluded that there were no differences in anastomotic leak between patients who underwent anastomosis for condition of small bowel or large bowel. Similarly, in our study, 8% of patients in handsewn group and 4% of patients in stapled group had clinical anastomotic leakage. Though there was a low leakage rate in stapled group compared to the hand-sewn group but this finding

was not statistically significant ($p > 0.05$). The apparently low leakage rate in stapled group may be due to less local spillage of bowel contents and also due to the uniform closure done by staplers along staple line.

Fayek¹⁴ in a prospective study among 50 patients who underwent colorectal anastomosis using stapled versus hand-sewn techniques after low anterior resection of mid-rectal carcinoma and Choy et al.¹⁵ in a randomized control trial among 1125 patients on 'Stapled versus handsewn methods for ileocolic anastomoses' mentioned 9.2% to 16.0% patients in the handsewn group and (9.3% to 12.0%) in the stapler group had surgical site infection. Both these studies didn't show statistically significant difference in wound infection rate. We also in our study found similar surgical site infection rate (16%) patients in handsewn group and (12%) patients in stapled group and this finding was not statistically significant ($p > 0.05$).

Dar et al.⁸ in a comparative study in 60 patients found the mean duration of postoperative hospital stay was 8.1 ± 2.12 days in the handsewn group and 7.8 ± 1.76 days in stapled group ($p = 0.013$). These results were similar to our study where the mean duration of hospital stay in the handsewn group was 9.04 ± 2.77 days and in the stapled group was 8.44 ± 2.32 days ($p = 0.366$).

Our study had some limitations. In this study the sample size was small. It is likely that with large patient population, results would have met what is found in the large population study. We could not do the cost analysis. In a country like Nepal where most of the patients presentation to the hospital is delayed the risk of morbidity and mortality becomes more. Also, our follow-up was limited to 4 weeks postoperatively, and long-term complications were not evaluated.

CONCLUSION

From our study, we can say that the stapling technique can significantly reduce the time for the anastomotic procedure and also the duration of the operation. However, there was no significant difference in the rate of anastomotic leak and wound infection between the handsewn and stapled anastomosis. Also there is no significant difference in the duration of hospital stay among two groups. As the duration of operation is less, definitely staplers may be advantageous in patients whose general condition is poor and who would not

tolerate prolonged anesthesia. Therefore, stapled anastomosis can be considered a better option over handsewn bowel anastomosis in special cases.

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