



International Journal of Surgery Science

E-ISSN: 2616-3470

P-ISSN: 2616-3462

© Surgery Science

<https://www.surgeryscience.com>

2024; 8(1): 129-135

Received: 16-12-2023

Accepted: 28-01-2024

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Outcome of gastrointestinal anastomosis following the use of stapling device and hand-sewn method: A comparative study

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DOI: <https://doi.org/10.33545/surgery.2024.v8.i1b.1061>

Abstract

Background: Intestinal anastomosis is one of the most commonly performed surgical procedures for benign or malignant gastrointestinal conditions. The choice for anastomosis between a stapling device and a hand-sewn approach relies on the surgeon's preference and also their level of surgical experience. Failure of intestinal anastomosis leads to anastomotic leakage; regarded one of the most commonly feared complication in surgical practice & is more serious and life threatening for malignant cases. This study was conducted with the objective of comparing the outcomes of stapling device and hand-sewn anastomosis of the gastrointestinal tract.

Aims: To assess and compare the clinical outcome of the patient in any elective gastrointestinal surgery using a stapler device vs. the hand-sewn method of anastomoses.

Methods: This prospective comparative study was conducted for 12 months at the Department of Surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka. 50 subjects underwent elective surgery, with one group (n = 25) undergoing stapling and the other group (n = 25) undergoing hand-sewn anastomosis.

Results: The mean age was 44.08±11.81 yrs. and 38.04±15.55 yrs. in the stapled group and hand-sewn group, respectively. The mean duration of surgery was 149.4±44.1 minutes in the stapled group and 183.6±60.1 minutes in the hand sewn group. Mean duration of surgery was significantly lower in the stapled group compared to the hand sewn group (p = 0.026). Three (12.0%) patients had an anastomotic leak in the stapled group and two (8.0%) individuals in the hand-sewn anastomosis. No significant difference in postoperative leakage between the two groups (p=0.635). The postoperative complications—fever was significantly higher in the hand-sewn group compared to the stapler anastomosis group (p<0.05). The mean VAS score for pain showed a significant difference on day 3 and day 5. The mean hospital stay was 13.72±2.54 days in the stapler group and 15.76±1.98 days in the hand-sewn group. Mean hospital stay was significantly reduced in the stapler group compared to the hand sewn group (p=0.003). The mean drain indwelling time was 8.64±1.04 days in the stapler group and 8.04±1.34 days in the hand-sewn group, which was not statistically significant between groups (p=0.083).

Conclusion: Stapling technique appears to be safer and superior to hand-sewing technique when operating time, hospital stay and fever are taken into account. There is no significant difference in anastomotic leak cases between the two techniques. Stapler anastomosis is a new surgical innovation that can be performed successfully and safely.

Keywords: Anastomotic leakage, stapling device, hand-sewn method, gastrointestinal

Introduction

In gastrointestinal surgery, intestinal resection and anastomosis are the most frequently performed surgical procedures in the elective or emergency setting for benign or malignant conditions. The fate of an anastomosis depends on the site of anastomosis, bowel caliber, and the nature of the underlying disease. The choice for anastomosis between a stapling device and a hand-sewing approach relies on the surgeon's preference and level of surgical experience [1]. Failure of intestinal anastomosis leads to anastomotic leakage, regarded as one of the most commonly feared complications in surgical practice, and it's more serious and life-threatening for malignant cases, leading to increased morbidity and mortality. The worldwide anastomotic leakage rate is 7.5% and it is more in colonic cancer patients [2].

Several risk factors have been extensively analysed from various studies, including male sex, obesity, diabetes mellitus, malnutrition, smoking, malignancy, intra-operative complications etc. Intestinal anastomosis dates back to 1000 B.C., the era of Shusruta (the great Indian surgeon). He described the use of black ants during suturing of intestinal anastomosis. From that day to this day, technology has evolved and progressed and along the way, some new complications and solutions have been learned and solved, respectively. However, stapler was first developed in 1908 at HULTL Hungary, but they didn't get popularity because the instruments were cumbersome and unreliable [3, 4]. In the last 30 years, there has been significant improvement in stapling devices. Previously, many studies have shown that AL following hand-sewn vs stapling devices is conflicting. Lamberd described his seromuscular suture technique for bowel anastomosis in 1826. Then Kocker's method, a 2-layer anastomosis became the standard for many years [3]. Some studies have shown that two techniques are well suited for different kinds of anastomosis, such as gastro-jejunosomy, jejeuno-jejunosomy, ileo-transverse anastomosis, Colo-rectal anastomosis etc. The single-layer extra-mucosal anastomosis advocated by Matheson is now known to have the least tissue necrosis and luminal narrowing [5-7]. There are many hypotheses that a good bowel anastomosis is dependent on good blood supply at both anastomotic ends, being under no tension, and being anastomosed with meticulous technique. The area of interest is the anastomosis technique, expressed as a stapled vs hand-sewn approach. A stapled anastomosis is defined as a functional end-end, side-side or end-side anastomosis constructed using a cutting or non-cutting linear or circular stapler. The definition of a hand-sewn anastomosis combines different techniques such as end-end, side-side, end-side, 1-2 layer, continuous or interrupted sutures, including monofilament or poly-filament suture material.

Materials and Methods

Study design: Prospective Observational study.

Place of study: This study was carried out in the Department of General Surgery, Sir Salimullah Medical College, Mitford Hospital, Dhaka, Bangladesh.

Period of study: 12 months (From 1 January 2021 to December 2021).

Study population: Adult male and female patients admitted in 'General surgery Department' at Sir Salimullah Medical College, Mitford Hospital according to their selection criteria.

Inclusion criteria

- Age: 18 to 65 years.
- BMI: 16-28.
- Undergoing elective surgery for any benign or malignant condition of the gastro-intestinal tract that includes gut resection anastomosis.
- For restoration of intestinal continuity.

Exclusion criteria

- Patient not fit for surgery.
- Pregnancy.
- Patient with esophageal pathology.

Sample size: The sample size was determined by following formula:

$$n = \frac{(u + v)^2 \times (\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2}$$

So, n = 25 (for each group)

Total 50 cases were needed as sample.

So, total 50 patients were taken according to selection criteria.

Group-I: Patients were treated by stapling anastomosis (n=25)

Group-II: Patients were undergone hand-sewn anastomosis by suture material (n=25).

Study methods: A total of 50 cases were selected according to selection criteria from the patients attending the surgery department of SSMC Mitford Hospital. All patients were admitted as elective cases from the OPD. After giving informed consent, the patients were divided into 2 groups. Selected patients were allocated into two groups by consecutive sampling. Group-I patients were treated by stapling anastomosis (linear stapler, circular stapler) and group-II patients underwent hand-sewn anastomosis by suture material.

All patients were evaluated by history, physical examination (thorough general examination, rebound tenderness, rigidity), and investigation, having a similar protocol. The patient investigations are complete blood count, blood sugar, blood urea, serum creatinine, urine routine, serum albumin, prothrombin time, and USG of the whole abdomen; X-ray abdomen in erect posture in A/P view; CT scan of the whole abdomen, upper gastrointestinal endoscopy, colonoscopy. Before operation, each patient of two groups were evaluated and compared for age and stage of the disease. A thorough clinical examination and radiological investigations were performed. A CT scan of the whole abdomen was performed for better visualization and also to determine the extent of underlying pathology. Immediately after the operation, a nasogastric tube and an intra-abdominal drain tube were placed and anal stretching was done whenever it was required. Daily patient follow-up is ensured, and wound conditions are assessed clinically in terms of collection in drain, type of content in drain, bowel sound auscultation, palpation of abdomen, local wound infection, discharge and presence of wound dehiscence.

Data collection: All the patients were enrolled by consecutive sampling. Thereafter, they were scrutinized according to eligibility criteria. They were explained regarding the study and the surgery. Informed consent was taken from every patient. The clinical history of the patients, physical examination findings and relevant investigations, post-operative complications, e.g., fever, abdominal pain and distension, wound dehiscence, drain tube collection, were recorded for analysis. The time of arrival in the postoperative ward was defined as zero hour postoperatively. All patients in both groups were in follow-up daily post-operatively. All patients were asked about the time required to return to normal activities.

Statistical analysis of data: Collected data were compiled, checked and edited first. Then all the relevant collected data were compiled on master chart first and statistical analysis was performed using the Statistical Package for Social Sciences (SPSS, Chicago, IL) version 23 software for Windows. The test statistics used to analysis the data was descriptive statistics with 95% confidence interval to make inference. Continuous variables were expressed as mean, standard deviation and categorical variables as frequencies and percentages. Test of significance was done by using student's t-test; and χ^2 tests P-

value was obtained. A probability value (p-value) of <0.05 is considered significant. The summarized information was presented in the form of tables and charts.

Results

A total of 50 patients were selected from OPD according to selection criteria. Selected patients were allocated into two

groups by consecutive sampling: Group-I (patients who had undergone anastomosis by stapling device, e.g., linear stapler, circular stapler) and Group-II (patients who had undergone anastomosis by hand-sewn method). The purpose of the study is to assess and compare the clinical outcome of the patient in any elective gastrointestinal surgery using a stapler device vs. the hand-sewn method of anastomoses.

Table 1: Sociodemographic characteristics of the study patients (N=50)

Variables	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Age group (years)			
<20	0(0.0%)	4(16.0%)	
21-30	3(12.0%)	7(28.0%)	
31-40	9(36.0%)	4(16.0%)	
41-50	5(20.0%)	6(24.0%)	
51-60	6(24.0%)	2(8.0%)	
>60	2(8.0%)	2(8.0%)	
Mean±SD	44.08±11.81	38.04±15.55	0.129ns
Gender			
Male	14(56.0%)	14(56.0%)	1.000ns
Female	11(44.0%)	11(44.0%)	
Occupation			
Housewife	9(36.0%)	8(32.0%)	
Businessman	3(12.0%)	1(4.0%)	
Student	0(0.0%)	4(16.0%)	0.267 ns
Service holder	9(36.0%)	9(36.0%)	
Day Labour	4(16.0%)	3(12.0%)	
BMI (kg/m²)			
Underweight (<18.5)	4(16.0%)	5(20.0%)	
Normal (18.5-24.9)	20(80.0%)	18(72.0%)	
Overweight (25.0-29.9)	1(4.0%)	2(8.0%)	
Mean ± SD	20.54±2.28	20.78±2.50	0.505 ns

Data were expressed as frequency and percentage and mean ± SD

Unpaired student t-test and Chi-square was performed to compare between two groups ns = not significant

Table 1 shows that the mean age was 44.08±11.81 and 38.04±15.55 years in group I and group II respectively. Male are predominant in both groups and equal distribution both groups.

Housewife 36% in group I and 32.0% in group II. Service folder 36% in group I and 36% in group II. The mean BMI of group I was 20.54±2.28 and 20.78±2.50 in group II. There was no significant difference between group I and group II regarding age, sex, occupation and BMI (p >0.05).

Table 2: Distribution of the study by operative procedure (N=50)

Operative procedure	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Gastrojejunostomy	6(24.0%)	4(16.0%)	
Jejunojunostomy	7(28.0%)	5(20.0%)	
Ileo-ileal anastomosis	0(0.0%)	2(8.0%)	
Ileocolic anastomosis	3(12.0%)	1(4.0%)	0.483ns
Colorectal anastomosis	3(12.0%)	4(16.0%)	
Gut restoration	6(24.0%)	9(36.0%)	
Total	25(100.0%)	25(100.0%)	

Data were expressed as frequency and percentage

Chi-square test was performed to compare between two groups NS= not significant

In Table 2 showed the distribution by operative procedure in two groups. In stapled group common operative procedure jejunojunostomy (28.0%) followed by gastro jejunostomy 24.0%. In Hand sewn group common procedure were gut

restoration 36% followed by jejunojunostomy (20.0%). No significant difference of operative procedure between two groups (p=0.483).

Table 3: Comparison of duration of surgery between group I and group II (N=50)

Variable	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Duration of surgery (minutes)	149.4±44.1	183.6±60.1	0.026*

Data were expressed as mean±SD

Unpaired t-test was performed to compare between two groups,

*Significant

In Table 3 showed that the mean duration of surgery was 149.4±44.1 days in stapled group and 183.6±60.1 days in hand

sewn group. Mean duration of surgery significantly lower in stapled group compare to hand sewn group (p=0.026).

Table 4: Distribution of patients by postoperative complication between group I and group II (N=50)

Postoperative Complication	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Fever	0(0.0%)	4(16.0%)	0.037*
Wound infection	3(12.0%)	8(32.0%)	0.172ns
Wound dehiscence	2(8.0%)	3(12.0%)	0.637 ns
Anastomotic leakage	3(12.0%)	2(8.0%)	0.673ns

Data were expressed as frequency and percentage

Chi-square test was performed to compare between two groups

*Significant

In Table 4 showed the postoperative complication. Fever was not found in stapled group and 16.0% in hand sewn group. Wound infection in 12% cases in stapled group and 32% in hand sewn cases. Wound dehiscence 8% in stapled group and 12% in hand sewn group. The stapled anastomoses had a higher leakage

frequency compared to the hand-sewn (12.0 vs. 8.0%). The difference was not statistically significant (p=0.637). Fever significantly higher in hand sewn group compare stapler anastomosis group (p<0.05).

Table 5: Comparison of drain Indwelling time (DIT) between group I and group II (N=50)

Variable	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Drian Indwelling Time (DIT) days	8.64±1.04	8.04±1.34	0.083 ns

Data were expressed as mean±SD

Unpaired t-test was performed to compare between two groups

In Table 5 showed that the mean DIT was 8.64±1.04 days in group I and 8.04±1.34 days in group II. Mean DIT was not statistically significant between group I and group II (p=0.083).

difference between groups at day 8 and at the time of discharge.

Table 8: Comparison of volume of drain collection between group I and group II at postoperative different follow up (N=50)

Table 6: Comparison of mean hospital stay between group I and group II (N=100)

Variable	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Length Hospital stay (days)	13.72±2.54	15.76±1.98	0.003*

Data were expressed as mean±SD

Unpaired t-test was performed to compare between two groups

*Significant

In Table 6 showed that the mean hospital stay was 13.72±2.54 days in group I and 15.76±1.98 days in group II. Mean hospital was significantly difference between group I and group II (p=0.003).

Table 7: Comparison of VAS score at different postoperative days between group I and group II (N=50)

Postoperative pain assessment (VAS)	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
VAS score at day 3	6.44±1.29	7.16±0.37	0.010*
VAS score at day 5	4.52±1.29	5.40±0.76	0.005*
VAS score at day 8	3.08±1.22	3.44±1.08	0.276ns
VAS score at discharge	1.13±0.34	1.64±1.28	0.064 ns

Data were expressed as mean±SD

Unpaired t-test was performed to compare between two groups

*Significant, ns= not significant

In Table 7 showed that the mean VAS score for pain significant difference at day 3 and day 5. However, no significant

Volume collection (ml)	Group I (Stapler anastomosis) (n=25)	Group II (Hand sewn anastomosis) (n=25)	p-value
Volume Day 1st	254.80±55.84	222.80±61.68	0.060 ns
Volume Day 2nd	210.40±41.68	184.00±66.02	0.097 ns
Volume Day 3rd	166.80±33.13	149.60±58.06	0.204 ns
Volume Day 4th	138.80±43.52	120.80±58.16	0.221 ns
Volume Day 5th	113.60±60.06	88.00±50.00	0.108 ns
Volume Day 6th	86.00±55.00	71.20±51.44	0.331 ns
Volume Day 7th	72.50±57.60	64.44±51.73	0.642 ns
Volume Day 8th	77.31±66.29	87.14±61.90	0.750 ns
Volume Day 9th	138.00±90.39	123.33±73.71	0.821 ns
Volume Day 10th	135.00±67.58	160.00	0.762 ns
Total drainage volume	1129.4±458.1	928.4±475	0.135ns

Data were expressed as mean±SD

Unpaired t-test was performed to compare between two groups

*Significant, ns= not significant

In Table 8 showed that the mean volume was not significant difference between group I and group II at day 1 to day 10 (p>0.05).

Discussion

In this study, it was compared the outcome of hand sewn anastomosis with stapled anastomosis in 50 patients who presented in Department of Surgery at Sir Salimullah Medical College Mitford Hospital, Dhaka. The results were analysed and compared with other studies published in literature. In present study showed the mean age was 44.08±11.81 and 38.04±15.55 years in stapled group and hand-sewn group respectively. Male are predominant in both groups and equal distribution both

groups (male: female ratio 1.3:1). Housewife 36%, service holder 36% in stapled group and house wife 32%, service holder 36.0% in hand-sewn group. The mean BMI was 20.54 ± 2.28 and 20.78 ± 2.50 in stapled group and hand-sewn group respectively. There was no significant difference between stapled group and hand-sewn group regarding age, sex, occupation and BMI ($p > 0.05$). In accordance this study Abdel Aziz et al. [8] reported the mean age of stapled group was 47.39 ± 11.76 and hand-sewn group 44.04 ± 10.48 years. Male 39.1% and female 60.9% in stapled group and male 40.7% and female 59.3% in hand-sewn group. Banurekha et al. [1] reported the mean age of patient who had hand-sewn anastomosis was 51 years and those who underwent stapler anastomosis was 49 years. Bhandary et al. [9] reported their study majority of patients in both groups were between 40 to 80 years. The mean age in the hand sewn group was 54.63 years and in the stapler group it was 56.63 years. Of the 70 cases 40 patients were males and 30 patients were females. In the present study, in the stapled group, the common operative procedure was jejunojejunostomy (28.0%), followed by gastrojejunostomy (24.0%). In the hand-sewn group, the most common procedures were gut restoration (36%), followed by jejunojejunostomy (20.0%). There was no significant difference in operative procedure between the two groups ($p = 0.483$). The mean duration of surgery was 149.4 ± 44.1 days in stapled group and 183.6 ± 60.1 days in hand-sewn group. Mean duration of surgery significantly lower in stapled group compare to hand-sewn group ($p=0.026$). In accordance this study Patel *et al.* [10] reported significant difference in mean operative time for stapled anastomosis which was significantly lesser than hand-sewn anastomosis (152.08 ± 64.51 vs 191.76 ± 51.45 minutes). Maatooq and Merdan [4] reported decreasing anastomosis time, the total operative time decreases in stapled group. There was a reduction in the operating time for the stapler group (136.5 ± 16.86 minutes) as compared with the hand-sewn group (176.25 ± 32.07) minutes, $p < 0.001$ which is statistically significant. Belbase et al [11] demonstrated the mean duration was longer in the hand-sewn group (147.12 ± 20.91 minutes in the hand-sewn group and 132.52 ± 15.71 minutes in stapled group). Hussain et al. [12] in his comparative study of 60 patients who underwent resection and anastomosis in gastrointestinal operations also found the mean operating time to be longer in hand-sewn group (147.6 min in the handsewn group and 111.6 minutes in the stapled group). In Adloff et al. [13] study found no statistically significant difference in the time duration between the two techniques, with the hand-sewn technique taking 180 minutes and the stapler technique taking 176 minutes. The Banurekha et al. [1], study found a significant difference in the time duration between the two techniques, with the hand-sewn technique taking 180 minutes, the stapler technique taking 135 minutes. In present study showed 3(12.0%) patients had an anastomotic leak stapled group and 2(8.0%) individuals had hand-sewn anastomosis. No significant difference of postoperative leakage between two groups ($p=0.635$). According to Choudhary et al. [3], the anastomotic leak occurred at a rate of 5.6 percent with hand-sewn anastomosis and 3.7 percent with stapled anastomosis, with no significant difference between the two techniques. In Benurekha et al. [1] study noted 11 patients had anastomotic leak, 8(16%) patients received hand-sewn anastomosis and 3(6%) patients had stapler anastomosis ($p=0.074$). In Belbase et al. [11] study anastomotic leak was 8.4% in hand-sewn anastomosis and 7.5% in stapled anastomosis and there was no significant difference in both techniques. Demetriades et al. [14] evaluated 207 patients who underwent hand-sewn 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 hand-sewn 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. Maatooq and Merdan [3] reported no significant difference in the anastomotic leak, none leak (5%) occurred in stapler group and one leak (5%) occurred in hand sewn group which is similar to Meta-analysis study done by Lustosa and review of Cochrane which demonstrated clinical leak of 7.1% in stapled group and 6.33% in hand-sewn group which was also not significant [15,16]. Stapler anastomosis is quick to perform and can be used safely and effectively in elective gastro intestinal surgeries. According to Mohammed et al. [17] study compared the hand-sewn and stapler as regard the postoperative leakage in emergent cases and there is no significant difference between the two groups ($p > 0.05$). Another study by Robert et al. [18] supported our findings. The present study showed wound infection in 12% of the cases in the stapled group and 32% of the hand-sewn cases. Wound dehiscence was 8% in the stapled group and 11% in the hand-sewn group. Fever was significantly higher in the hand-sewn group compared to the stapler anastomosis group ($p < 0.05$). The mean VAS score for pain significant difference at day 3 and day 5. However, no significant difference between groups at day 8 and at the time of discharge. In accordance with this study, Mohammed *et al.* [17] reported that in stapler there are decreased postoperative complications compared to hand-sewn and the p value is significant ($p < 0.05$). Bhandary et al. [9] reported hand-sewn group had one anastomotic leak when compared to stapler group but was statistically not significant. Regarding other complications hand-sewn group had two complications, whereas stapler group had three complications. Both the groups did not have any mortality. Ismael et al [19] reported regarding postoperative general complications. The number of complications in SA group was 3 complications (5.8%) compared to 11 complications (21.1%) in HS group, with overall morbidity regarding general complications was (13.5%). No statistical significant difference in general complication was noted between two groups ($p=0.62$). The number of local complications in SA group was 11 complications (21.5%) compared to 25 complications in HS group (48.07%), with over all morbidity was (34.95%) it means that there is no statistical significant difference regarding local complications ($p=0.061$). Total number of patients who developed complication in SA group was 9 patients (17.6%), compare to 20 patients (38.4%) in HS group (P. value 0.019) which is a significant difference. Regarding local complications, 6 patients (11.6%) from HS group developed wound infection compared to 3 patients (5.9%) from SA group ($p=0.317$). Balik et al. [20] reported in a study enrolling 225 patients reported that there were no statistically significant differences ($p > 0.05$) between the two groups in the rates of wound infection and postoperative complications. In accordance this study Mamun et al [21] demonstrated post-operative complications of fever in Stapled group-2(8%) and hand sewn 06(24%), wound infection in stapled group was 03(12%) and hand sewn 04(16%), Ileus/intestinal obstruction in stapled group was 01(4%) and hand sewn 02(8%), anastomotic failure in stapled group 1(4%) and hand sewn 02(8%). Another study by similar results was found in study of Singha et al [22] they showed postoperative fever (18.8%) in stapled group and (19.2%) in hand sewn group, wound infection (27.1%) in stapled group and 23.1% in hand sewn group, Ileus/intestinal obstruction 10.4% in stapled group and 13.5% in hand sewn group, anastomotic leakage 8.3% in stapled group and 13.5% in

hand sewn group. In present study showed the mean hospital stay was 13.72 ± 2.54 days in stapler group and 15.76 ± 1.98 days in hand-sewn group. Mean hospital was significantly reduced in stapler group compare to hand-sewn group ($p=0.003$). The mean drain indwelling time was 8.64 ± 1.04 days in stapler group and 8.04 ± 1.34 days in hand-sewn group. Mean indwelling time was not statistically significant between groups ($p=0.083$). Concordance Purkayastha et al [23] reported mean postoperative stay in hand sewn group, the mean postoperative stay was 17.5 days, and in stapled group, it was 12.9 days, with a statistically significant ($p=0.004$). Intercoastal drainage tube removal mean time in hand-sewn and stapled groups was 8.52 and 7.13 days, respectively, which was consistent with the current series. In agreement Patel et al. [10] reported the mean hospital stay in case of stapled anastomosis was 12.72 ± 8.40 days and in hand-sewn anastomosis it was 14.04 ± 5.87 days. Belbase et al. [11] noted 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. Mamun et al. [21] reported mean post operative hospital stay stapled group was $6.44 (\pm 1.35)$ days and $7.00 (\pm 1.32)$ days in Hand sewn group ($p < 0.01$) that was statistically not significant. Mean anastomotic time in stapled group was $16.60 (\pm 2.06)$ mins and $25.12 (\pm 3.98)$ mins in hand sewn group ($p < 0.01$) that was statistically significant. Flingerhut et al [24] reported hospital stay showed no statistically significant outcome data in study. In stapled group, it was 13.44 days and in hand-sewn group it was 13.62 days. In our present study in comparing the outcome of hand-sewn suturing and stapler technique in gastrointestinal surgery we found the following: In stapler anastomosis there is decreased operative time, early discharge from the hospital and decreased postoperative complications in comparison to hand sewn anastomosis, there is no statistically significant difference in anastomotic leak cases between the two techniques We recommend the use of stapler anastomosis whenever possible.

Conclusion

Stapling device appears to be safer and superior to the hand-sewn technique when operative time, length of hospital stay and fever are taken into account. However, there is no statistically significant difference in anastomotic leak cases between the two techniques. So, stapler anastomosis is a new surgical innovation that can be performed safely and successfully.

Limitations

It was conducted upon a small size of population in a very limited area to represent and more extensive investigations could not be done due to lack of resources which would produce more informative study. Long term outcome cannot be assessed because a short period of follow up. This study was conducted in a single center and result may not be generalized.

Recommendations

The operation time can be greatly be reduced with the use of stapling device, and there are also less post-operative complications, but the frequency of anastomotic leakage remains unchanged. Compared to handsewn gastrointestinal surgery, stapled anastomosis may be preferable as a better alternative. Similar type of study can be done with large sample with longer follow up period to fortify the statistical power of observation. For study purpose necessary instruments should be easily available and cheap or free for the patients.

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How to Cite This Article

AKM Touhidul Islam, Akhter M, Md. Bhuiyan AR, Bandha BC, Sarkar AK, HM Mamun, et al. Outcome of gastrointestinal anastomosis following the use of stapling device and hand-sewn method: A comparative study. *International Journal of Surgery Science.* 2024;8(1):129-135.

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