ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 10 | October - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A RETROSPECTIVE COMPARATIVE STUDY ON STAPLER VERSUS HAND-SEWN TECHNIQUES IN GASTROINTESTINAL ANASTOMOSIS: AN ANALYSIS OF TWENTY-FIVE CASES EACH

General Surgery

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ABSTRACT

Background: Gastrointestinal surgery often involves resecting bowel loops and performing anastomosis, a critical aspect of the procedure. The advent of mechanical sutures via stapler devices represents a technological advancement that facilitates bowel loop anastomosis, offering benefits such as reduced tissue trauma and shorter procedural durations. The objective of this study was to compare outcomes between hand-sewn and stapler anastomosis techniques across various elective gastrointestinal surgeries. **Methodology:** A retrospective comparative study was conducted at the Department of General Surgery, Mahatma Gandhi Hospital, Jaipur, involving 50 patients of diverse demographics and genders.**Results:** Among the 50 patients, diagnoses included 7 cases of Benign Gastric Outlet Obstruction (GOO), 18 cases of Post-corrosive Oesophageal Stricture, 5 cases of obstruction, 6 cases of post-ileostomy complications, 5 cases of carcinoma of the ascending colon, 1 case of carcinoma of the caecum, 4 cases of ileo-caecal growth, 3 cases of carcinoma of the descending colon, and 1 case of sigmoid colon growth. In the stapler anastomosis group, the mean total operative time was (156.20±45.21) minutes, whereas in the hand-sewn anastomosis group, it was (188.40±48.32) minutes, with a p-value of 0.019. **Conclusions:** This study highlights a significant advantage of stapler use in consistently reducing operative time. However, no statistically significant differences were noticed between stapler and hand-sewn techniques concerning other criterion such as restoration of intestinal function, postop hospital stay, and complications like leakage, fistula and stricture formation.

KEYWORDS

Gastrointestinal anastomosis;Hand-sewn technique ; Stapler method ; Abdominal surgery

INTRODUCTION

In gastrointestinal surgery, after resecting bowel loops, creating anastomoses between the bowel loops is a critical component of the procedure. The Seromuscular suture technique, introduced by Lembert in 1826, is fundamental in supporting gastrointestinal surgeries. Currently, single-layer extra-mucosal anastomosis, pioneered by Matheson of Aberdeen, is preferred due to its ability to minimize tissue necrosis and luminal narrowing, replacing traditional materials like catgut and silk.[1,2]

Technological advancements such as mechanical sutures using stapler devices have revolutionized anastomosis procedures.[3] Stapler devices offer advantages including reduced tissue trauma, shorter procedural duration, and lower risk of anastomotic leaks. They are now widely adopted by surgeons due to their safety, accessibility, and efficiency. However, there are concerns among surgeons regarding their use in critical sites for anastomosis, emphasizing the importance of precise approximation without tension and ensuring adequate blood supply.[4]

Anastomotic technique plays a crucial role in determining surgical success, with hand-sewn and stapled sutures being the primary methods in clinical practice for gastrointestinal surgeries[5]. While staplers were initially developed to address concerns about anastomotic patency, no definitive indications have been established, leading many surgeons to utilize both techniques based on individual patient and procedural factors.[6,7]

Currently, there is a lack of comprehensive studies comparing the superiority of stapled versus hand-sewn anastomoses in general gastrointestinal surgeries. This retrospective study aims to evaluate and compare outcomes between hand-sewn and stapled anastomoses across various types of elective gastrointestinal surgeries.

Methodology

This retrospective comparative study was conducted in the Department of General Surgery at Mahatma Gandhi Hospital ,Jaipur, from March 2023 to March 2024. The study enrolled 50 patients of various genders and age groups who required gastrointestinal tract anastomosis due to clinical conditions. Purposive sampling was used to select 25 cases of patients who underwent Handsewn GI anastomosis and another 25 cases who underwent Stapler GI anastomosis, based on predefined inclusion criteria (>18 years of age) and exclusion criteria (<18 years of age, patients undergoing radiotherapy, pregnant women). Written informed consent was obtained from all participants.

The study proforma documented detailed histories, including pre-operative blood investigations, operative findings, method of anastomosis, anastomotic time, total operating time, duration of post-anastomosis abstinence from oral feeding based on clinical recovery, hospital stay after surgery, and incidences of complications such as anastomotic leakage, stricture, fistula, pain, and mortality. Preoperative preparations included bowel preparation, deep venous thrombosis prophylaxis, and intravenous administration of third-generation cephalosporin with metronidazole during anesthesia induction.

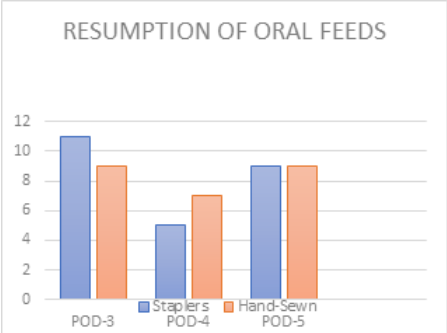
RESULT

Among the 50 patients included in this study, the distribution of conditions treated included 8 cases of benign gastric outlet obstruction (GOO), 17 cases of post-corrosive esophageal stricture, 6 cases of obstruction, 5 cases of post-ileostomy status, 4 cases of carcinoma of the ascending colon, 2 case of carcinoma of the caecum, 3 cases of ileo-caecal growth, 4 cases of carcinoma of the descending colon, and 1 case of sigmoid colon growth. Of these participants, 30 were male and 20 were female. The majority of patients (44%) were in the 41-50 years age group, followed by 26% in the 21-30 years age group.

Age group (years)	Male (%)	Female (%)
21-30	9(18)	4(8)
31-40	4(8)	3(6)
41-50	17(34)	5(10)
>50	1(2)	7(14)

The total operative time varied across the surgeries: 7 surgery were completed in less than 120 minutes (2 hours), with 5 surgeries using stapler anastomosis & 2 using hand-sewn anastomosis; 24 surgeries (48%) lasted between 120 to 180 minutes (2-3 hours), including 12 using stapler anastomosis and 12 using handsewn anastomosis; and the remaining 19 surgeries (38%) lasted over 180 minutes (3 hours), with 8 using stapler anastomosis and 11 using handsewn anastomosis.

Total operative time (minutes)	Stapler	Hand sewn
<120	5	2
120-180	12	12
>180	8	11



Resumption Of Oral Feeds

	Staplers	Hand-Sewn
POD-3	11	9
POD-4	5	7
POD-5	9	9

In the stapler anastomosis group, the meantime taken to perform the anastomosis was 11.80±2.44 minutes, compared to 17.80±2.53 minutes in the handsewn anastomosis group ($p < 0.05$, Independent t-test). This difference indicates that stapler anastomosis procedures were significantly faster than handsewn techniques.

Type of Anastomosis	Total time for anastomosis	
	Mean	SD
Stapler	11.80	2.44
Hand Sewn	17.80	2.53

Regarding post-operative recovery, 20 patients (40%) resumed oral feeding on the POD-3, including 11 from stapler anastomosis group and 9 from handsewn anastomosis group. Twelve patients (24%) resumed oral feeding on the 4th post-operative day, with 5 from the stapler group and 7 from the handsewn group. Eighteen patients (36%) resumed oral feeding on the 5th post-operative day, with 9 from each group. There was no significant difference observed in leakage rates between the two groups.

Type of Anastomosis	Leakage	
	Yes	NO
Stapler	2	23
Hand sewn	4	21

Unfortunately, 4 patients (8%) succumbed to complications of surgery, with deaths occurring on various post-operative days: one on POD-10, another on POD-14, one on POD-21, and one on POD-25. The 46 remaining patients were discharged from the hospital with follow up treatment.

DISCUSSION

In this study, the stapler and handsewn groups were compared across several parameters including time taken to perform anastomosis, total operative time, resumption of oral feeds after surgery, hospital stay duration, and post-operative complications such as anastomotic leak, stricture, fistula, and overall patient outcomes.

The mean time taken to perform anastomosis in the stapler group was (11.80±2.44) minutes, whereas in the handsewn group it was (17.80±2.53) 25 minutes[8-10], with a statistically significant p value of 0.001 (Independent t=-8.514, p<0.05, 95% CI -7.417 to -4.583). This finding aligns with previous studies by Rushin et al and Damesha et al, as well as a study by Hori et al in Japan, all of which demonstrated shorter anastomotic times in the stapler group compared to handsewn techniques.[8-12]

Regarding the mean duration of abstinence from oral feeding, it was (3.92±0.909) days in the stapler group and (4.00±0.866) days in the handsewn group, with a p value of 0.751 (Independent t=-0.319, p>0.05, 95% CI -0.585 to 0.425). This result is consistent with findings from Scher et al, Rushin et al, and Damesha et al, which showed no significant difference in the time to resumption of oral feeding between the two methods.

In terms of post-operative complications, there was no significant difference in leakage rates between the stapler and handsewn groups (Chi square=0.758, df=1, p=0.667). This finding is consistent with a meta-analysis conducted by Lustosa and a Cochrane review, both of which reported similar clinical leak rates between stapled and hand-sewn anastomoses.[13,14]

Similarly, there was no significant difference in post-operative mortality between the two groups (Chi square=1.087, df=1, p=0.609)[15]. Meta-analysis by Liu et al from China also supported this finding, showing no significant difference in postoperative mortality rates between stapled and handsewn techniques. This aligns with studies from the West of Scotland, Highland groups, and a 1998 meta-analysis, which collectively found no disparity in mortality outcomes. However, Banurekha et al reported significantly lower mortality with stapler anastomosis compared to handsewn techniques, which contrasts with the findings of this study[16].

CONCLUSION

To achieve broader acceptance, an innovative technique must demonstrate efficiency and speed without compromising safety. In this study, one notable advantage of staplers was the consistent reduction in operating time. However, there was no significant difference observed between the stapler and hand-sewn groups concerning other parameters such as restoration of intestinal function, postoperative hospital stay, and complications like leakage, fistula, or stricture formation.

The reduction in operating time with staplers may particularly benefit patients with poor general condition who cannot tolerate prolonged anaesthesia. In situations where access is highly limited, such as in low anterior resection, hand-sewn anastomosis can be challenging .However, mechanical stapling devices offer added advantages. Despite the usefulness of stapling devices in specific scenarios, it is essential to recognize the enduring value of traditional suturing techniques, a principle that remains relevant even in modern surgical practice.

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