

Bowel Anastomosis- A Retrospective Comparative Study On Stapler Verses Hand Sewn Technique

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ABSTRACT

Background: In gastrointestinal surgery after resection of bowel loops, anastomosis of the bowel loops is the main part of the surgery. The evolution of mechanical sutures by stapler devices is a technological advancement which helps anastomosis of bowel loops with less tissue injury and decreased time duration of procedure. Objective of current study was to compare the hand sewn anastomosis with stapler anastomosis in various types of elective gastrointestinal surgeries.

Methods: A retrospective comparative study which included total of 100 patients was conducted in department of general surgery at SGT Hospital, Gurugram. The study included patients of both gender and different age groups.

Results: Out of 100 patients, 4 patients had Benign Gastric Outlet Obstruction (GOO), 24 patients had Post corrosive esophageal stricture, 12 patients had intestinal tuberculosis, 6 patients were of post ileostomy status, 10 patients had obstruction, 12 patients had post ileostomy status, 8 patients had carcinoma of ascending colon, 4 patient had carcinoma of caecum, 12 patients had ileo-caecal growth, 6 patients had carcinoma of descending colon and 2 patient had sigmoid colon growth. In stapler anastomosis group Mean Total operative time was (156.20±45.21) minutes whereas in handsewn anastomosis group Mean Total operative time was (188.40±48.32) minutes with p value of 0.019.

Conclusions: In this study, one distinct advantage of staplers was the consistent reduction in operating time. However, no significant difference was found between the stapler and hand-sewn groups with respect to other parameters such as restoration of intestinal function, postoperative hospital stay, and postoperative complications like leakage, fistula or stricture formation.

Keywords: Abdominal surgery, Gastrointestinal anastomosis, Hand sewn technique, Stapler method,

Date of Submission: 09-04-2023

Date of Acceptance: 22-04-2023

I. INTRODUCTION

After bowel loops are removed following gastrointestinal surgery, the anastomosis of the bowel loops takes precedence. Lambert identified the seromuscular suture technique in 1826 as the basis for gastrointestinal surgery. Due to its ability to cause less tissue necrosis or luminal narrowing, single layer extra mucosal anastomosis, which was developed by Matheson of Aberdeen, is now more frequently employed and has replaced catgut and silk.^{1,2} A technical innovation that aids in the anastomosis of intestinal loops with less tissue damage and shorter procedure times is the progression of mechanical sutures by stapler devices.³ Moreover, the risk of an anastomotic leak is reduced. Many surgeons now frequently employ the stapler approach. In terms of safety, accessibility, process time and efficiency, it is superior to the hand-sewn anastomosis. Regarding the stapler's use in crucial anastomosis sites, many surgeons are skeptical. For suturing and stapling, a precise approximate fit avoiding tension and with a healthy blood supply is necessary.⁴ One of the most important aspects affecting surgical success is the anastomotic technique. The two main anastomotic techniques used in GI procedures are hand sewing and stapled sutures.⁵ Staplers were initially created to solve the alleged patency issue in anastomoses, primarily. As neither approach has definite indications as of yet, most surgeons use both in actual clinical settings.^{6,7} Studies comparing the superiority of hand-sewn versus stapled anastomosis in general procedures are scarce. The hand- sewn anastomosis and stapler anastomosis in several elective gastrointestinal surgery types are compared in this retrospective analysis.

II. AIM AND OBJECTIVES

The purpose of the current study was to compare anastomosis time, total operating time in procedures involving multiple anastomosis, length of hospital stay, duration of oral feeding restriction following anastomosis based on clinical recovery and complications such as anastomotic leakage, stricture, fistula and pain etc.

III. METHODS

This is a retrospective comparative study conducted in department of general surgery at SGT Hospital, Gurugram during September 2021 to August 2022. The study included total 100 patients of both gender and different age groups. Patients selected for this study included those who were admitted with various clinical problems requiring anastomosis of gastro-intestinal tract. By using purposive sampling technique 50 cases were taken of patients who underwent handsewn gastrointestinal anastomosis and another 50 cases were taken of patients with stapler gastrointestinal anastomosis in consecutive manner according to inclusion criteria.

IV. INCLUSION AND EXCLUSION CRITERIA

The age requirement for inclusion in the current study was >18 years. The current study had age restrictions of <18 years, patients who had received radiotherapy, and pregnant women. Patient's written informed consent was gathered from case papers found in the SGT, Gurugram. From there, 50 cases of patients who had handsewn gastrointestinal anastomosis and another 50 cases of patients who had stapler gastrointestinal anastomosis were taken sequentially in accordance with the inclusion criteria. A thorough history of the procedure for gastrointestinal anastomosis was recorded. Age, gender, pre-operative blood tests, surgical findings, anastomosis technique, anastomotic time, total operating time, duration of oral fasting after anastomosis based on clinical recovery, hospital stay following surgery, and complications like anastomotic leakage, stricture, fistula, pain and mortality were all taken into account when creating a predesigned proforma for all patients. All patients underwent preoperative preparation, which included bowel preparation, DVT prophylaxis, and intravenous 3rd generation cephalosporin with metronidazole at the time of anesthesia induction. In both the hand sewn and stapler groups, every anastomosis case was completed by a senior surgeon in accordance with standard norms.

V. DATA COLLECTION AND ANALYSIS

A p value of less than 0.05 was regarded as significant for statistical analyses utilizing the chi-square and t tests on data entered into a Microsoft Excel Sheet.

VI. RESULTS

Out of 100 patients, 14 patients had benign gastric outlet obstruction (GOO), 36 patients had post corrosive esophageal stricture, 10 patients had obstruction, 12 patients had post ileostomy status, 10 patients had ascending colon cancer, 2 patients had caecal cancer, 8 patients had ileo-caecal growth, 6 patients had descending colon cancer, and 2 patients had sigmoid colon growth. 38 women and 62 men in total participated in the study. The majority of research participants (44%) were in the 41-50 age range, while 26% of patients were in the 21-30 age range. Total duration of surgery for all patients involved in this study was divided into 3 groups on the basis of total operative time which are <120, 120-180, >180 (Table 2).

Table 1: Demographic details of study participants (n=100).

Age group (years)	Male (%)	Female (%)
21-30	18 (18)	8 (8)
31-40	8 (8)	6 (6)
41-50	34 (34)	10 (10)
>50	2 (2)	14 (14)

Table 2: Total operative time of various patients (n=100).

Total operative time (minutes)	Type of anastomosis	
	Stapler	Hand Sewn
<120	10	4
120-180	24	24
>180	16	22

Out of 100 surgeries, 14 (14%) were completed before 120 minutes (2 hours), including 10 using stapler anastomosis and 4 by handsewn anastomosis, 48 (48%) were completed within 120 minutes to 180 minutes (2-3 hours) which included 24 using stapler anastomosis and 24 by handsewn anastomosis, and the remaining 38 (38%) were completed in more than 180 minutes (3 hours) including 16 using stapler anastomosis and 22 by handsewn anastomosis (Table 2). With a p value of 0.001, the handsewn anastomosis group’s mean time to complete anastomosis was (17.80±2.53) minutes as opposed to the stapler anastomosis group’s mean time of (11.80±2.44) minutes. The amount of time needed for anastomosis between the two groups differed significantly. When compared to hand sewing, stapler anastomosis took less time. (Independent t=-8.514, p<0.05, 95% CI- 7.417 to -4.583) (Table 3).

Table 3: Comparison between these two methods based on time taken for performing anastomosis (n=100).

Type of anastomosis	Total time for anastomosis		T value (p value)
	Mean	SD	
Stapler	11.80	2.44	-8.51 (0.001)
Hand Sewn	17.80	2.53	

Table 4: Anastomotic leak after surgery in patients (n=100).

Type of anastomosis	Leakage		X2 value (p value)
	Yes	No	
Stapler	4	46	0.758 (0.384)
Hand Sewn	8	42	

Out of 100 patients, 40 patients (40%) resumed oral feeding on the third post-operative day, including 22 patients who underwent stapler anastomosis and 18 patients who underwent Handsewn anastomosis; 24 patients (24%) resumed oral feeding on the fourth post- operative day, including 10 patients who underwent stapler anastomosis and 14 patients who underwent handsewn anastomosis. The remaining 36 patients (36%) resumed oral feeding on the fifth post-operative day, including 18 patients from the stapler anastomosis group and 18 patients from the handsewn anastomosis group (Figure 1).

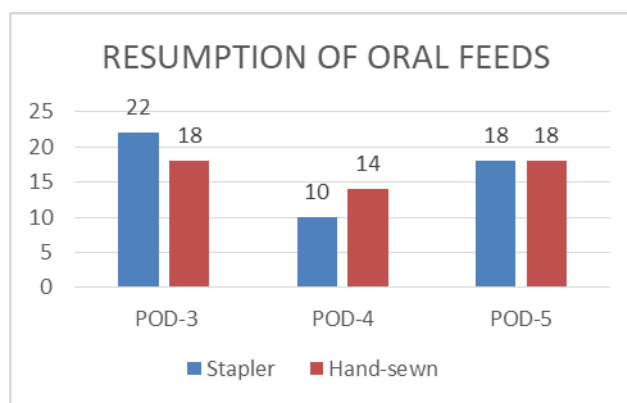


Figure 1: Comparison of resumption of oral feeds after surgery (n=100).

In terms of leakage following surgery, there is no noticeable difference between the two groups. 8 (8%) of the 100 patients died as a result of surgical complications. 2 of these 8 patients passed away on POD-10, while the other 6 died on POD-14, POD-21 and POD-25. Rest of 92 patients received hospital discharges.(Figure 2).

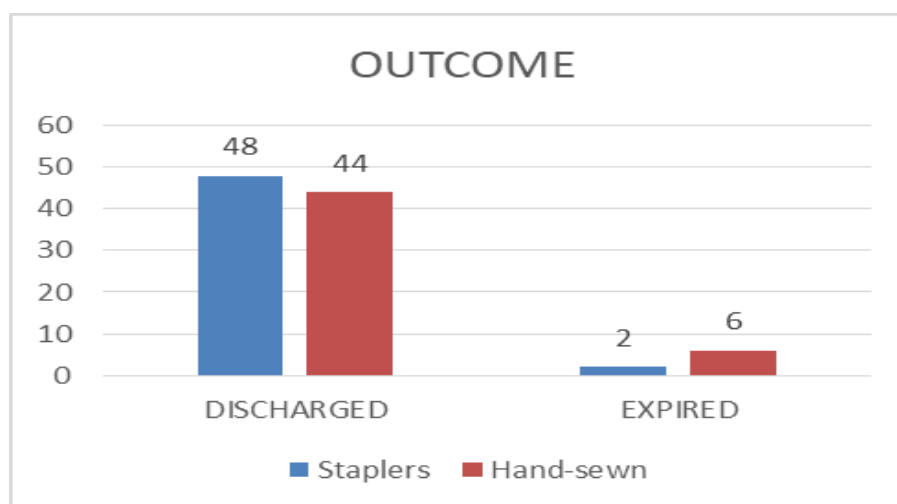


Figure 2: Comparison of outcome of two different gastrointestinal anastomosis methods (n=100).

VII. DISCUSSION

In this study, the anastomosis time, overall operating time, oral feedings resumed after surgery, hospital stay following surgery, post-operative complications like anastomotic leak, stricture and fistula, as well as the patient's postoperative results were compared between the staplers and handsewn groups. With a p value of 0.001, the handsewn anastomosis group's mean time to complete anastomosis was (17.80±2.53) minutes as opposed to (11.80±2.44) minutes for the stapler anastomosis group. (Independent t=-8.514, p<0.05, 95% CI -7.417 to -4.583). This is comparable to studies by Rushin et al, Damesha et al and Hori et al conducted in Japan, which showed a significant reduction in the anastomotic periods in the stapled group and also showed that the anastomosis time is shorter in the stapler group (14 mins) than in the handsewn group (25 mins).^{8,9,10} In the current study, handsewn anastomosis group had a mean abstinence from oral feed of (4.00±0.866) days with a p value of 0.751 as opposed to stapler anastomosis group's mean abstinence from oral feed of (3.92±0.909) days. (Independent t=-0.319, p>0.05, 95% CI -0.585 to 0.425). Intestinal function recovery did not vary substantially between the two anastomotic techniques, according to Scher et al. Patients with stapled anastomoses needed an average of 3.8 days before resuming oral feeding, compared to 3.7 days for suture technique patients. This is comparable to studies by Rushin et al and Damesha et al that found no difference between the two groups with a p value of >0.05.⁸⁻¹² In this study, there is no apparent distinction between the two groups in terms of leakage following surgery (Chi square=0.758, df=1, p=0.667), which is comparable to a meta-analysis research by Lustosa and a Cochrane review that showed a clinical leak of 7.1% in the stapled group and 6.33% in the group that was handsewn, both of which were not statistically significant.^{13,14} In the current study, there is no discernible difference between the two groups about the outcomes in terms of mortality (Chi square=1.087, df =1, p=0.609). A meta-analyses conducted by Chinese researches Liu et al found no significant differences in the incidence of postoperative mortality (RR=1.52, 95% CI: 0.97-2.40; p=0.07).¹⁵ Similarly there was no variation in mortality in the studies of the West of Scotland and Highland groups as well as the 1998 meta-analysis. This is in contrast to the Banurekha et al study, which found that stapler anastomosis significantly reduced mortality compared to hand sewn anastomosis.¹⁶

VIII. Limitations

The current study's limitation was that it was conducted in a hospital with a subset of the population rather than the overall population; hence, the findings cannot be generalized to the general population. One of the other restrictions of the current investigation was the small sample size.

IX. CONCLUSION

An innovative procedure must be quick and effective without sacrificing safety if it is to be widely accepted. One standout benefit of staplers in this investigation was the continuous decrease in operating time. Regarding other factors like intestinal function recovery, postoperative hospital stay, and postoperative problems like leakage, fistula development and stricture formation, there was no appreciable difference between the hand- sewn and stapler groups. Staplers may be useful in patients with poor general health who would not tolerate lengthy anesthesia because of the reduction in operating time. When the access is extremely restricted, especially in low anterior resection, hand-sewing anastomosis can be quite challenging; in these circumstances, mechanical stapling devices have an added advantage. Although stapling tools maybe useful in some circumstances, it's important to remember the traditional suturing technique and the adage that still holds true today.

REFERENCES

- [1]. Lustosa SA, Matos D, Atallah AN, Castro AA. Stapled versus handsewn methods for colorectal anastomosis surgery. *Cochrane Database Syst Rev.* 2001;3: CD003144.
- [2]. Choy PY, Bissett IP, Docherty JG, Parry BR, Merrie A, Fitzgerald A. Stapled versus handsewn methods for ileocolic anastomoses. *Cochrane Database Syst Rev.* 2011;9:CD004320.
- [3]. Murthy V, Pai MV, Bhat R, Thejeswi P, Comparative study of hand sutures versus staplers in elective gastric surgeries in a south Indian population. *J Surg.* 2013; 30(2):23-9.
- [4]. Bhandary S, Babu NM, Gojanur G, Reddy CKP. Comparative study of bowel anastomosis hand sewn versus stapler. *IOSR J Dent Med Sci.* 2016;15(12):37-42.
- [5]. Halsted W. Circular suture of the intestine: an experimental study. *Am J Med Sci* 1887;94:436.
- [6]. Bailey A, Love D. *Short practice of surgery; the principles of anastomosis.* 27th ed. USA: Mc-Graw Hill publisher; 2010:97-9.
- [7]. Brooks DC, Zinner MJ (2000) *Surgery of the small and large bowel.* In: Zinner MJ, Ellis H, editors, *Maingot's abdominal operations.* 10th ed. USA: Appleton and Lange; 2010:1321-30.
- [8]. Thakor RB, Kansal SS, Salecha PA. A comparative study of Hand suture verses Stapler anastomosis Gastrointestinal surgeries. *National J Med Res.* 2014; 14(4):354-6.
- [9]. Damesha N, Lubana PS, Jain DK, Mathur R. A Comparative Study of Sutured and Stapled
- [10]. Anastomosis in Gastrointestinal Operations. *Internet J Surg.* 2008;15(2):23-9.
- [11]. Hori S, Ochiai T, Gunji Y, Hayashi H, Suzuki T. A prospective randomized trial of hand-sutured versus mechanically stapled anastomoses for gastroduodeno-stomy after distal gastrectomy. *Gastric Cancer.* 2004; 7(1):24-30.
- [12]. Scher KS, Scott-Conner C, Ong WT. A comparison of stapled and sutured anastomoses in gastric operations. *Surg Gynecol Obstet.* 1982;154:548-52.
- [13]. Reiling RB, Reiling WA, Bernie WA, Huffer AB, Perkins NC, Elliott DW. Prospective controlled study of gastrointestinal stapled anastomoses. *Am J Surg.* 1980;139:147-52.
- [14]. Lustosa, SAS, Matos, D, Atallah, AN, Castro, AA. Stapled versus hand-sewn method for colorectal anastomosis surgery. *Cochrane Datab Sys Review.* 2007;2:23.
- [15]. Neutzling CB, Lustosa SA, Proenca IM, da Silva EM, Matos D. Stapled versus handsewn methods for colorectal anastomosis surgery. *Cochrane Database Syst Rev.* 2012;(2):CD003144.
- [16]. Liu QX, Min JX, Deng XF, Dai JG. Is hand sewing comparable with stapling for anastomotic leakage after esophagectomy? A meta-analysis. *World J Gastroenterol.* 2014;20(45):17218-26.
- [17]. Banurekha R. Hand sewn versus stapler anastomosis in elective gastro region. *Int Surg J.* 2017;4(7):2316- 20.

Naresh Modi, et. al. "Bowel Anastomosis- A Retrospective Comparative Study On Stapler Verses Hand Sewn Technique." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 28(4), 2023, pp. 46-50.