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A Comparative Study Between Stapler Versus Handsewn Anastomosis in Gastrointestinal Surgery

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Author`s Contribution

[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [4,6]Active participation in active methodology, [2,3]analysis, or interpretation of data for the work, [5]Drafting the work or revising it critically for important intellectual content

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ABSTRACT

Objective: To contrast outcome of hand-sewn and stapler anastomosis in gastro intestinal surgeries in terms of 'time required for anastomoses, postoperative complications and Hospital stay.

Methodology: This comparative study was done at Surgical Unit-II, LUH, Jamshoro, on patients aged >18 years, who underwent gastro intestinal surgery scheduled for elective and emergency stapler or hand-sewn anastomosis, of either gender. After diagnosis the patients were randomly selected for both groups Stapler Anastomosis (group A) and hand-sewn Anastomosis (group B). Patients were assessed for time taken during anastomosis, postoperative complications, operative time and post-operative hospital stay. All the data was entered and analyzed by SPSS version 23.

Results: Mean age of cases in stapler anastomosis was 35.74±16.4 years and in hand-sewn Anastomosis was 31.62±14.96 years. Mean operative time in stapler anastomosis was significantly less compared to hand-sewn Anastomosis 35.35±5.34 hours and 60.31±10.29 hours respectively, (P-0.001). Hand–sewn anastomosis gained significantly longer time than stapler anastomosis, 27.10±5.95 minutes and 3.73±1.86 minutes respectively, (P- 0.001). Additionally, postoperative complications were higher among hand-sewn group, as; 17 wound infection cases and 3 anastomosis leakage in stapler anastomosis group, and 22 cases of wound infection, 6 cases of anastomosis leakage, and 3 abdominal abscess cases were in hand-sewn anastomosis group. Subsequently the Hospital stay was significantly higher among hand-sewn group as 10.76±2.24 days as compare to stapler anastomosis 5.58±1.36 days, (P-0.043).

Conclusion: The stapler anastomosis concluded to be a safe, reliable, and adaptable surgical tool, with shorter operative time, decreased complications rate and shorter Hospital stay in contrast to handsewn anastomosis.

Keywords: Gastrointestinal surgeries, Anastomosis, Stapler, Hand-sewn, Complications.

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Introduction

Gastrointestinal (GI) anastomosis represents surgical interventions of GI tract for handling intestinal diseases, trauma, perforation, obstruction, and malignancies to reestablish a complication-less and tension-free bowel continuity following GI tract resection.[1] Anastomotic failure is linked to serious postoperative complications such as anastomotic leakage, fistula development, peritonitis, and prolonged hospitalization.[2,3] In this regard, hand-sewn suturing and stapled anastomosis techniques are widely utilized.

Hand-sewn suturing requires longer operative time along with considerable technical expertise, however can tackle various anatomic situations, yet in resource limited settings, with flexible suturing pattern.[4] Stapled anastomosis, conversely, offers uniform suturing, reduced operative time, and consistent anastomotic construction, making it more suitable for emergency surgeries and technically challenging situations. However, this technique demands selection of suitable device with proper staple height and vigilant alignment with tissue edges. In this regard, postoperative complications remain a major concern in anastomotic technique selection.[5]

Recent studies often favor the stapled anastomosis compared to hand-sewn techniques. A review study demonstrated a significant reduction in anastomotic and overall operative time, shorter hospitalization, and lower rate of anastomotic leakage and surgical site infection in stapled anastomosis when compared with Hand-Sutured procedure.[6] Similarly, a meta-analysis also suggests decreased operative time, fewer complications, leak reduction and decreased postoperative paralytic ileus in anastomoses with staples than those without.[7] Reduced operative time is particularly beneficial in emergency settings. In these settings, patients often present with sepsis, electrolyte imbalance, or poor physiological reserve. However, reduced length of hospitalization and lower complication rates can benefit enhanced recovery post-surgery and reduced economic burden in elective procedures.[8,9] On the other hand, conflicting findings have also been published in some contemporary studies, suggests comparable rates of anastomotic leakage, intra-abdominal abscess, wound infection, and mortality between both the stapled and the hand-sewn anastomoses procedures.[10-12]

A recent comprehensive review based on comparative observational studies in stapled and hand-sewn anastomosis failed to establish statistical differences in related complication patterns, suggesting similar patterns of anastomotic leak, hospitalization length, surgical site infections, and mortality across studies.[10]

Another study on Hand-sewan versus stapled anastomoses in emergency settings suggested comparable findings, with statistically insignificant association between anastomosis type and post-procedure complications, and hospitalization length.[11] Similarly, one of the single-center retrospective studies indicated comparable outcomes between staple and manually suturing methods of bowel anastomosis, with insignificant differences in operative duration, hospital stay, and overall complications.[12] The ongoing debate and inconsistent outcomes reported in recent literature necessitate further comparative studies to evaluate the effectiveness of stapled versus hand-sewn anastomosis across different clinical settings. Therefore, this study intended to compare both techniques in terms of time required for anastomosis, postoperative complications, and duration of hospital stay in patients undergoing gastrointestinal surgery.

Methodology

Present comparative study was done at Surgical Unit-II, LUH, Jamshoro. Study was conducted during 2 years from June 2017 to May 2019. All the patients aged >18 years, both genders, and underwent gastro intestinal surgery scheduled for elective and emergency stapler or hand-sewn anastomosis were included, while patients presented with cardiorespiratory diseases, uncontrolled diabetes Mellitus, chronic liver disease, patients unfit for anesthesia, patients aged above 80 years and those who were not willing to take a part of study were excluded. IRB was obtain from the ethical review committee Ref no DOC #LUMHS/CEPG/-135/40. The sample calculation of 100 cases was done using the raosoft software for Sample size calculation by using the least proportion of 6.33% with level of significance 5% and power of test 90%, and further were divide in two groups as 50 cases in each group. After taking complete medical history, clinical examination and diagnosis the informed consent was obtained, both procedures stapler anastomosis and hand-sewn anastomosis were explained, including their respective advantages and disadvantages. Subsequently patients were then randomly allocated into two groups: patients of Group A undergoing stapler anastomosis and patients of Group B undergoing hand-sewn anastomosis procedures. All procedures were performed by consultants having more than 3 years of post-fellowship experience as per Hospital management protocol. A predesigned proforma used to record the data including socio-demographic of the patient, stapler and hand sewn anastomosis in GIT surgery 'time required for anastomosis, postoperative complications (Bleeding, Anastomosis Leakage, fecal fistula, stricture, abscess and wound infection), operative time (Time taken from the start of skin incision to completion of the skin closure), anastomosis time (Time taken from start to achievement of anastomosis) and post-operative Hospital stay. The patients were asked for follow up visit after one week of discharge and were advised to report in case of any problem. Final outcome was measured at the end of 6

months. All the data was entered in the proforma. The data was analyzed by using SPSS 23.0

Results

Mean age of cases in stapler anastomosis was 35.74±16.4 years, while in hand-sewn Anastomosis group was 31.62±14.96 years (P-0.194). There were males in majority 36 in stapler anastomosis group, while in hand-sewn anastomosis both males and females were in qual number. Typhoid perforation was most frequent etiological factor in 47(47%) cases, followed by Adhesive intestinal obstruction 23(23.0%), traumatic perforations 12(12.0%), Tuberculosis 8(8.0%) and malignancy 7(7.0%), while bowel gangrene was found in only 3(3.0%) cases. **(**Table I)

Table I: Distribution of cases according to etiology. (n=100)

Etiology	Frequency	Percentage
Typhoid perforation	47	47.0%
Tuberculosis	23	23.0%
Traumatic perforations	12	12.0%
Adhesive intestinal obstruction	08	08.0%
Malignancy of GIT	07	07.0%
Bowel gangrene	03	03.0%
Total	100	100.0%

The Illeo-ilial anastomosis was the most common procedure done in 41cases in Stapler Anastomosis group and in 36 cases of hand-sewn Anastomosis group. There was no significant difference in type of anastomosis according to operative procedure (P- 0.309). (Table II)

Table II: Distribution of type of anastomosis according to operative procedure. (n=100)

Type of anastomosis	Operative procedures		P-Value
	Stapler Anastomosis	hand-sewn Anastomosis	
Colocolic	2	3	0.309
Illeo-colic	4	8	
Illeo ileal	41	36	
Jejeno-jejunal	3	3	

Overall mean operative time was significantly less in stapler anastomosis and in hand-sewn Anastomosis was 35.35±5.34 minutes and 60.31±10.29 minutes respectively, (P- 0.001). Particularly the Hand–sewn anastomosis took considerably longer time than stapler anastomosis, with mean time of anastomosis as 27.10±5.95 minutes and 3.73±1.86 minutes respectively, (P- 0.001). According to the complications 8 cases had developed wound infection and anastomosis leak was in 3 cases of stapler anastomosis group, while wound infection in 15 cases, leakage in 8 cases and abdominal abscess was found in 3 cases of hand-sewn anastomosis group, indicating a significantly higher rate of complications in hand-sewn anastomosis group (p,0.05). Moreover, the mean of hospital stay was also significantly higher in hand-sewn anastomosis group (10.76±2.24 days) compared to the stapler anastomosis group (5.58±1.36 days) (P-0.043). (Table III)

Discussion

Intestinal anastomosis exists as one of the technically demanding surgical procedures due to anastomoses failure, resulting in high complication rates, with hand-sewn and stapled anastomosis described as common surgical procedure. Yet, the optimal technique remains uncertain.[13] In this study, total 100 patients were included and then equally distributed into Stapler and hand-sewn groups. The mean age of cases in stapler anastomosis (35.74±16.4 years) was higher than the mean age of those in hand-sewn Anastomosis (31.62±14.96 years), with male predominance (36%) in stapler anastomosis. There was a significant difference in type of operative procedure in gender distribution (P-0.022). But no significant difference was found in both group according to mean age (P-Value=0.194). In comparison to this, Seo SH et al[14] carried out the study comparing the stapled and hand sewn techniques in gastrojejunostomies and reported the almost

Table III: Outcomes comparisons among both groups. (n=50)

Variables		Operative procedures		P-Value
		Stapler Anastomosis	hand-sewn Anastomosis	
Skin incision to skin closure operative time (minutes**)**		35.35±5.34	60.31±10.29	0.001
Time of anastomosis (minutes**)**		3.73±1.86	27.10±5.95	0.0001
Complications				
Wound infection	Yes	08	15	0.013
	No	42	35	
Anastomosis leak	Yes	3	08	0.014
	No	47	42	
Pelvic abscess	Yes	0	3	0.049
	No	50	47	
Mean Hospital stay (days)		5.58±1.36	10.76±2.24	0.043

similar mean age and gender distribution across the groups like this study. Consistently Banurekha R et al[15] reported that the average age of handsewn anastomosis group was 51 years, while stapler anastomosis group mean age was 49 years.

In present study, typhoid perforation (47.0%) was most frequent etiological factor followed by Tuberculosis (23.0%), and Traumatic perforations (12.0%), while adhesive intestinal obstruction, Malignancy of GIT, and Bowel gangrene were found in only 8.0%, 7.0%, and 3.0% of the cases respectively. Additionally, Illeo-ilial anastomosis was the most common procedure done in 41cases in Stapler Anastomosis group. Similarly, Illeo-ilial was performed in most of 36 cases in hand-sewn Anastomosis group. There was no significant difference in type of anastomosis according to operative procedure (P-value=0.309). In line with these findings, Islam et al[16] also found that difference in operative procedure was not significant between the two groups (p=0.483). However, jejunojejunostomy (28.0%) and gut restoration (36%) were the most common operative procedure in stapled and Hand-sewn groups respectively.

In our study, Hand–sewn anastomosis took considerably longer time than stapler anastomosis, with mean anastomosis time of 27.10±5.95 minutes and 3.73±1.86 minutes respectively and total mean operating time of 60.31±10.29 minutes and 35.35±5.34 minutes respectively. Consistent findings were reported in the study of Belbase et al[17] who compared stapled anastomotic techniques with hand-sewn method in lower GI and found that time required for anastomosis and total operative time significantly were reduced in stapling (11.0±1.9 and 132.5 ± 15.7 minutes respectively) compared to hand-sewn method (32.0±4.5 and 147.1±20.9 minutes respectively); p<0.001 and p<0.05 respectively. Similarly findings were documented in the studies conducted by Hemming et al.,[18] McLeod et al.,[19] and Deng et al,[20] who claimed that Hand-sewn anastomoses is more time-consuming and difficult to learn than stapled anastomoses during surgery.[8,9]

In present study cohort, the rate of complications was statistically significant across the groups, as the wound infection (15% vs. 8%), anastomosis leak (8% vs. 3%), and 3 abdominal abscesses (3% vs. 0%) were significantly higher in Hand–sewn anastomosis as compare to stapler anastomosis (p=<0.05). In agreement with these findings, the study carried out by El-Shakhs et al.[21] revealed that wound infection and anastomosis leak were significantly higher in Hand–sewn anastomosis (6.7% each) as compare to stapler anastomosis, where no complication was notes, however the differences did not reach the statistical significance (P<0.05). Consistent findings were documented in the study of Feroci et al,[22] and Jian-Cheng et al.,[23] who reported higher rates of complication in hand-sewn procedure than the stapler anastomosis.

In current study, the overall mean hospital stay was found significantly decreased 5.58±1.36 in stapler anastomosis group in contrast to the hand-sewn procedure as 10.76±2.24 days (P-0.043). Aligning with these findings, Kumar P et al[24] reported that the mean operating time was significantly shortened in the stapler group 7.99 days versus hand-sewn group 11.01 days (P =0.03). Comparable findings were also stated in few other studies carried out by Islam AT[16] and Hussain T et al[25] wherein hospital stay was shorter in stapler anastomosis in comparison to hand-sewn anastomosis.

Conclusion

Present revealed that the stapler technique is the safe and more reliable surgical tool, with very with shorter operative time, decreased complications rate and shorter Hospital stay in contrast to handsewn anastomosis. However, no mortality was noted in both techniques. Indicating the stapling technique is faster to perform, and with modern advances in recent devices of stapling, it can be applied safely and excellently in the gastrointestinal surgeries, and the surgeons should be equally expert with devices of the stapling as with needle holders and the sutures.

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