

Comparative Study of Surgical Outcome of Linear Stapled Versus Manual Anastomosis Technique During Reversal of Loop Ileostomies

ANEETA KUMARI¹, REHMAT URF SEHRISH SHAH², SEEMA SHABBIR³, AMBREEN MUNIR⁴, SYED ASAD ALI SHAH⁵, SUHAIL AHMED SOOMRO⁶

¹Registrar of general surgery, Isra University hospital Hyderabad

²Resident of general surgery, LUMHS/ Jamshoro

³Consultant general surgeon, Sindh Govt. Hospital Qasimabad/ Hyderabad

^{4,5}Professor of surgery, LUMHS/ Jamshoro

⁶Assistant Professor of surgery, Bilawal Medical College for Boys/ Jamshoro

Corresponding author: Aneeta Kumari, Email: dranita.mukesh@gmail.com

ABSTRACT

Objective: To compare the surgical outcomes of linear stapler versus manual anastomosis for the reversal of loop ileostomies

Subjects and methods: This randomized control trial was conducted in the department of General Surgery at Liaquat University Hospital Jamshoro, from June 2018 to May 2019. All the patients with an age of 14 to 45 years of either gender, having typhoid perforation, and having undergone ileostomy in an emergency after 6–12 weeks of previous surgery were included. All patients were divided into two groups. Patients in group A were reversed with a linear stapler (LS), and the others were reversed through manual suturing (MS). Patients were followed for two weeks during Hospital stay and were discharged on clinically stable condition with normal bowel movements and no complication. Outcome was measured in terms of operative time, hospital stays, and postoperative complications in both groups. All the data was recorded in the predesigned proforma and analyzed by SPSS version 26.

Results: A total of 218 patients were studied; the most common age group was 15–30 years in both groups, and males were in the majority in both groups. Anastomosis leakage occurred in 3.7% of patients in group A, while none was found in group B. The infection rate was significantly lower at 13.8% in group A compared to group B at 34.9% ($p=0.001$). Intestinal obstruction was observed in 1.8% of patients in group A compared to 8.3% in group B ($p=0.002$). Prolonged Hospital stay was significantly higher in group B (8.7%) ($p=0.001$).

Conclusion: It was concluded that stapler anastomosis is the safe, most reliable, and adaptable surgical tool for ileostomy reversal. It consumed very less operative time with very lower rate of complications and less time for follow-up as compared to manual suturing.

Keywords: Reversal loop ileostomies, linear stapler, manual anastomosis

INTRODUCTION

In the case of having intestinal perforation, a temporary colostomy, such as a Hartmann's operation, is performed. 1. With a rate of morbidity of more than 50%, reversal a Hartmann's surgery can be challenging, and as a result, many patients never get their stoma reversal. 1, 2 Wound infection, sepsis, and ileus are the most common consequences following Hartmann's reversal. A loop ileostomy is a surgically created stoma in the intestine that is generally used for temporary faecal diversion. 3 Normal intestinal passage is later re-established after closure of the loop ileostomy either manually or via linear staplers, usually after a period of 45–90 days. 4 Manual or hand sewn reversal is a conventional old method and is time consuming with a lot of edemas at the anastomotic site, which delays over all recovery and fears of anastomotic failure. More radical surgical treatments are now possible because of advancements in anastomosis methods, and stomas are commonly employed in these surgeries to minimize anastomosis leakage. 5 The use of a loop ileostomy for faecal diversion lowered mortality and morbidity, especially following anastomosis surgery. 6,7 In contrast, the linear stapler device technique is safer, quicker, with less fear of anastomotic failure in expert hands, and hence the recovery is rapid with less hospital stay. Non-specific postoperative complications reported with either type of stoma closure include wound hemorrhage, wound infection/hematoma, small bowel obstruction at the site of ileostomy closure, iatrogenic bowel injury, local abdominal wall abscess, wound dehiscence, and postoperative peri stomal dermatitis. 3,4,8 The reversal has been linked to various morbidities, according to numerous authors. 8,9 Before reversing a loop ileostomy, a sufficient dietary foundation is required to optimize the health of the patient. In order to achieve satisfactory outcomes and avoid the occurrence of particular postoperative complications connected to anastomosis, appropriate surgical principles must be applied during any kind of reversal. An experienced surgeon who is technically skilled in both approaches should conduct an ileostomy reversal. In our setup, the most common cause of construction of loop ileostomy is typhoid perforation compared to

other colorectal problems observed in developed countries. 9–11 The aim of this study is to determine the comparative surgical outcome of linear stapled versus manual anastomosis for the reversal of loop ileostomies in our population. As stapled technique is a newly introduced technique on literature search, it has been observed that international studies are available on this topic but local studies are limited, as their population is genetically and geographically different from the population, so implementation of their results is not possible. As such, a technique that shows better results in the population was recommended for practice in future.

MATERIAL AND METHODS

This randomized control trial was conducted in the department of General Surgery at Liaquat University Hospital Jamshoro, from June 2018 to May 2019. All the patients with an age of 14 to 45 years of either gender, who got typhoid perforation and underwent ileostomy in an emergency and readmitted for reversal after 6–12 weeks of previous surgery were included. Patients whose loop ileostomy was constructed after ileoanal anastomosis, restorative Panproctocolectomy, and ileopouch anastomosis for colonic malignant disease were excluded from the study. Patients with secondary ileostomy constructed after anastomotic failure and patients with positive hepatitis B and C virology were excluded. Written consent was taken from all the participants. Patients were selected through surgical OPD who had undergone loop ileostomy 45–90 days back due to typhoid perforation and were now admitted for reversal. A brief history and local examination were carried out after removing the ileostomy bag. Primary surgery documents were evaluated. Loopograms were carried out to see the patency and viability of the distal loop, along with other base line investigations. All patients were divided into two groups, group A was reversed through a linear stapler (LS), and group B was reversed through a manual suture (MS). Both techniques were performed by a senior surgeon who has had experience for more than 5 years. During their hospital stay, all of the patients were monitored for two weeks and were discharged in clinically stable condition with normal bowel movements and no complications.

Outcome was measured as operative time, hospital stays, and postoperative complications such as wound infection, anastomosis leakage, and intestinal obstruction in both groups. All the data was recorded in both groups on a predesigned proforma. All the data was entered into the SPSS 26.0 version.

RESULTS

A total of 218 patients were studied; the most common age group was 15-30 years in both groups. Of all, 84 (38.5%) were males in group A and 88 (40.4%) were males in group B. **Table: 1**

The frequency of 2-5 feces/day was significantly higher in group A than in group B, with a p-value of 0.001. 2-5 flatus /day were also significantly higher among patients in group A in contrast to group B, p-value 0.001. **Table: 2**

Anastomosis leakage occurred among a total of 8 (3.7%) patients, which was significantly associated with group B (p=0.001). Infection was found significantly lower at 13.8% in group A compared to group B at 34.9% (p=0.001). Intestinal obstruction was observed to be significantly lower at 1.8% in group A compared to group B 8.3% (p=0.002). Prolonged hospitalization occurred in 4 (1.8%) of the cases in Group A and 19 (8.7%) of the cases in Group B (p=0.001). **Table: 3**

Table 1: Patient's distribution according to age among of groups n=218

Variables		Study groups		p-value
		Group A	Group B	
Age groups	15-30 years	77(35.3%)	80(36.7%)	0.651
	31-45 years	32(14.7%)	29(13.3%)	
Gender	Males	84(38.5%)	88(40.4%)	0.507
	Females	25(11.5%)	21(9.6%)	

Group A= Linear stapler n=109, Group B= Manual suturing n=109

Table: 2 Patient's distribution according to feces/day and flatus/day among both groups n=218

Variables		Study groups		p-value
		Group A	Group B	
Feces/day	2-5	109(50.0%)	62(28.4%)	0.001
	6-10	00	42(19.3%)	
	>10	00	5(2.3%)	
	Total	109(50.0%)	109(50.0%)	
Flatus/day	2-5	109(50.0%)	82(37.6%)	0.001
	6-10	00	27(12.4%)	
	>10	00	00	
	Total	109(50.0%)	109(50.0%)	

Group A= Linear stapler, Group B= Manual suturing

Table: 3 Patient's distribution according to anastomosis leakage among both groups n=218

Variables		Study groups		p-value
		Group A	Group B	
Anastomosis leakage	Yes	00	8(3.7%)	0.004
	NO	109(50.0%)	101(46.3%)	
Infection	Yes	30(13.8%)	76(34.9%)	0.001
	NO	79(36.2%)	33(15.1%)	
Intestinal obstruction	Yes	4(1.8%)	18(8.3%)	0.002
	NO	105(48.2%)	91(41.7%)	
Prolonged Hospital stay	Yes	4(1.8%)	19(8.7%)	0.001
	NO	105(48.2%)	90(41.3%)	

Group A= Linear stapler n=109 Group B= Manual suturing n=109

DISCUSSION

A de-functioning loop ileostomy is a surgery that allows faeces to be diverted from a distal anastomosis. This procedure is mostly used to speed up the recovery of a low colorectal anastomosis and reduce the risk of an anastomotic leak. According to our findings (p=0.001), the time of the surgery differed significantly between the

two groups as manual suturing had more time consumption. Similarly, other studies reported that, during surgery, hand-sewn anastomoses have been shown to be more time-consuming and challenging to understand than stapled anastomoses.^{12,13} Furthermore, compared to hand-sewn anastomosis, stapled anastomosis is more cost-effective and has a reduced risk of comparable postoperative complications. In this study, there was a significant difference found in complications in both operative procedures as wound infection, intestinal obstruction and anastomosis leak were higher in manual suturing anastomosis as compared to stapler anastomosis. In comparison to this, Coolman et al¹⁴ reported that end-to-end intestinal anastomosis predisposes the patient to stricture formation, post-operatively. Similarly, in other studies, as with hand stitched ileostomy closure, individuals who had stapled anastomosis had quite a lower rate of complications.¹⁵

In this study, anastomosis leakage occurred among a total of 8 (3.7%) patients in the manual suturing group, while it was not found in any patient in the linear stapler group. Consistently, in the study of Yamamoto T et al¹⁶ reported that in the stapled group, there was a significantly lower rate of anastomotic leak 1(2%) compared to sutured group 6(8%). Kyzer & Gordon et al¹⁷ After 223 stapled functional end-to-end anastomoses, there was only a 0.9 percent postoperative leak rate. The biggest prospective randomized trial comparing stapled and handsewn anastomosis in 440 patients found that the stapled anastomosis group had considerably fewer leaks (2.8 percent versus 8.3 percent).¹⁸ Stapled anastomoses are more expensive than sutured anastomoses, but the extra cost is likely justified due to the lower complication rate and shorter hospital stay. Intestinal obstruction was observed among a total of 22 (10.1%) patients, out of which 4 (1.8%) were from group A and 18 (8.3%) in group B. Finally, it was observed that intestinal obstruction was significantly higher among patients in group B as compared to group A, p-value 0.002). Intestinal blockages after ileostomy closure surgeries have been reported to range from 0% to 15% in the literature. According to some studies, intestinal blockages are less common in stapler surgeries since they need a bigger anastomosis. 19. In a meta-analysis, Chow et al.²⁰ reported that the incidence of intestinal blockage was 7.2 percent, while Dinc B et al.²¹ reported that intestinal obstructions occurred in 6.06 percent of participants who were treated conservatively. In this study, infection was found among a total of 106 (48.6%) patients, followed by 30 (13.8%) in group A and 76 (34.9%) in group B. Wound infection is one of the most common consequences of ileostomy closure surgery. Despite varying rates, it is observed in approximately 18.3 percent of cases. In Chow's et al²⁰ research, wound infections were 5%, and in Hasegawa's et al²² study, wound infections were 9.2%, with no differences between groups.

In this study, there was a significant difference in total days of hospital stay according to operative procedure. The mean of total days of hospital stay was found to be 5.58±1.36 in stapler anastomosis and 10.76±2.24 in hand-sewn anastomosis. In comparison to this, a study conducted by Bangaru H et al²³ reported that the stapler group had a significantly shorter average operating time (P0.05) and the postoperative stay in hospital in both the stapler and hand-sewn groups was virtually statistically significant. Horisberger et al.²⁴ found that the cost associated with the time of the surgery was decreased in the stapler group due to the shorter duration of the operation using a stapler. Despite the fact that a stapler is a costly tool, this study found that decreasing the length of a surgery saves total hospital costs. The entire cost of using the manual method was substantially greater than the total cost of using a stapler. In two patients, the increased expense of the manual approach led to the beginning of severe problems such as anastomosis leaking.²¹ It's important to remember that ileostomy surgery has a high morbidity rate, both during the procedure and after it's over. However, no statistical differences were found, the decreased probability of anastomosis leakage with a stapler compared to the manual approach gives the impression

that using a stapler is safer.²¹ Total expenditures rise in this group because the risk of problems with manual anastomosis is higher. Furthermore, using a stapler decreases the length of a surgery, lowering overall hospital expenditures. The duration of anaesthesia is reduced, which aids postoperative healing indirectly. In order to compare the two groups, prospective randomized studies with a larger number of patients would be beneficial.²¹

CONCLUSION

It was concluded that stapler anastomosis is a safe, reliable, and adaptable surgical tool for ileostomy reversible. It consumed very less operative time with a much lower rate of complications and less time for follow-up as compared to manual suturing. Male gender and old age were significantly associated with infection, anastomosis leakage, and intestinal obstruction.

REFERENCES

- Sherman KL, Wexner SD. Considerations in stoma reversal. *Clinics in Colon and Rectal Surgery*. 2017 Jul;30(03):172-7.
- Yang P F, Morgan M J. Laparoscopic versus open reversal of Hartmann's procedure: a retrospective review. *ANZ J Surg*. 2014;84(12):965-969
- Ali SA, Soomro AG, Memon AS, Shaikh NA. Postoperative Complications of Reversal of Loop Ileostomy. *JLUMHS* 2009;8(1):23-25.
- Muneer A, Shaikh AR, Shaikh GA, Qureshi GA. Various complications in ileostomy construction. *World App Sci J* 2007;2(3):190-3.
- Papadopoulos V, Bangeas P, Xanthopoulou K, Paramythiotis D, Michalopoulos A. Stoma prolapse handmade repair under local anesthesia with variation of Altemeier method in severe patients: a case report and review of the literature. *Int J Surg Case Rep* 2017;1;(2).
- Luglio G, Pendlimari R, Holubar DS. Loop ileostomy reversal after colon and rectal surgery, a single institutional 5-year experience in 944 patients. *Arch Surg* 2011;146:1191-6.
- Courtier R, Parés D, Silva CA, et al. Clinical results of loop ileostomy closures in rectal cancer surgical patients. Effect of chemotherapy in the waiting period. *Cir Esp* 2010;88:308-13
- Mushaya CD, Chandra R, Sansom W, Keck J. Temporary diverting ileostomy via the umbilicus: a small case series. *Arch Int Surg* 2015 Mar;100(3):436-43.
- Siddiqui FG, Shaikh JM, Soomro AG, Bux K, Memon AS, Ali SA. Outcome of Ileostomy in the Management of Ileal Perforation. *JLUMHS* 2008;7(3):168-172
- Chaudhary P, Ishaq Nabi GR, Tiwari AK, Kumar S, Kapur A, Arora MP. Prospective analysis of indications and early complications of emergency temporary loop ileostomies for perforation peritonitis. *Annals Gastro Hellenic Socie* 2015;28(1):135.
- Rohit D, Jain S, Verma RS, Pandey G. Temporary Loop Ileostomy for Ileal Perforation-A Surgical Experience of 56 Cases in a Resource Limited Setting. *Sch. J. App. Med. Sci* 2017;5(5C):1931-37
- Hemming K, Pinkney T, Futaba K, et al. A systematic review of systematic reviews and panoramic meta-analysis: staples versus sutures for surgical procedures. *PLoS One*. 2013;8(10):e75132. [PMC free article]
- McLeod RS, Wolff BG, Ross S, et al. Recurrence of Crohn's disease after ileocolic resection is not affected by anastomotic type: Results of a multicenter, randomized, controlled trial. *Dis Colon Rectum*. 2009;52(5):919-27.
- Coolman B.R., N. Ehrhart, G. Pijanowski, E. J. Ehrhart and S. L. Coolman (2000). Comparison of Skin Staples with Sutures for Anastomosis of the Small Intestine in Dogs. *Vet Surg*; 29: 293-302.
- Orkin BA, Popowich DA. Anastomosis leaks – is stapler Brand A Risk Factor; 2013: Sages Society of American gastroenterology and endoscopy : Annual Meeting. 2013. [Internet] available from URL <https://www.sages.org/meetings/annualmeeting/abstracts-archive/anastomotic-leaks-stapler-brand-a-risk-factor/>.
- Yamamoto T, Bain IM, Mylonakis E, Allan RN, Keighley MR. Stapled functional end-to-end anastomosis versus sutured end-to-end anastomosis after ileocolonic resection in Crohn disease. *Scandinavian journal of gastroenterology*. 1999 Jan 1;34(7):708-13.
- Kyzer S, Gordon PH. The stapled functional end-to-end anastomosis following colonic resection. *Int J Colorectal Dis* 1992;7:125-31
- Kracht M, Hay JM, Fagniez PL, Fingerhut A. Ileocolonic anastomosis after right hemicolectomy for carcinoma: stapled or hand-sewn? *Int J Colorectal Dis* 1993;8:29-33
- Wong KS, Remzi FH, Görgün E, et al. Loop ileostomy closure after restorative proctocolectomy: outcome in 1504 patients. *Dis Colon Rectum*. 2005;48:243-50
- Chow A, Tilney HS, Paraskeva P, et al. The morbidity surrounding reversal of defunctioning ileostomies: a systematic review of 48 studies including 6,107 cases. *Int J Colorectal Dis*. 2009;24:711-23.
- Dinc B, Ay N, Ciyiltepe H. Comparing methods of ileostomy closure constructed in colorectal surgery in Turkey. *Przegląd gastroenterologiczny*. 2014;9(5):291.
- Hasegawa H, Radley S, Morton DG. Stapled versus sutured closure of loop ileostomy: randomized controlled trial. *Ann Surg*. 2000;231:202-4.
- Bangaru H, Veitla RM, Pigilam M, Kunwargiri GK. Comparative study between staplers and conventional (hand-sewn) anastomosis in gastrointestinal surgery. *Indian Journal of Surgery*. 2012 Dec 1;74(6):462-7
- Horisberger K, Beldi G, Candinas D. Loop ileostomy closure: comparison of cost effectiveness between suture and stapler. *World J Surg*. 2010;34:2867-71