



## END TO END ANASTOMOSIS VERSUS SIDE TO SIDE STAPLED ANASTOMOSIS IN CLOSURE OF ILEAL STOMAS-A PROSPECTIVE RANDOMIZED CONTROL TRIAL

### General Surgery

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### ABSTRACT

**Background:** A defunctioning ileostomy is a commonly used surgical procedure to allow faecal diversion to facilitate healing of distal anastomosis or where primary anastomosis is not possible. The method of reversing the ileostomy is by either of two techniques- Side to side (Stapler) anastomosis or end to end anastomosis. The aim is to compare outcomes of these two techniques of closure of stoma and their complication rates. **Method:** This prospective study was conducted on 50 patients admitted for ileal stoma closure in Department of General Surgery, SMS Medical College and Hospital, Jaipur during September 2020 to September 2022 after taking proper consent. Patients were divided into two groups (25 in each group)-Group A (end to end anastomosis) and group B (side to side stapler group). The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software ver 21.0. For statistical significance, p value of less than 0.05 was considered as significant. **Results:** Of 50 patients (25 in each group) there were total of 6 leaks- 5 in end to end (Group A) (2 patients requiring revision surgery) and 1 in side to side (Group B) group. The mean day of passing flatus/ motion was  $3.48 \pm 0.77$  /  $4.56 \pm 0.87$  days and  $2.52 \pm 0.59$  /  $3.36 \pm 0.49$  days in end to end and side to side group respectively. And early discharge from hospital in side to side group. **Conclusion:** The study shows superiority of side to side technique compared to hand-sewn technique in terms of early passing of flatus/motion, less leak rates, decreased hospital stay and cost effectiveness.

### KEYWORDS

Anastomosis; Bowel; End to end; Gastrointestinal; Ileal Stomas; Side to side

### INTRODUCTION

Stomas are made when we are unable to perform anastomosis or there is risk of leak due to high contamination (perforation), Koch's abdomen, inflammatory bowel diseases, gangrenous changes and after hemi colectomy or colorectal anastomosis for malignant condition. [1,2] Diverting loop ileostomy is useful for reduction of the consequences of an anastomotic leak and is considered by some authors to reduce the incidence of anastomotic complications. [3] The closure of stomas or anastomosis may be constructed using linear stapler or by suturing i.e. side to side and end to end anastomosis. The technique depends upon the site, bowel lumen and quality and underlying disease process. One important factor in the decision to perform a particular anastomosis, however, remains individual experience and preference. "The key to a successful anastomosis is the accurate union of two viable bowel ends with complete avoidance of tension" [4]. Thus, the most important factors in the creation of a bowel anastomosis are: (1) meticulous technique; (2) good blood supply; and (3) no tension. In particular, complications increase medical costs, prolong hospitalization time, and increase the need for outpatient care. This study is aimed to compare side to side and end to end techniques for closure of ileostomy and their complication rates. This prospective study was conducted on 50 patients (25 in each group) admitted for ileal stoma closure in Department of General Surgery, SMS Medical College and Hospital, Jaipur during September 2019 to September 2020 after taking proper consent.

### MATERIALS AND METHOD

This study was performed in Department of General Surgery, SMS Medical College and Hospital, Jaipur during September 2020 to September 2022 on 50 patients who were admitted for ileal stoma closure after taking proper consent. Before operation every patient's loopogram was done to rule out any distal pathology. Closure of the ileostomy (loop/double barrel) was carried out under general anaesthesia. Systematic prophylactic antibiotics (Cefuroxime 1.5 g and metronidazole 0.5 g) were administered to all patients prior to the operation. Patients were divided into two groups- In Group A (25 patients): End to end anastomosis with/without a short small bowel resection was performed by mobilizing the small bowel as much as needed for closing the stoma. In Group B (25 patients): side to side anastomosis with/without short bowel resection was performed. The complications were assessed in early postoperative period after surgery and 3-6 months follow up was kept.

### Statistical Analysis

The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the presentation of the continuous variables was done as mean  $\pm$  SD and median values. The data normality was checked by using Kolmogorov-Smirnov test. The

cases in which the data was not normal, we used non parametric tests. The following statistical tests were applied for the results:

1. The comparison of the variables which were quantitative in nature were analyzed using Mann-Whitney Test (for two groups).
2. The comparison of the variables which were qualitative in nature were analyzed using Chi-Square test/Fisher's Exact test.

The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software ver 21.0. For statistical significance, p value of less than 0.05 was considered as significant.



Fig. 1a End to end anastomosis

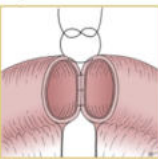


Fig. 1b\* End to end anastomosis



Fig. 2a Stapled anastomosis

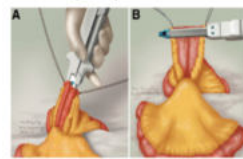


Fig. 2b\*\* Side to side Stapled anastomosis

Source: copyright © Praveen Kumar Joshi, Shreyas D S, Assistant Professor, SMS Medical College and Hospital, Jaipur. The anatomical illustration and end-to-end anastomosis in infants and children: a single surgeon's 27-year experience. J Pediatr Surg. 2018; 53(10):1717-1724. doi: 10.1016/j.jpedsurg.2017.11.012. Epub 2017 Dec 2. PMID: 29141340. \*\* Zhang, Wanding B Hong, Peng B Ding, Guangguo B Yang, Kunlin B Li, Xiaoming B Ding, Jinding B Shi, Qianqiang B Cao, Long B Shen, Guangguo B Li, Zhen B Zhang, Peng B Shi, Ning B Zhou, Liping. (2017). Technical considerations and outcomes for test-artery replacement: a retrospective study in China. BMC Surgery 17, 10.1186/s12884-016-0724-1.

### RESULTS

**Table 1:-Comparison of socio-demographic characteristics between end to end and side to side anastomosis.**

| Socio-demographic characteristics | End to end anastomosis (A)(n=25) | Side to side anastomosis (B) (n=25) | Total             | P value | Test performed        |
|-----------------------------------|----------------------------------|-------------------------------------|-------------------|---------|-----------------------|
| Age(years)                        |                                  |                                     |                   |         |                       |
| Mean $\pm$ SD                     | 39.6 $\pm$ 18.27                 | 33.88 $\pm$ 14.68                   | 36.74 $\pm$ 16.65 | 0.356   | Mann Whitney test;265 |
| Median(25th-75th percentile)      | 36(23-50)                        | 30(26-37)                           | 30(25-49.25)      |         |                       |
| Range                             | 15-80                            | 14-68                               | 14-80             |         |                       |
| Gender                            |                                  |                                     |                   |         |                       |
| Female                            | 8 (32%)                          | 13 (52%)                            | 21 (42%)          | 0.152   | Chi square test;0.152 |
| Male                              | 17 (68%)                         | 12 (48%)                            | 29 (58%)          |         |                       |

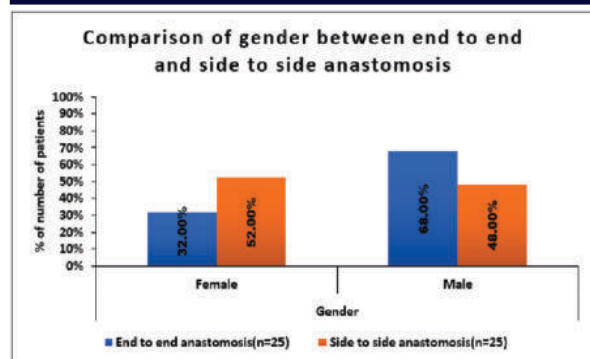


Figure 1.1:-Comparison of gender between end to end and side to side anastomosis.

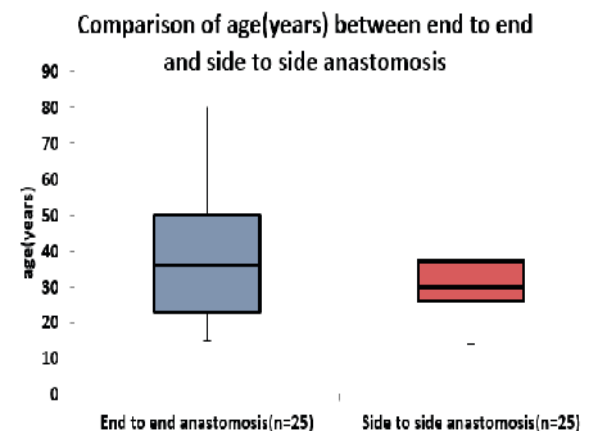


Figure 1.2:-Comparison of age(years) between end to end and side to side anastomosis.(non-parametric variable, Box-whisker plot)

Table 2:-Comparison of outcome between end to end and side to side anastomosis.

| Outcome                        | End to end anastomosis (A) (n=25) | Side to side anastomosis (B) (n=25) | Total           | P value | Test performed           |
|--------------------------------|-----------------------------------|-------------------------------------|-----------------|---------|--------------------------|
| Post-operative recovery issues | 5 (20%)                           | 1 (4%)                              | 6 (12%)         | 0.189   | Fisher Exact test        |
| Leak                           | 5 (20%)                           | 1 (4%)                              | 6 (12%)         | 0.189   | Fisher Exact test        |
| Revision of surgery            | 2 (8%)                            | 0 (0%)                              | 2 (4%)          | 0.49    | Fisher Exact test        |
| Flatus(days)                   |                                   |                                     |                 |         |                          |
| Mean $\pm$ SD                  | 3.48 $\pm$ 0.77                   | 2.52 $\pm$ 0.59                     | 3 $\pm$ 0.83    | <.0001  | Mann Whitney test; 113.5 |
| Median (25th-75th percentile)  | 3(3-4)                            | 2(2-3)                              | 3(2-3.75)       |         |                          |
| Range                          | 2-5                               | 2-4                                 | 2-5             |         |                          |
| Motion(days)                   |                                   |                                     |                 |         |                          |
| Mean $\pm$ SD                  | 4.56 $\pm$ 0.87                   | 3.36 $\pm$ 0.49                     | 3.96 $\pm$ 0.92 | <.0001  | Mann Whitney test; 79    |
| Median(25th-75th percentile)   | 5(4-5)                            | 3(3-4)                              | 4(3-4.75)       |         |                          |
| Range                          | 3-7                               | 3-4                                 | 3-7             |         |                          |
| Post-operative hospital stay   |                                   |                                     |                 |         |                          |
| Mean $\pm$ SD                  | 5.84 $\pm$ 1.8                    | 4.56 $\pm$ 0.71                     | 5.2 $\pm$ 1.5   | 0.001   | Mann Whitney test; 155.5 |
| Median (25th-75th percentile)  | 5(5-6)                            | 4(4-5)                              | 5(4-5)          |         |                          |
| Range                          | 4-10                              | 4-7                                 | 4-10            |         |                          |

Comparison of outcome between end to end and side to side anastomosis

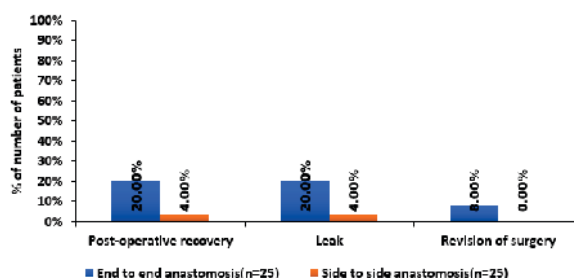


Figure 2.1:-Comparison of outcome between end to end and side to side anastomosis.

Comparison of outcome between end to end and side to side anastomosis

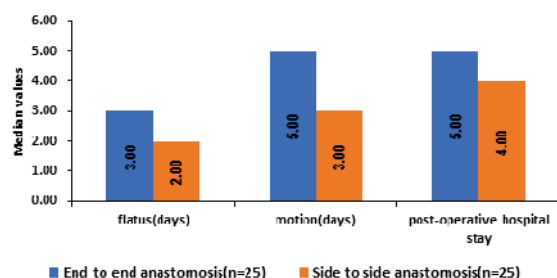


Figure 2.2 :-Comparison of outcome between end to end and side to side anastomosis.(non-parametric variables)

Table 3:-Comparison of follow up obstruction between end to end and side to side anastomosis.

| Follow up obstruction | End to end anastomosis (n=25) | Side to side anastomosis (n=25) | Total     | P value | Test performed    |
|-----------------------|-------------------------------|---------------------------------|-----------|---------|-------------------|
| Normal                | 23 (92%)                      | 25 (100%)                       | 48 (96%)  | 0.49    | Fisher Exact test |
| Obstruction           | 2 (8%)                        | 0 (0%)                          | 2 (4%)    |         |                   |
| Total                 | 25 (100%)                     | 25 (100%)                       | 50 (100%) |         |                   |

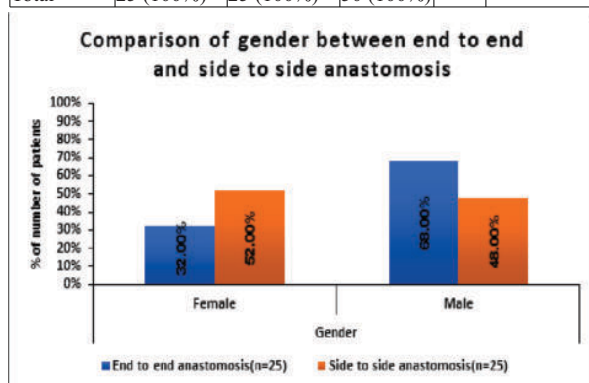


Figure 3: - Comparison of follow up obstruction between end to end and side to side anastomosis.

## DISCUSSION

Ileostomies are becoming increasingly popular among surgeons as they are simple to make and close than conventional loop colostomy. [5,6] It has been suggested that stapled closure of ileostomy may reduce the complication rate from bowel obstruction because the lumen created using a stapled side-to-side technique may be wider than that created by sutured closure.[7] In this randomized controlled study, we found that sutured closure was associated with a higher rate of leak that is in 5(20%) of which only 2 required revision surgery and other patients were managed conservatively [8] and only 1(4%) in stapler group which didn't require any surgery. This may be explained by the fact that stapled closure is relatively less dependent on surgical skills than sutured closure and wider calibre in stapled anastomosis. Recovery rate was also good in stapler group. The mean day of passing

flatus/ motion was mean  $3.48 \pm 0.77$  /  $4.56 \pm 0.87$  days and  $2.52 \pm 0.59$  /  $3.36 \pm 0.49$  days in Group A and Group B respectively. And early discharge from hospital in Group B mean  $4.56 \pm 0.71$  days. These can also be explained by the above-mentioned statement i.e. lumen size is increased by stapler anastomosis. Only 2 patients reported with obstruction in follow-up who was reoperated, obstruction was due to tuberculous stricture just before the closure site in one patient; the other patient had a loop of bowel obstructed as a result of adhesions.

In this study, stapled closure resulted in a lower risk of leak, bowel obstruction and good recovery of the patient and cost-effective method for ileostomy closure as less hospital stay and less financial burden but opposed by some studies. [9] We did not attach too much importance to the operating time difference between the groups because of the wide confidence intervals. We still recommend stapled closure rather than sutured closure of ileostomy because of the lower risk of post-operative complication. [10,11,12]

### LIMITATION

Although in our study stapled anastomosis was better as compared to hand sewn end to end anastomosis for ileostomy closure but sample size (n=50) is not adequate to establish strong acceptance. Further studies are required to obtain confidence.

### CONCLUSION

The study shows superiority of side to side technique compared to hand-sewn technique in terms of early passing of flatus/motion, less leak rates, decreased hospital stay and cost effectiveness.

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