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Comparative Analysis of Single-Layered vs. Double-Layered Bowel Anastomosis Closure Techniques: An Analytical Cross-Sectional Study

Dr. Vishnapu Shyam Krishna[1], Dr. S. Vishnu Sai Ram[2], Dr. K Suhas[3]

[1]Post Graduate, Department of General Surgery, Alluri Seetharamaraju Academy of Medical Sciences, Eluru, 534005, Andhra Pradesh, India
Email: *ramshyam2411[at]gmail.com*

[2]M. B. B. S, M. S. (General Surgery)

[3]Professor and HOD, Department of General Surgery, Alluri Seetharamaraju Academy of Medical Sciences, Eluru 534005, Andhra Pradesh, India

Abstract: ***Objective: To evaluate and compare the clinical outcomes of single-layered (SL) and double-layered (DL) bowel anastomosis techniques in terms of postoperative recovery, complications, and patient safety. Methods: This analytical cross-sectional study was conducted on 50 patients undergoing bowel anastomosis at King George Hospital, Visakhapatnam. Patients were randomly assigned to receive either SL or DL closure (25 each). Postoperative parameters including time to bowel sound return, passage of flatus and stool, duration of hospital stay, and complication rates were recorded and analyzed using SPSS v24.0. Results: SL closure led to earlier passage of flatus (3 vs.4 days), earlier stool passage (6 vs.7 days), and shorter hospital stays (8 vs.10 days) compared to DL closure. These differences were statistically significant (p<0.05). Bowel sounds returned on the same day in both groups. No significant differences in anastomotic leaks or surgical site infections were noted. Conclusion: SL bowel anastomosis is a safe and effective alternative to DL closure. It offers improved postoperative recovery and reduced hospital stay, suggesting its preferable use in routine surgical practice.***

Keywords: Bowel anastomosis, single-layer closure, double-layer closure, postoperative recovery, gastrointestinal surgery

1. Introduction

Bowel anastomosis is a vital surgical procedure performed following bowel resection to re-establish gastrointestinal continuity. It is commonly indicated in cases of bowel obstruction, perforation, gangrene, trauma, and malignancy. Traditionally, the double-layer (DL) suturing technique has been the standard approach due to its perceived strength and security. However, concerns such as tissue strangulation, narrowing of the bowel lumen, prolonged operative time, and foreign body reaction have prompted investigation into alternative methods.

The single-layer (SL) closure technique, which uses a continuous or interrupted extra mucosal suture in a single pass, has gained traction due to its simplicity, reduced operative time, and favourable postoperative outcomes. Several studies have highlighted the efficiency of SL closure, noting its association with reduced tissue trauma, faster return of bowel function, and lower costs. Despite these potential benefits, widespread adoption is limited due to concerns regarding anastomotic integrity and long-term complications. This study aims to contribute to the body of evidence by comparing postoperative outcomes between SL and DL techniques in a clinical setting.

2. Materials and Methods

This was a hospital-based analytical cross-sectional study conducted over 19 months (March 2023 to March 2024) in the Department of General Surgery, Alluri seetharamaraju academy of medical sciences, Eluru.

Inclusion Criteria: Patients undergoing laparotomy with bowel anastomosis.

Exclusion Criteria: Patients with diabetes mellitus, tuberculosis, those on steroids, or with colorectal anastomosis were excluded.

Sample Size: 50 patients were included, divided equally into two groups of 25 each.

Group Allocation:

- **Group A (SL):** Single-layer extramucosal anastomosis using vicryl sutures.
- **Group B (DL):** Double-layer closure with a first continuous layer of vicryl followed by seromuscular silk reinforcement.

Outcome Measures: Postoperative outcomes included time to return of bowel sounds, passage of flatus and stools, duration of hospital stay, and occurrence of complications (e. g., anastomotic leak, infection).

Statistical Analysis: Data were analyzed using SPSS v24.0. Categorical variables were compared using Chi-square or Fisher's exact test. Mann-Whitney U test was used for continuous variables. A p-value <0.05 was considered statistically significant.

3. Results

Demographics: Most patients were males (84%) and aged between 51–60 years (42%). The most common indication for surgery was ileal perforation (86%).

Postoperative Outcomes

Parameter	SL Group (Mean ± SD)	DL Group (Mean ± SD)	p – value
Bowel Sounds (days)	2.52 ± 0.59	3.24 ± 0.72	0.001
Flatus Passage (days)	3.40 ± 0.65	4.04 ± 0.74	0.002
Stool Passage (days)	6.24 ± 0.83	6.76 ± 0.88	0.031
Hospital Stay (days)	8.32 ± 1.03	9.92 ± 1.12	0.001

Complications: No significant difference in the rate of anastomotic leaks or wound infections between the groups.

4. Discussion

The findings of this study suggest that single-layer bowel anastomosis offers significant benefits in terms of faster recovery and reduced hospital stay without increasing complication risks. These results align with previous studies by Shah et al., Wayand et al., and Maurya et al., which similarly reported shorter time to return of bowel function and shorter hospitalization for SL closures.

The simplicity of the SL technique may contribute to less tissue trauma and better preservation of blood supply, facilitating quicker healing. Moreover, fewer sutures reduce the risk of foreign body reactions and potential sites for infection. The results of this study reinforce the notion that SL anastomosis can be a safe and efficient technique for bowel surgery.

While some previous studies (e. g., Ordorica et al.) found no difference in outcomes, the consistency across multiple other investigations and our study support SL as a viable, perhaps preferable, alternative to DL anastomosis.

5. Conclusion

Single-layer bowel anastomosis is a clinically effective and safe technique, offering advantages of faster gastrointestinal recovery and shorter hospital stays compared to the traditional double-layer method. Given these findings, the SL method may be recommended as the preferred closure technique in appropriate clinical settings. Further studies with larger populations and longer follow-up are encouraged to confirm these results and assess long-term outcomes.

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