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Comparison of Recovery in Single Layer Vs Double Layer Closure Technique in Patients Undergoing Ileostomy Reversal

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ABSTRACT

Objective: To evaluate the outcomes of recovery based on single-layer versus double-layer suture closure techniques in patients who have undergone ileostomy reversal. **Methods:** After the ethical approval from the institutional review board, this comparative observational study was conducted at Nishtar Hospital Multan, from 1st September 2023 to 1st March 2024. Through non-probability consecutive sampling, 50 patients above age 18 years, both genders, Patients with ASA class I-III, Patients who are undergoing a temporary ileostomy for any clinical indication, such as colorectal cancer, inflammatory bowel disease, or trauma, and are now candidates for ileostomy reversal were included in the present study. Patients were randomly divided into two groups; Group A single layer suture (n=25) and Group B- double layer suture (n=25). **Results:** In the present study, the most common type of anastomosis is entero-enteric, and the least was colo-rectal. The mean duration of was significantly greater in group B as compared to group A (19.6±1.9 vs. 30.0±1.8, p<0.0001). Most common complication was wound infection in both study groups. The mean duration of the participants in the hospital is almost similar between the groups (8.4±1.4 and 8.7±0.8; p=0.284). **Conclusion:** Hence, based on our findings, the single-layer approach while conducting the ileostomy reversal can be beneficial and indeed result in a reduction in time, without any difference in complications. Additionally, it is also easier to train surgical residents in the single-layer techniques, as opposed to the double-layered technique, especially in a teaching institute setting. We recommend the usage of the single-layer method while conducting the ileostomy reversal based on this study.

INTRODUCTION

The surgical reversal of ileostomy is a crucial step towards restoring normal gastrointestinal function in patients who underwent temporary diversion for varied reasons. One of the critical aspects of this surgical procedure is the closure of the abdominal incision, which is completed using a single-layer or double-layer suture technique (1). Several factors determine the choice between these two techniques, including patient recovery impact and surgical outcomes and complications (2). The debate on the use of single-layer versus double-layer suture closure in surgical practice has been ongoing, with variations between the opinions of surgeons based on clinical training, experience, and consideration of evolving evidence (3). Early studies cited by Saravanan et al. indicated double-layer closure's beneficial strength and security, reducing the chances of anastomotic leakage and wound dehiscence. However, concerns were raised regarding the method's relative disadvantages, such as an increased risk of stricture formation and additional operating time (4). In contrast, recent studies have placed more preference on the single-layer technique, arguing that the technique has equal if not better healing and complications outcomes compared to the double-layer method concluding that it considerably reduces operative time, tissue handling, and foreign body load (5). A meta-analysis by Zeeuw et al also found no differences in anastomotic leakage or hernia formation, prompting the need for more studies to demonstrate whether single- or double-suture suturing is more beneficial (6). Some more progressed studies are currently looking into patient-centered outcomes, such as the intensity of pain, time to recovery and resumption of normal daily life, and quality of life. For instance, Patel et al. reported an overall lesser pain and faster recovery times with a lower pain score on single-layer closure patients (7). Therefore, the evolving studies

based on evidence and best practices in scoping appropriate closure suture techniques show a lack of consensus from variations in methodologies outcome measures, and patient populations. Potential factors such as the addition of barbed sutures, the use of tissue glues, and state-of-the-art technologies further bring new variables. This paper seeks to evaluate the outcomes of recovery based on single-layer versus double-layer suture closure techniques in patients who have undergone ileostomy reversal.

METHODS

After the ethical approval from the institutional review board, this comparative observational study was conducted at Nishtar Hospital Multan, from 1st September 2023 to 1st March 2024. Through non-probability consecutive sampling, 50 patients above age 18 years, both genders, Patients with ASA class I-III, Patients who are undergoing a temporary ileostomy for any clinical indication, such as colorectal cancer, inflammatory bowel disease, or trauma, and are now candidates for ileostomy reversal were included in the present study. Patients with multiple abdominal surgeries, patients with infections at surgical sites, and pregnant females were excluded from the present study. Patients were randomly divided into two groups; Group A single layer suture (n=25) and Group B- double layer suture (n=25). After the informed consent from the patients, demographic details including age, gender, and body mass index (BMI) were recorded alongside information on comorbidities and the American Society of Anesthesiologists (ASA) score to assess patients' overall health status. Surgical history, specifically prior abdominal surgeries and details of the initial ileostomy creation surgery was documented. In the single layer group, ileostomy closure was performed by interrupted method with seromuscular non-absorbable silk 3-0 suture. In double-layer ileostomy closure was performed by the inner layer continuous absorbable 3-0 polyglactin 910 suture and the external layer was with interrupted 3-0 silk suture. Operative and post-operative outcome with wound infection, intraabdominal abscess, stricture of anastomosis site, anastomotic leak, peritonitis, septicemia and time taken for surgery, cost factor, wound infection, intra-abdominal abscess and death for wound infection, intra-abdominal abscess and stricture of anastomosis site. SPSS version 21 was used for the analysis of the data. Continuous variables were presented as Mean and standard deviation and categorical variables were presented as frequency and percentage. A T-test was utilized to compare the study variables between the groups. P ≤0.05 was considered significant.

RESULTS

A total of 50 patients were included in the study, with 25 patients in each group. The analysis compared demographic characteristics, clinical variables, complications, and follow-up outcomes between patients undergoing single-layer and double-layer closure techniques for ileostomy reversal. The findings provide insights into the differences in surgical outcomes, complication rates, and recovery patterns between the two techniques.

Table 1 shows the demographic data while table 2 shows clinical parameters of the study participants in both groups. Hence the table 3 shows the follow up data. The mean age of the participants in both groups was 37.04±8.7 and 38.28±7.5 years. The majority of the participants were male in both study groups (68% vs. 80%). The mean BMI of the study participants in both groups was 23.84±2.1 and 23.16±1.6 kg/m^2. The mean hemoglobin level, total serum protein levels, and serum albumin were similar in both the study groups. In the present study, the most common type of anastomosis is entero-enteric, and the least was colo-rectal. The mean duration of was significantly greater in group B as compared to group A (19.6±1.9 vs. 30.0±1.8, p<0.0001). Most common complication was wound infection in both study groups. The mean duration of the participants in the hospital is almost similar between the groups (8.4±1.4 and 8.7±0.8; p=0.284).

Table 1

Demographic Variables

Variables	Group A (n=25)	Group B (n=25)	P-value
Age (years)	37.04 ± 8.7	38.28 ± 7.5	0.376
Male gender	17 (68%)	20 (80%)	0.08
BMI (kg/m²)	23.84 ± 2.1	23.16 ± 1.6	0.15
Hemoglobin (g/dL)	11.36 ± 1.4	11.6 ± 1.5	0.387
Total Serum Proteins (g/dL)	7.6 ± 2.5	8.0 ± 2.4	0.126
Serum Albumin (g/dL)	3.48 ± 0.32	3.48 ± 0.30	0.432

Figure 1

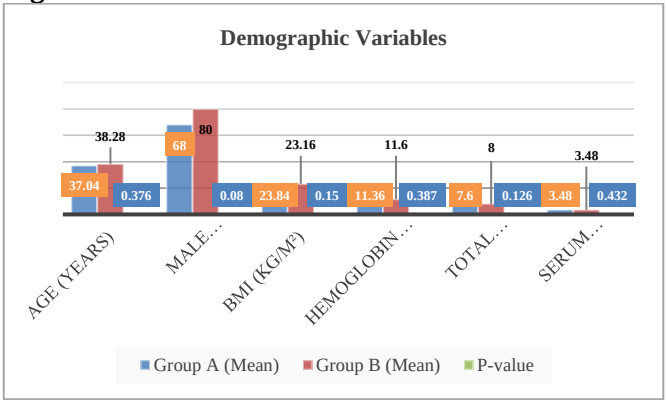


Table 2

Clinical Variables

Variables	Group A (n=25)	Group B (n=25)	P-value
Type of anastomosis			0.002
Colo–colic	3 (12%)	2 (8%)	
Colo–rectal	3 (12%)	1 (4%)	
Entero-colic	5 (20%)	2 (8%)	

Entero-enteric	14 (56%)	20 (80%)	
Duration of anastomosis (min)	19.6 ± 1.9	30.0 ± 1.8	<0.0001
Complications			
Abscess	3 (12%)	4 (16%)	0.327
Fistula	2 (8%)	2 (8%)	0.432
Intestinal Obstruction	0	4 (16%)	0.043
Leak	3 (12%)	5 (20%)	0.161
Wound Infection	5 (20%)	9 (36%)	0.043
Wound Dehiscence	5 (20%)	6 (24%)	0.287
Duration of hospital stay (days)	8.4 ± 1.4	8.7 ± 0.8	0.284

Figure 2

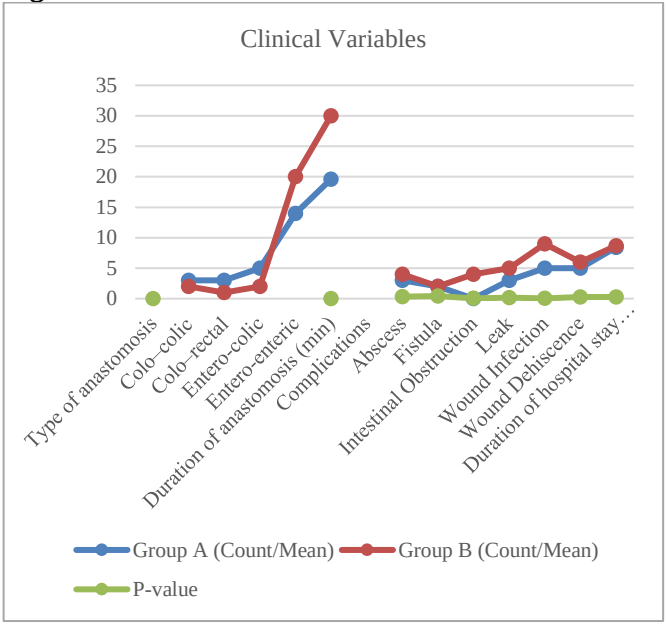
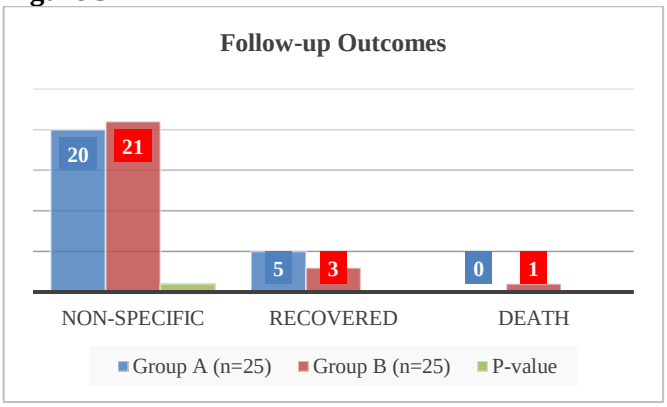


Table 3

Follow-up Outcomes

Outcome	Group A (n=25)	Group B (n=25)	P-value
Non-specific	20	21	1.0000
Recovered	5	3	
Death	0	1	

Figure 3



DISCUSSION

Similar to the research conducted by Kumar et al., the average age in group A (SL) and group B (DL) was 38.69 years and 34.35 years, respectively(8). The study population was predominantly male. Out of the total of 50 patients, 37 of them, which accounts for 71.7%, were men. However, it was determined that this finding was statistically insignificant. This observation aligns with the majority of males in the study sample conducted by Patil et al., where 70% of the patients were male (9). The aforementioned studies exhibit a higher proportion of male patients in both categories and consequently, in the overall study sample.

The most common anastomosis performed in our study was an Entero-enteric type, and the least was a colorectal anastomosis. The findings of our study correspond with that of Patil et al., Kumar et al., Sharma et al., and Patro et al., and in the case of the herein studies, EE anastomoses were the most common type of anastomosis being performed (10, 11). The mean ±SD duration of anastomosis in the SL group is 19.57 ±2.25 minutes, whereas it is 30 ± 2.59 minutes in the DL group, and the difference in the duration of anastomosis is statistically significant. The mean duration was significantly greater in group B as compared to group A (19.6±1.9 vs. 30.0±1.8, p<0.0001). This finding coincides with the study of Singh et al; and Dhamnaskar et al., who reported that the time to perform an anastomosis was statistically time-consuming for DL than for SL (10, 12).

The mean duration of the hospital stay was found to be 8.4±1.4 in the A group and 8.7±0.8days in the B group, and the difference was statistically insignificant. This is similar to the findings by Kumar et al. as no statistically significant difference between the two groups in terms of duration of hospital stay was noted (8). However, studies by Sharma et al. and Owaid et al. found a significant difference in the duration of hospital stay between the SL and DL groups (11, 13). Dhamnaskar et al. noted that there was also a significant difference between the SL and DL groups with SL 8.84 ± 3.11 days and DL 10.44 ± 5.87 days [p=0.048] (12). The most common complication in our study was wound infections, seen in a total of 14 cases, in 56% of patients, followed by wound dehiscence in 11 (44%) of patients. Mittal et al. observed a 20% incidence of wound infection, in their study of 60 cases of ileostomy reversal, and an 8.3% wound dehiscence (14).

CONCLUSION

Hence, based on our findings, the single-layer approach while conducting the ileostomy reversal can be beneficial and indeed result in a reduction in time, without any difference in complications. Additionally, it is also easier to train surgical residents in the single-layer techniques, as opposed to the double-layered technique, especially in a teaching institute setting. We recommend the usage of the single-layer method while conducting the ileostomy reversal based on this study.

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