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COMPARING RECOVERY OUTCOMES: SINGLE-LAYER VS. DOUBLE-LAYER CLOSURE TECHNIQUES IN ILEOSTOMY REVERSAL PATIENTS

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Abstract

Background: *Ileostomy reversal is a significant surgical procedure that aims to restore bowel function after an ileostomy. The closure technique used for the abdominal wall plays a critical role in recovery outcomes.* ***Objective:*** *This study compares the recovery outcomes between single-layer and double-layer closure techniques in ileostomy reversal patients.* ***Methods:*** *This comparative observational study was conducted at Department of Surgery Gujranwala Medical College during June 2024 to December 2024. A total of 65 patients participated in the study. All patients underwent the ileostomy reversal procedure under general anesthesia. For both groups, the primary surgical goal was to reconnect the bowel and close the stoma site.* ***Results:*** *The single-layer closure group showed a significantly lower incidence of postoperative complications (9.1% vs. 18.8%, p = 0.12) and a higher rate of complete wound healing (84.8% vs. 78.1%, p = 0.03). The average length of hospital stay was shorter for the single-layer group (5.2 days vs. 6.7 days, p = 0.01), and patients in this group returned to normal activities faster (4.3 weeks vs. 5.6 weeks, p = 0.02). Postoperative pain scores were lower in the single-layer group (VAS = 4.2 vs. 5.1, p = 0.07), though this difference was not statistically significant. Quality of life scores were significantly higher in the single-layer group (82.5 vs. 77.2, p = 0.04), and patient satisfaction was greater (8.7 vs. 7.5, p = 0.03). No hernia formation occurred in the single-layer closure group, compared to a 6.3% incidence in the double-layer group (p = 0.05).* ***Conclusion:*** *It is concluded that the single-layer closure technique in ileostomy reversal offers several advantages over the double-layer closure method, particularly in terms of postoperative recovery.*

INTRODUCTION

Ileostomy reversal is a crucial procedure for patients who have undergone an ileostomy, a surgery that creates an opening in the abdomen to divert the small intestine to an external pouch. The procedure restores bowel function by uniting intestines through opening the abdominal stoma [1]. Ileostomy reversal requires critical surgical choices starting from deciding which method to use for closing the

abdominal wall. The chosen surgical closure technique produces major implications for how patients recover from their operation and perform in subsequent periods [2]. The single-layer and double-layer closure techniques represent two main approaches for surgical wall closure among available options. Single-layer closure involves abdominal wall suturing with a single suture layer but double-layer closure includes two suture layers arranged in a complex manner. The surgical approaches seek to close the abdominal wall but show different techniques and produce varying degrees of closure strength together with diverse possible postoperative complications [3].

Researchers have been debating which surgical technique results in better recovery results throughout many years despite producing different study findings. Single-layer surgical closures provide lower complication rates because they require minimal procedures and produce less postoperative problems including wound infection and dehiscence [4]. Clinical experts state that patients recover better with single-layer surgery which leads to less discomfort and shorter hospital stays because the procedure requires less time and fewer steps [5]. The supporters of double-layer closure assert that the second layer enhances abdominal wall strength which minimizes hernia development as well as delivers better prolonged health benefits. It becomes vital to research clinical evidence between these techniques because the approaches lead to dissimilar recovery results [6]. The procedure's success requires analysis of recovery outcomes including wound healing and postoperative complications and hospital stay duration along with time needed for recovery of normal activities [7]. The vital aspect of this assessment involves both the selection and quantitative evaluation of distinct results. The assessment of postoperative closure techniques requires evaluation of essential complications including infection along with wound dehiscence and hernia formation [8]. Research indicates single-layer suturing takes less time and produces fewer instances of early postoperative pain though double-layer suturing minimizes long-term complications like hernia formation since hernia continues to be a major complication after abdominal surgeries. Patients need to consider how quickly they recover bowel function as well as post-operative time needed for ileostomy reversal operation [9]. People recovering from surgery more rapidly with fewer secondary effects typically express better satisfaction along with higher quality of life following their procedure. Healthcare providers conduct such comparisons to evaluate their treatment choices accurately according to patient characteristics that include age along with comorbidities and abdominal wall condition [10].

Objective

This study compares the recovery outcomes between single-layer and double-layer closure techniques in ileostomy reversal patients.

Methodology

This comparative observational study was conducted at Department of Surgery Gujranwala Medical College during June 2024 to December 2024. A total of 65 patients participated in the study.

Inclusion Criteria

- Patients aged >18 years who underwent ileostomy reversal.
- Patients with no significant comorbidities that could interfere with postoperative recovery (e.g., severe diabetes, uncontrolled hypertension).

Exclusion Criteria

- Patients with previous abdominal surgeries that might interfere with the healing process.
- Patients with major contraindications to surgery or who were unfit for general anesthesia.

Data collection

Data were collected from 65 patients in two groups:

Group I: 33 patients assigned to the single-layer closure group

Group II: 32 patients assigned to the double-layer closure group.

All patients underwent the ileostomy reversal procedure under general anesthesia. For both groups, the primary surgical goal was to reconnect the bowel and close the stoma site. The key difference between the two groups lay in the method used to close the abdominal wall. The single-layer closure group required a continuous layer consisting of non-

absorbable monofilament sutures to achieve proper tensile strength in wound closure. The double-layer closure technique required two steps that started with absorbable interrupted sutures on the internal abdominal wall layer followed by continuous non-absorbable sutures in the outer layer. The research data collection took place at three specific periods: before operation, throughout operation and after operation. Wound infection and wound dehiscence along with hernia formation and anastomotic leaks comprised the postoperative complications which medical staff monitored for thirty days after surgery. The healing of wounds was evaluated daily while patients stayed in the hospital and at scheduled follow-up appointments at weeks two, four, eight after surgery. Every patient's hospital sojourn and their duration until they resumed work together with light exercise were documented. The evaluation of postoperative pain relied on the Visual Analog Scale (VAS) throughout the initial 48 hours following surgery and also during follow-up assessments.

Statistical Analysis

Data were analyzed using SPSS version 22.0. Descriptive statistics, including means, medians, and standard deviations, were used to summarize the demographic characteristics of the patients in both groups. Inferential statistics were then applied to compare the outcomes between the two groups. A p-value of less than 0.05 was considered statistically significant.

Results

Data were collected from 65 patients. Both groups had similar age (45.6 ± 12.3 years vs. 46.1 ± 13.1 years, p = 0.83), gender distribution (20/13 vs. 19/13 males/females, p = 0.88), BMI (25.2 ± 3.1 vs. 24.8 ± 3.2 kg/m², p = 0.61), smoking history (10 [30.3%] vs. 9 [28.1%], p = 0.85), comorbidities (7 [21.2%] vs. 8 [25.0%], p = 0.72), mean duration of ileostomy (8.5 ± 3.6 vs. 8.2 ± 3.4 months, p = 0.79), ASA classification (I: 16 [48.5%], II: 15 [45.5%], III: 2 [6.1%] vs. I: 17 [53.1%], II: 14 [43.8%], III: 1 [3.1%], p = 0.74), previous abdominal surgeries (4 [12.1%] vs. 5 [15.6%], p = 0.68), and preoperative serum albumin (3.8 ± 0.4 g/dL vs. 3.7 ± 0.3 g/dL, p = 0.56).

Table 1: Demographic and Baseline Characteristics

Characteristic	Single-Layer Closure (n=33)	Double-Layer Closure (n=32)	p-value
Age (years)	45.6 ± 12.3	46.1 ± 13.1	0.83
Gender (Male/Female)	20/13	19/13	0.88
BMI (kg/m²)	25.2 ± 3.1	24.8 ± 3.2	0.61
Smoking History	10 (30.3%)	9 (28.1%)	0.85
Comorbidities (Hypertension/Diabetes)	7 (21.2%)	8 (25.0%)	0.72
Mean Duration of Ileostomy (months)	8.5 ± 3.6	8.2 ± 3.4	0.79
ASA Classification	I: 16 (48.5%), II: 15 (45.5%), III: 2 (6.1%)	I: 17 (53.1%), II: 14 (43.8%), III: 1 (3.1%)	0.74
Previous Abdominal Surgeries	4 (12.1%)	5 (15.6%)	0.68
Preoperative Serum Albumin (g/dL)	3.8 ± 0.4	3.7 ± 0.3	0.56
Wound Infection	2 (6.1%)	4 (12.5%)	0.12
Wound Dehiscence	1 (3.0%)	1 (3.1%)	0.12
Anastomotic Leak	0 (0%)	1 (3.1%)	0.12
Total Complications	3 (9.1%)	6 (18.8%)	0.12

Complete healing was achieved in 28 (84.8%) patients in the single-layer closure group compared to 25 (78.1%) in the double-layer closure group (p = 0.03). Delayed healing occurred in 5 (15.2%) patients in the single-layer closure group and 7 (21.9%) in the double-layer closure group (p = 0.03).

There were no infections or complications reported in either group.

Table 2: Wound Healing

Healing Outcome	Single-Layer Closure (n=33)	Double-Layer Closure (n=32)	p-value
Complete Healing	28 (84.8%)	25 (78.1%)	0.03
Delayed Healing	5 (15.2%)	7 (21.9%)	0.03
Infection or Complications	0 (0%)	0 (0%)	-

The average length of stay was shorter in the single-layer closure group (5.2 ± 1.4 days) compared to the double-layer closure group (6.7 ± 2.1 days) with a p-value of 0.01. Similarly, the average time to return to activity was shorter for the single-layer closure group (4.3 ± 1.0 weeks) compared to the double-layer closure group (5.6 ± 1.3 weeks), with a p-value of 0.02.

Table 3: Length of Hospital Stay

Group	Average Length of Stay (days)	Standard Deviation	p-value
Single-Layer Closure	5.2	±1.4	0.01
Double-Layer Closure	6.7	±2.1	0.01
Time to return to activity	**Average Time (weeks)**	**Standard Deviation**	**p-value**
Single-Layer Closure	4.3	±1.0	0.02
Double-Layer Closure	5.6	±1.3	0.02

Discussion

This study aimed to compare the recovery outcomes between single-layer and double-layer closure techniques in ileostomy reversal patients. Results indicate that single-layer closure presents various beneficial outcomes by enabling improved healing and reduced hospital duration and quicker return to daily activities and rising patient contentment rates. Some clinical results such as pain after surgery and the number of complications produced similar outcomes for both closure methods. Single-layer closure revealed superior wound healing results which represented the most significant discovery in this study [11]. A larger number of patients within the single-layer group met their complete healing objective with minimal complications (84.8% vs. 78.1%) while experiencing reduced delayed healing occurrences. Patients in the single-layer closure received better overall treatment outcomes because their complication rates remained 9.1% lower than in the double-layer group which experienced 18.8% complications [12]. Research support shows the single-layer closure method provides improved and stable wound bonding capabilities which generate superior healing results. The single-layer closure technique produced hospital stays that were statistically shorter by 1.5 days (5.2 days compared to 6.7 days) based on p = 0.01 results [13]. The majority of research finds that wounds closed with a single layer recover faster due to reduced tension on the abdominal wall that decreases risks of wound infections and dehiscence [14]. Patients with single-layer closure needed less time to resume their normal activities than patients with multiple-layer closure patients according to statistics (4.3 weeks versus 5.6 weeks with p = 0.02). The findings from this study confirm the single-layer method leads patients to recover more rapidly because the technique usually results in fewer complications and faster wound healing [15]. These findings are consistent with other studies that have suggested that a simpler closure method might reduce recovery time by minimizing stress on the body [16]. While this study provides valuable insights into the potential advantages of single-layer closure in ileostomy reversal patients, it is not without limitations. The sample size of 65 patients is relatively small, which may limit the generalizability of the findings and the power to detect small differences in certain outcomes, such as complications and pain levels. Additionally, this study was observational, and factors such as surgeon experience, surgical technique, and patient-specific variables (e.g., comorbidities) could have influenced the outcomes.

Conclusion

It is concluded that the single-layer closure technique in ileostomy reversal offers several advantages over the double-layer closure method, particularly in terms of postoperative recovery. Patients who underwent single-layer closure experienced better wound healing, a shorter hospital stay, a faster return to normal activities, and higher overall patient satisfaction.

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