

Outcome of Conventional Linear Versus Purse String Skin Closure of Intestinal Stoma Reversal

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Abstract

Background: Stoma closure is one of the most frequently performed surgery. The common complications are surgical site infection (SSI) and poor scar cosmesis. Compared to the conventional linear closure, the purse-string closure technique is expected to have less wound infection, smaller size scar and good patient satisfaction. The aim of this study is to evaluate the feasibility of PSC of stoma site at a tertiary hospital and comparing it with LC of stoma.

Materials and methods: This study was performed in the Department of General Surgery, Chittagong Medical College Hospital for a period of one year with a sample size of 72. About 36 subjects were enrolled in each group, Group-A (Linear closure) and Group-B (Purse string closure). Each patient of both group were observed for wound infection, post-operative pain, scar formation, patient satisfaction, and length of post-operative hospital stay.

Results: The level of pain according to VAS score was 4 in 36 (100.0%) in Group A and 6(16.7%) in Group B. One third (33.3%) patients had wound infection in Group A and 4(11.1%) in Group B. The mean duration of hospital stay was 9.72±3.46 days in Group A and 7.97±2.46 days in Group B which is statistically significant ($p<0.05$). The mean patient satisfaction score was 17.75±1.59 in Group A and 22.12±0.73 in Group B which is statistically significant ($p<0.05$). The mean patient scar assessment scale was 42.47±0.99 in Group A and 35.88±2.81 in Group B which is statistically significant ($p<0.05$). The mean observer scar assessment scale was 41.97±1.28 in

Group A and 36.22±2.73 in Group B which is statistically significant ($p<0.05$).

Conclusion: Purse-string skin closure for stoma reversal had significantly less incidence of surgical wound infection, improved the scar outcome, good patient satisfaction, reduce complications and better cosmesis.

Key words: Linear Closure (LC); Patient and Observer Scar Assessment Scale (POSAS); Purse String Closure (PSC); Patient Satisfaction Score; Stoma Closures; Scar Cosmesis; Visual Analogue Scale (VAS).

Introduction

Stoma closure is considered a minimally invasive surgery, however temporary stoma reversal after colorectal surgery is associated with complication rates as high as 5%.^{1,2}

Various stoma closure techniques have been employed to reduce this appallingly higher level of Surgical Site Infection (SSI) in these patients, such as primary continuous or interrupted stitch wound closure, primary closure with drain, loop primary closure, delayed primary closure, secondary closure and Purse String Closure (PSC).³

The purse string closure technique combines the concept of leaving the wound open to provide drainage and minimize Stoma Closure Site Infection (SCSI) while still providing some degree of wound apposition to minimize healing time.

The aim of this study is to evaluate the feasibility of PSC of stoma site at a tertiary hospital and comparing it with LC of stoma. Outcome variable were SSI, length of hospital stays, Scar formation, patient's satisfaction and post-operative pain.

Materials and methods

This is a Quasi Experimental study which was performed on 72 patients who underwent a loop ileostomy and loop colostomy reversal from 15th July 19 to 15th June 20 at the Department of Surgery, Chittagong Medical College Hospital. A protocol was approved by the Ethical Review Committee and Institutional Review Board at the Chittagong Medical College Hospital.

Patients eligible for stoma closure were selected according to inclusion and exclusion criteria. For group-A Linear Closure and group-B Purse string

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closure were done. Convenient sampling technique was applied for this study. Written informed consent was taken from participants. All the patients in this study were given prophylactic antibiotic before the procedure.

For linear skin closure patients were received elliptical incision around the stoma and for Purse string closure patient were received a circular incision around the stoma. After proper adhesiolysis of the stoma a simple closure or resection-anastomosis of gut was performed. After insertion of intestine into the abdomen a drain was kept in pelvis. Then a layer by layer linear suturing was done on the fascia of rectus abdominis muscle. For linear closure, Closure of wound was done by vertical mattress with a non-absorbable suture.

For purse string closure, Closure of wound was done by using single continuous subcuticular stitch with Prolene No 1 resulting in a rounded wound leaving approximately 0.5cm skin defect in the middle. This left a circular void which was plugged by a piece of rolled gauze immersed in Povidone iodine. The gauze was removed 48h post-operatively. All patients were received post-operative anti-biotic for 7 days and analgesia for required duration. During post-operative period wound infection were assessed by the characteristics adopted from the Centers for Disease Control and Prevention (CDC) definition of SSI and Post-operative pain was assessed by Visual Analogue Scale (VAS) (0-5). Patient satisfaction scoring was done at 1 month after surgery by using patient satisfaction score. Patient satisfaction score is a value from 6 to 30 based on a satisfaction questionnaire that measures the following factors: scar appearance, Patient expectations regarding the scar, level of post-operative pain, time to wound healing, ease or difficulty of wound care, and limitation of activity caused by the healing wound. A higher score indicates better results.⁴ Follow up at two-month, Patient and observer scar assessment scale (POSAS) was used to assess the wound scar and cosmesis between the two groups.⁵

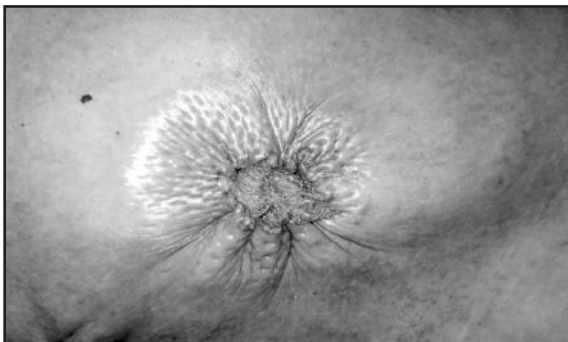


Figure 1 Purse-string Skin Closure (PSC)

Data were collected using a predetermined approved case record form. All the data were compiled on a master chart first. Statistical analysis of the results was obtained by using windows-based computer software device (SPSS-21). Sample was taken by convenient sampling technique. p-Value < 0.05 was considered as significant at 95% confidence interval.

Results

Table I Distribution of the study patients according to post-operative events (n=72)

Post-operative events	Group A (n=36)		Group B (n=36)		p value
	n	%	n	%	
Post-operative pain					
Yes	36	100	36	100	-
No	0	0.0	0	0.0	
Level of pain (Visual analogue scale))					
3	0	0	30	83.3	0.001 ^s (Chi square test)
4	36	100	6	16.7	
Mean ± SD	4	±0	3.17	±0.38	
Wound infection					
Yes	12	33.3	4	11.1	0.023 ^s (Chi square test)
No	24	66.7	32	88.9	
Characteristics					
Center for disease control and prevention guidelines- Grade-1	12	33.3	4	11.1	-

s=significant.

p value reached from Chi square test.

Table I shows the mean level of pain was 4±0 (Range 4-4) in Group A and 3.17±0.38(Range 3-4) in Group B. One-third (33.3%) patients had wound infection in Group A and 4(11.1%) in Group B. One-third (33.3%) patients had characteristics 1 in Group A and 4(11.1%) in Group B. The differences of level of pain were statistically significant (p-0.001) between two groups.

Table II Distribution of the study patients according to Length of hospital stay (n=72)

Duration of hospital stay	Group A (n=36)		Group B (n=36)		p value
	n	%	n	%	
7days	22	61.1	31	86.1	
14days	14	38.9	5	13.9	
Mean ± SD	9.72	±3.46	7.97	±2.46	0.016 ^s (Unpaired-t test)

s=significant.

p value reached from Unpaired t-test.

The mean length of hospital stay was 9.72 ± 3.46 days (Range 7-14) in Group A and 7.97 ± 2.46 days (Range 7-14) in Group B. The differences were statistically significant ($p=0.016$) between two groups.

Table III Distribution of the study patients according to patient satisfaction score (n=72)

	Group A (n=36) Mean±SD	Group B (n=36) Mean±SD	p value
Patient Satisfaction Score (6-30)	17.75 ±1.59	22.12 ±0.73	0.001 ^s (Unpaired- t test)

s=significant.

p value reached from Unpaired t-test.

The mean patient satisfaction score was 17.75 ± 1.59 (Range 15-21) in Group A and 22.12 ± 0.73 (Range 20-23) in Group B. The differences were statistically significant ($p=0.001$) between two groups.

Table IV Distribution of the study patients according to patient and observer scar assessment scale (n=72)

	Group A (n=36) Mean±SD	Group B (n=36) Mean±SD	p value
Patient scar assessment scale (6-60)	42.47± .99	35.88±2.81	0.001 ^s (Unpaired-t test)

s=significant.

p value reached from Unpaired t-test.

The mean patient scar assessment scale was 42.47 ± 0.99 (Range 41-45) in Group A and 35.88 ± 2.81 (Range 31-40) in Group B. The differences were statistically significant ($p=0.001$) between two groups.

Table V Distribution of the study patients according to patient and observer scar assessment scale (n=72)

	Group A (n=36) Mean±SD	Group B (n=36) Mean±SD	p value
Observer scar assessment scale (6-60)	41.97±1.28	36.22±2.73	.001 ^s (Unpaired-t test)

s=significant.

p value reached from Unpaired t-test.

The mean patient and observer scar assessment scale was 41.97 ± 1.28 (Range 40-45) in Group A and 36.22 ± 2.73 (Range 31-42) in Group B. The differences were statistically significant ($p=0.01$) between two groups.

Discussion

In the present study, distribution of the study patients according to post-operative events showed that all (100.0%) patients had post-operative pain in both groups. The mean level of pain was 4 ± 0 in Group A and 3.17 ± 0.38 in Group B.

In accordance with our study, authors reported that pain is 0.27% less in Purse string skin (PSC) closure than Linear Closure (LC) group (Totally, mean \pm standard deviation [range], 2 ± 1.2).⁶ Similarly, Alvandipour et al reported that the mean rank of pain in the PSC group was significantly less than it was in the LC after surgery which is almost consistent with our study.⁷

In this study, One-third (33.3%) patients had wound infection in Group A and 4(11.1%) in Group B. The differences of level of pain were statistically significant ($p=0.023$) between two groups.

In this context, Lee et al reported that the wound infection was found in 5 cases (16.7%) in group LC and in one case (5.6%) in group PSCL ($p=0.26$) which is almost comparable to our study.⁸

In our study, the mean length of hospital stay was 9.72 ± 3.46 days in Group A and 7.97 ± 2.46 days in Group B. The differences were statistically significant ($p=0.016$) between two groups.

Sureshkumar et al observed that the conventional linear closure group patients (Group 1) stayed longer in the hospital compared to purse-string closure group patients (Group 2) who were discharged two days earlier on an average than Group 1.⁵

The current study showed that the mean patient satisfaction score was 17.75 ± 1.59 in Group A and 22.12 ± 0.73 in Group B. The differences were statistically significant ($p=0.001$) between two groups.

In the study of Williams et al the patient satisfaction was assessed using a four point's score. They inferred that patients with purse-string skin closure were very satisfied in comparison with the linear closure group (70% vs. 20%).⁹

In this study, the mean patient scar assessment scale was 42.47 ± 0.99 in Group A and 35.88 ± 2.81 in Group B. The differences were statistically significant ($p=0.001$) between two groups. Sureshkumar et al. (2018) concluded that the mean Patient and Observer Scar Assessment Scoring (POSAS) scores between the groups (65.30 vs. 83.40, $p=0.012$) were statistically

significant. This proved significant improvement in scar cosmesis in purse-string skin closure.

In our study, the mean observer scar assessment scale was 41.97 ± 1.28 in Group A and 36.22 ± 2.73 in Group B. These finding correlates well with the study of van der Wal et al.¹⁰

Limitations

- This study was performed in a selected population of General Surgery department of Chittagong Medical College and Hospital for a period of one year. Therefore, the sample lacks representation of the population.
- Limited sample size with short period.
- This study involved stoma reversal for heterogeneous index surgeries.

Conclusion

The Purse String Closure (PSC) technique had a higher patient satisfaction than the Linear Closure (LC) technique, although wounds could take longer to heal when the PS approach is used. Compared to the conventional linear closure, the purse-string closure technique is expected to have less wound infection, improved scar cosmesis, and good patient satisfaction because of a smaller size scar. Our results suggest that the Purse String Closure (PSC) is the technique of choice to minimize SSI in intestinal Stoma reversal. Thus, purse-string skin closure could be a good alternative to the conventional linear closure.

Recommendations

Further multi-center research works are recommended with the inclusion of larger number of sample size representing same socio-demographic profiles. It would be desirable to have a homogeneous population undergoing conventional linear Closure versus Purse String Skin Closure of intestinal stoma reversal.

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Contribution of authors

FM-Conception, Design, acquisition of data, data interpretation, manuscript writing & final approval. MNHB-Analysis, critical revision & final approval. SCB- Conception, design, analysis, data interpretation, drafting & final approval.

SA-Data interpretation, analysis, critical revision & final approval.

MAA- Analysis, data interpretation, critical revision & final approval.

SMM- Data Collection, critical revision & final approval.

Disclosure

All the authors declared no competing interest.

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