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LINEAR VERSUS PURSE STRING CLOSURE OF ILEOSTOMY REVERSAL WOUNDS IN ASPECTS OF COSMESIS AND WOUND INFECTION

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Ileostomy reversal, Cosmatic effects, Wound infection.

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Abstract

The introduction of ileostomy has facilitated lower pelvic anastomosis. Many complications can occur after ileostomy closure. Wound infection and cosmetic problems are common after reversal of ileostomy. Objective of the study was to compare the frequency of satisfaction with cosmetic effects between linear versus purse-string skin closure after a loop ileostomy reversal. The study design was Randomized controlled trail, conducted at In-patient surgical department, DHQ Gujranwala, from 30 June, 2024 to 29 December, 2024. Total of 60 (30 in each group) patients undergoing ileostomy reversal was enrolled in the study. Two groups were made as follows;

- *Group-A; Linear skin closure*
- *Group-B; Purse-string skin closure*

Satisfaction with cosmetic effect was found in 21 out of 30 (70%) cases in Group-A (Linear skin closure) and in 28 out of 30 (93.3%) cases in Group-B (Purse string closure) (p=0.04). Wound infection occurred in 08 out of 30 (26.7%) cases in Group-A (Linear skin closure) and in 03 out of 30 (10%) cases in Group-B (Purse string closure) (p=0.18). So we concluded that satisfaction with cosmetic effect was significantly better in Purse string closure as compared to Linear skin closure. Wound infection was also less common in Purse string closure as compared to Linear skin closure but difference was not statistically significant.

INTRODUCTION

Anastomotic leakages are common following rectal surgery. Over the years, the introduction of ileostomy has facilitated lower pelvic anastomosis. A de-functioning loop ileostomy is created to divert bowel contents away from the site of anastomosis, thereby reducing the need for re-operation/intervention in presence of an anastomotic leak. [1-3]

Many complications can occur after ileostomy closure (obstruction, infection, necrosis, leakage, and iatrogenic incisional hernia). Stoma closure site infection (SCSI) and bad scar formation are frequent complications after ileostomy closure.[3-5]

The purse-string (PS) approximation technique after an ileostomy closure has combined the concept of leaving the wound open to provide drainage and minimize SCSI while still providing some degree of wound apposition to minimize healing time. While

conventional linear closure is a continuous closure technique.[5-7]

The purse-string (PS) approximation technique has been claimed to be associated with less wound infection and scar formation, as well as with better cosmetic effect and patient satisfaction.[8-10]

Wound infection and cosmetic problems are common after reversal of ileostomy. To reduce the incidence of these complications, purse-string skin closure was introduced, that has an advantage over conventional linear skin closure. My study was designed to compare wound infection rates and cosmetic effects between linear and purse-string skin closure after a loop ileostomy reversal.

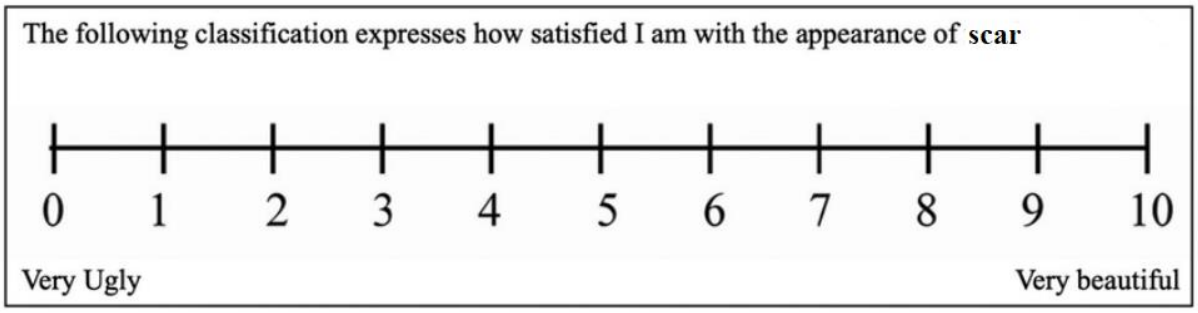
OBJECTIVE:

To compare the frequency of satisfaction with cosmetic effects between linear versus purse-string skin closure after a loop ileostomy reversal.

OPERATIONAL DEFINITIONS:

Wound infection: It was YES if there was presence of pain, redness, swelling and presence of pus at surgical site and growth of bacteria on culture within 2 weeks of ileostomy reversal surgery.

Satisfaction with cosmetic effects: It was assessed at 3 months interval after surgery on following visual Analog Scale (VAS) for appearance of scar after ileostomy reversal. A score of ≥7 on this scale was considered as satisfaction with the cosmetic effects.



Socioeconomic Status (Family Income in Pkr/month):

- < 60,000 (LOW)
- 60,000-200,000 (MIDDLE)
- More than 200,000 (HIGH)

HYPOTHESIS:

There is difference in the frequency of wound infection and satisfaction with cosmetic effects between linear versus purse-string skin closure after a loop ileostomy reversal.

MATERIALS AND METHODS:

Setting: In-patient surgical department, DHQ Gujranwala

Duration of study: 30 June, 2024 to 29 December, 2024

Study Design: Randomized controlled trail

Sample Size: 60 (30 in each group)

It is calculated using 5% level of significance, 80% power of test and expected frequency of infection as 0% in purse-string skin closure and 36.6% in control [10]

Sampling technique: non-probability consecutive sampling

Inclusion Criteria:

- Age 14-60 years
- Both gender
- Patient undergoing loop ileostomy reversal

Exclusion Criteria:

- History of previous abdominal surgery
- History of previous abdominal trauma
- Unwilling to take part in the study

Data collection procedure:

After taking consent from ethical review committee, a total of 60 (30 in each group) patients who will present in in-patient department of surgery, DHQ, Gujranwala, undergoing ileostomy reversal was enrolled in the study. All cases should be fulfilling inclusion and exclusion criteria, informed consent was taken from each patient. They were briefed about objectives of this study, ensuring them confidentiality of the information provided and fact that there is no risk involved to the patient while taking part in this study. Proper permission has been taken from institutional ethical committee to conduct this study. Complete bio-data and socioeconomic status of the patient was assessed by researcher himself.

Group allocation was done by lottery method under supervision of a consultant surgeon of the hospital and if they decide to change the group, that patient was excluded from study. Two groups were made as follows;

Group-A; Linear skin closure

Group-B; Purse-string skin closure

To minimize the bias, reversal of ileostomy was performed by a single surgeon (researcher himself under supervision of a consultant surgeon of the hospital).

All cases were followed for two weeks to assess development of wound infection as defined in operational definition and after three months for cosmetic effects as defined in operational definition. All relevant parameters was recorded in an especially designed proforma

Data analysis:

Data was analyzed with SPSS version 24. Mean ± SD was presented for quantitative variables like age and VAS score for cosmetic effect. Frequency and percentage was calculated for qualitative variables like gender, socioeconomic status, wound infection and satisfaction with cosmetic effect. Comparison of wound infection and satisfaction with cosmetic effect was done between two groups by using chi square test and p-value ≤ 0.05 was considered statistically significant. Comparison of VAS score for cosmetic effect was done between two groups by using t-test and p-value ≤ 0.05 was considered statistically significant. Stratification of wound infection and satisfaction with cosmetic effect was done with regard to age groups, gender and socioeconomic status to see the effect of these effect modifiers. Post stratification using the chi-square test, p-value ≤ 0.05 was considered statistically significant.

RESULTS:

Mean age in Group-A (Linear skin closure) was 32.93 ± 8.54 and in Group-B (Purse string closure) 32.67 ± 7.58 (Table # 01; p=0.90).

VAS score for cosmetic effect in Group-A (Linear skin closure) was 5.93 ± 1.05 and in Group-B (Purse string closure) 7.90 ± 0.71 (Table # 02; p=0.00).

Distribution of age groups, gender and socioeconomic status was statistically similar in both study groups (Table # 03-05; p=1.00).

In Group-A (Linear skin closure) 12 (40%) cases were male and 18 (60%) cases were female & in Group-B (Purse string closure) 14 (46.7%) were male and 34 (56.7%) cases were female (Table # 04; p=0.79).

Wound infection occurred in 08 out of 30 (26.7%) cases in Group-A (Linear skin closure) and in 03 out of 30 (10%) cases in Group-B (Purse string closure) (Table # 06; p=0.18).

Satisfaction with cosmetic effect was found in 21 out of 30 (70%) cases in Group-A (Linear skin closure) and in 28 out of 30 (93.3%) cases in Group-B (Purse string closure) (Table # 07; p=0.04).

Stratification of Wound infection was done with regards to Age groups, Gender, Socioeconomic status & p-values are depicted in respective tables (Table # 08-10).

Stratification of Satisfaction with cosmetic effect was done with regards to Age groups, Gender, Socioeconomic status & p-values are depicted in respective tables (Table # 11-13).

Table # 01: Mean and standard deviation of Age

	Study group	N	Mean	Std. Deviation	p-value
Age	Group-A (Linear skin closure)	30	32.93	8.54	0.90
	Group-B (Purse string closure)	30	32.67	7.58	

Table # 02: Mean and standard deviation of VAS score for cosmetic effect

	Study group	N	Mean	Std. Deviation	p-value
VAS score for cosmetic effect	Group-A (Linear skin closure)	30	5.93	1.05	0.00
	Group-B (Purse string closure)	30	7.90	0.71	

Table # 03: Distribution of Age groups among study groups

			Study group		Total	p-value
			Group-A (Linear skin closure)	Group-B (Purse string closure)		
Age groups	Up to 40 years	Count	22	23	45	1.00
		% within Study group	73.3%	76.7%	75.0%	
	41 years and above	Count	8	7	15	
		% within Study group	26.7%	23.3%	25.0%	
Total		Count	30	30	60	
		% within Study group	100.0%	100.0%	100.0%	

Table # 04: Distribution of Gender among study groups

			Study group		Total	p-value
			Group-A (Linear skin closure)	Group-B (Purse string closure)		
Gender	Male	Count	12	14	26	0.79
		% within Study group	40.0%	46.7%	43.3%	
	Female	Count	18	16	34	
		% within Study group	60.0%	53.3%	56.7%	
Total		Count	30	30	60	
		% within Study group	100.0%	100.0%	100.0%	

Table # 05: Distribution of Socioeconomic status among study groups

			Study group		Total	p-value
			Group-A (Linear skin closure)	Group-B (Purse string closure)		
Socioeconomic status	Low	Count	12	15	27	0.38
		% within Study group	40.0%	50.0%	45.0%	
	High	Count	16	11	27	
		% within Study group	53.3%	36.7%	45.0%	
	High	Count	2	4	6	
		% within Study group	6.7%	13.3%	10.0%	
Total		Count	30	30	60	
		% within Study group	100.0%	100.0%	100.0%	

Table # 06: Distribution of Wound infection among study groups

			Study group		Total	p-value
			Group-A (Linear skin closure)	Group-B (Purse string closure)		
Wound infection	Yes	Count	8	3	11	0.18
		% within Study group	26.7%	10.0%	18.3%	
	No	Count	22	27	49	
		% within Study group	73.3%	90.0%	81.7%	
Total		Count	30	30	60	
		% within Study group	100.0%	100.0%	100.0%	

Table # 07: Distribution of Satisfaction with cosmetic effect among study groups

			Study group		Total	p-value
			Group-A (Linear skin closure)	Group-B (Purse string closure)		
Satisfaction with cosmetic effect	Yes	Count	21	28	49	0.04
		% within Study group	70.0%	93.3%	81.7%	
	No	Count	9	2	11	
		% within Study group	30.0%	6.7%	18.3%	
Total		Count	30	30	60	
		% within Study group	100.0%	100.0%	100.0%	

Table # 08: Stratification of Wound infection with regards to Age groups

Age groups	Wound infection	Total	p-value				
	Yes	No					
Up to 40 years	Study group	Group-A (Linear skin closure)	Count	6	16	22	0.14
			% within Study group	27.3%	72.7%	100.0 %	
		Group-B (Purse string closure)	Count	2	21	23	
			% within Study group	8.7%	91.3%	100.0 %	
	Total	Count	8	37	45		
		% within Study group	17.8%	82.2%	100.0 %		
41 years and above	Study group	Group-A (Linear skin closure)	Count	2	6	8	1.00
			% within Study group	25.0%	75.0%	100.0 %	
		Group-B (Purse string closure)	Count	1	6	7	
			% within Study group	14.3%	85.7%	100.0 %	
	Total	Count	3	12	15		
		% within Study group	20.0%	80.0%	100.0 %		

Table # 09: Stratification of Wound infection with regards to Gender

Gender				Wound infection		Total	p-value
				Yes	No		
Male	Study group	Group-A (Linear skin closure)	Count	5	7	12	0.06
			% within Study group	41.7%	58.3%	100.0%	
		Group-B (Purse string closure)	Count	1	13	14	
			% within Study group	7.1%	92.9%	100.0%	
	Total		Count	6	20	26	
			% within Study group	23.1%	76.9%	100.0%	
Female	Study group	Group-A (Linear skin closure)	Count	3	15	18	1.00
			% within Study group	16.7%	83.3%	100.0%	
		Group-B (Purse string closure)	Count	2	14	16	
			% within Study group	12.5%	87.5%	100.0%	
	Total		Count	5	29	34	
			% within Study group	14.7%	85.3%	100.0%	

Table # 10: Stratification of Wound infection with regards to Socioeconomic status

Socioeconomic status				Wound infection		Total	p-value
				Yes	No		
Low	Study group	Group-A (Linear skin closure)	Count	5	7	12	0.06
			% within Study group	41.7%	58.3%	100.0%	
		Group-B (Purse string closure)	Count	1	14	15	
			% within Study group	6.7%	93.3%	100.0%	
	Total		Count	6	21	27	
			% within Study group	22.2%	77.8%	100.0%	
High	Study group	Group-A (Linear skin closure)	Count	3	13	16	0.25
			% within Study group	18.8%	81.3%	100.0%	
		Group-B (Purse string closure)	Count	0	11	11	
			% within Study group	0.0%	100.0%	100.0%	
	Total		Count	3	24	27	
			% within Study group	11.1%	88.9%	100.0%	
High	Study group	Group-A (Linear skin closure)	Count	0	2	2	0.47
			% within Study group	0.0%	100.0%	100.0%	
		Group-B (Purse string closure)	Count	2	2	4	
			% within Study group	50.0%	50.0%	100.0%	
	Total		Count	2	4	6	
			% within Study group	33.3%	66.7%	100.0%	

Table # 11: Stratification of Satisfaction with cosmetic effect with regards to Age groups

Age groups				Satisfaction with cosmetic effect		Total	p-value
				Yes	No		
Up to 40 years	Study group	Group-A (Linear skin closure)	Count	15	7	22	0.71
			% within Study group	68.2%	31.8%	100.0%	
		Group-B (Purse string closure)	Count	21	2	23	
			% within Study group	91.3%	8.7%	100.0%	

	Total		Count	36	9	45	
			% within Study group	80.0%	20.0%	100.0%	
41 years and above	Study group	Group-A (Linear skin closure)	Count	6	2	8	0.47
			% within Study group	75.0%	25.0%	100.0%	
		Group-B (Purse string closure)	Count	7	0	7	
			% within Study group	100.0%	0.0%	100.0%	
	Total		Count	13	2	15	
			% within Study group	86.7%	13.3%	100.0%	

Table # 12: Stratification of Satisfaction with cosmetic effect with regards to Gender

Gender				Satisfaction with cosmetic effect		Total	p-value
				Yes	No		
Male	Study group	Group-A (Linear skin closure)	Count	8	4	12	0.15
			% within Study group	66.7%	33.3%	100.0%	
		Group-B (Purse string closure)	Count	13	1	14	
			% within Study group	92.9%	7.1%	100.0%	
	Total		Count	21	5	26	
			% within Study group	80.8%	19.2%	100.0%	
Female	Study group	Group-A (Linear skin closure)	Count	13	5	18	0.18
			% within Study group	72.2%	27.8%	100.0%	
		Group-B (Purse string closure)	Count	15	1	16	
			% within Study group	93.8%	6.3%	100.0%	
	Total		Count	28	6	34	
			% within Study group	82.4%	17.6%	100.0%	

Table # 13: Stratification of Satisfaction with cosmetic effect with regards to Socioeconomic status

Socioeconomic status				Satisfaction with cosmetic effect		Total	p-value
				Yes	No		
Low	Study group	Group-A (Linear skin closure)	Count	5	7	12	0.00
			% within Study group	41.7%	58.3%	100.0%	
		Group-B (Purse string closure)	Count	15	0	15	
			% within Study group	100.0%	0.0%	100.0%	
	Total		Count	20	7	27	
			% within Study group	74.1%	25.9%	100.0%	
High	Study group	Group-A (Linear skin closure)	Count	14	2	16	1.00
			% within Study group	87.5%	12.5%	100.0%	
		Group-B (Purse string closure)	Count	9	2	11	
			% within Study group	81.8%	18.2%	100.0%	
	Total		Count	23	4	27	
			% within Study group	85.2%	14.8%	100.0%	
High	Study group	Group-A (Linear skin closure)	Count	2		2	0.04
			% within Study group	100.0%		100.0%	
		Group-B (Purse string closure)	Count	4		4	
			% within Study group	100.0%		100.0%	
	Total		Count	6		6	
			% within Study group	100.0%		100.0%	

DISCUSSION:

Our study was conducted on total of 60 (30 in each group) patients. Mean age in Group-A (Linear skin closure) was 32.93 ± 8.54 and in Group-B (Purse string closure) 32.67 ± 7.58 (Table # 01; p=0.90).

VAS score for cosmetic effect in Group-A (Linear skin closure) was 5.93 ± 1.05 and in Group-B (Purse string closure) 7.90 ± 0.71 (Table # 02; p=0.00).

Distribution of age groups, gender and socioeconomic status was statistically similar in both study groups (Table # 03-05; p=1.00).

In Group-A (Linear skin closure) 12 (40%) cases were male and 18 (60%) cases were female & in Group-B (Purse string closure) 14 (46.7%) were male and 34 (56.7%) cases were female (Table # 04; p=0.79).

Wound infection occurred in 08 out of 30 (26.7%) cases in Group-A (Linear skin closure) and in 03 out of 30 (10%) cases in Group-B (Purse string closure) (Table # 06; p=0.18).

Satisfaction with cosmetic effect was found in 21 out of 30 (70%) cases in Group-A (Linear skin closure) and in 28 out of 30 (93.3%) cases in Group-B (Purse string closure) (Table # 07; p=0.04).

Stratification of Wound infection was done with regards to Age groups, Gender, Socioeconomic status & p-values are depicted in respective tables (Table # 08-10).

Stratification of Satisfaction with cosmetic effect was done with regards to Age groups, Gender, Socioeconomic status & p-values are depicted in respective tables (Table # 11-13).

In a randomized clinical trial was conducted by Alvandipour et al, on 66 patients who underwent a stoma closure, at Sari Emam Khomeini Hospital, Iran. Patients were divided into 2 groups according to the stoma closing method: the Purse-String closure (PSC) group (n = 34) and the Linear closure (LC) group (n = 32). Infection occurred in 1 of 34 PSC patients (2.9%) and in 7 of 32 LC patients (21.8%), and this difference was statistically significant (P = 0.021). Patients in the PSC group were more satisfied with the resulting wound scar and its cosmetic appearance at one month and three months after surgery (P = 0.043).[8] Similarly, our study was also conducted on total of 60 (30 in each group) patients. Wound infection occurred in 08 out of 30 (26.7%) cases in Group-A (Linear skin closure) and in 03 out of 30 (10%) cases in Group-B (Purse string closure) (p=0.18). Satisfaction with cosmetic effect was found in 21 out of 30 (70%) cases in Group-A (Linear skin closure) and in 28 out of 30 (93.3%) cases in Group-B (Purse string closure) (p=0.04). These results were similar as results of the study by Alvandipour et al.[8]

In a study by Lee et al, 48 consecutive patients undergoing a loop ileostomy reversal were enrolled. Outcomes were compared between linear skin closure (group L, n = 30) and purse string closure (group P, n = 18). Original indication for ileostomy was 23 cases of malignancy (76.7%) in group L, and 13 cases of malignancy (77.2%) in group P. The median time duration from ileostomy to reversal was 4.0 months (range, 0.6 to 55.7 months) in group L and 4.1 months (range, 2.2 to 43.9 months) in group P. The median operative time was 103 minutes (range, 45 to 260 minutes) in group L and 100 minutes (range, 30 to 185 minutes) in group P. The median hospital stay was 11 days (range, 5 to 4 days) in group L and 7 days (range, 4 to 14 days) in group P (P < 0.001). Wound infection was found in 5 cases (16.7%) in group L and in one case (5.6%) in group L (P = 0.26).[9] Our study was also conducted on total of 60 (30 in each group) patients. Wound infection occurred in 08 out of 30 (26.7%) cases in Group-A (Linear skin closure) and in 03 out of 30 (10%) cases in Group-B (Purse string closure) (p=0.18).

Camacho-Mauries et al, randomly assigned to linear closure (n = 30) or purse string closure (n = 31) of their ostomy wound. The infection rate for the control group (linear closure) was 36.6% (n = 11) vs 0% in the purse string closure group (p < 0.0001).[10] In our study, Wound infection occurred in 08 out of 30 (26.7%) cases in Group-A (Linear skin closure) and in 03 out of 30 (10%) cases in Group-B (Purse string closure) (p=0.18).

Healing time was 5.9 weeks in the linear closure group and 3.8 weeks in the purse string group (p = 0.0002). Seventy percent (70%) of the patients with purse string closure were very satisfied in comparison with 20% in the other group (p = 0.0001).[10] In our study, satisfaction with cosmetic effect was found in 21 out of 30 (70%) cases in Group-A (Linear skin closure) and in 28 out of 30 (93.3%) cases in Group-B (Purse string closure) (p=0.04).

Another randomized control trial was carried out in Southern India. Patients with various stoma reversals, including colostomy, as well as ileostomy reversal,

were included in the study. Patients were divided into Group I - conventional linear skin suturing (n = 40) and Group II - purse-string closure (n = 40). Purse-string skin closure for stoma reversal had significantly less incidence of SSI. The duration of antibiotic therapy was also less in purse-string skin closure patients as compared to linear skin closure patients. Purse string skin closures significantly improved the scar outcome and patient satisfaction.[11] However in our study, the frequency of wound infection was not statistically different between the two wound closure approaches. However, satisfaction with cosmetic effect was significantly higher in purse string closure group in our study.

CONCLUSION:

Satisfaction with cosmetic effect was significantly better in Purse string closure as compared to Linear skin closure. Wound infection was also less common in Purse string closure as compared to Linear skin closure but difference was not statistically significant.

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