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Outcome of purse-string versus linear skin closure after ileostomy stoma reversal in terms of stoma sites infection and cosmesis

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Abstract

Objective: To evaluate the incidence of infection and patient satisfaction in terms of cosmesis between purse-string closure and the usual linear closure of stoma wound.

Method: The experimental randomised clinical trial was conducted December 2017 to December 2018 at the Surgical Unit 1, Lahore General Hospital, Lahore, Pakistan, and comprised patients undergoing ileostomy stoma reversal. The patients were randomised into 2 groups using computer-generated random numbers. Group A underwent purse-string closure, while group B received linear closure. Both groups were followed post-operatively at 1 and 3 months for wound infection. Patient satisfaction was ascertained using standard tools. Data was analysed using SPSS version 20.

Results: Of the 72 patients, there were 37(51.4%) in group A and 35(48.6%) in group B. Overall, there were 50(69.4%) males and 22(30.5%) females. Infection occurred in 2(5.4%) group A patients and in 8(22.8%) group B patients (p=0.023). Patients in group A were more satisfied at 3 months post-surgery than patients in group B (p=0.001).

Conclusion: Purse-string closure was found to be associated with a lower incidence of wound infection and higher patient satisfaction compared to linear closure.

Key Words: Ileostomy, Stoma reversal, POSAS score, SSI, Purse string closure.

Introduction

A stoma is commonly used in the management of colorectal cancer surgery, infective bowel diseases, like typhoid, tuberculosis, and inflammatory bowel disease, like ulcerative colitis. Stoma closure is considered a minimally invasive surgery, but complications can occur after stoma closure, including obstruction, infection, necrosis, leakage and iatrogenic incisional hernia [1]. According to a study, temporary stoma reversal after colorectal surgery is associated with complication rates as high as 5% (2).

Surgical site infection (SSI) in stoma is a frequent complication after ileostomy closure, with a reported incidence varying from 0% to 41% (3). The most frequent cause of wound infection is bacterial contamination of the skin surrounding the ileostomy / colostomy due to prolonged contact with bowel contents or due to leakage of the ileostomy contents (4). It is associated with increased costs for healthcare services, hospital stays, medications and nursery care, as well as with increased morbidity and reduced quality of life (QOL). Primary linear closure is linked with high rates of SSI, and, therefore, some prefer leaving the wound open. Another modification is the circumferential purse-string (PS) approximation technique, which has been associated with less wound infection and scar formation, as well as with better cosmetic effect and patient satisfaction [5]. The PS technique combines the concept of leaving the wound open to provide drainage and minimise SSIs while still providing some degree of wound apposition to reduce healing time [6]. A study [7] advanced this technique and reported on a short series of successful infection-free

ileostomy reversals. The first large meta-analysis investigating PS approximation in comparison to primary skin closure [8] found significantly reduced SSIs for PS closure (PSC).

Studies have also concluded that primary closure technique is related to lower wound infection [9, 10], and there was no associated increase in the risk of wound infection [11]. Another study showed that PS circumferential approximation of wound after ileostomy reversal closure significantly reduced SSIs compared to linear closure (LC) without any effect on cosmetics and patient satisfaction [12]. No data in this regard is available for South-Asia population, especially Pakistan.

The current study was planned to compare SSI incidence and patient satisfaction in terms of cosmesis in patients undergoing stoma reversal surgery either by circumferential PSC or conventional LC of the wound.

Patients and Methods

The prospective, randomised controlled trial (RCT) was conducted at the Department of General Surgery, Lahore General Hospital, Lahore, Pakistan, from December 2017 to December 2018. After approval from the institutional ethics committee, the sample size was calculated at 5% level of significance, 80% power of test and an expected percentage of wound infection in PSC 16% and LC 5.6% [13]. Those included were adult patients of either gender who underwent temporary stoma formation secondary to typhoid perforation. Patients aged <18 years, those who had a stoma formation for other pathologies, who died or did not continue the follow-up, and who needed secondary surgery at other centres were excluded. The RCT was registered with ChiCTR (Registration No: ChiCTR1900025624).

Aftet taking informed consent from the patients, they were divided into PSC group A and LC group B using computer-generated sheets. Data regarding demographics, including age and gender, co-morbidities, like diabetes mellitus

(DM), hypertension (HTN), chronic obstructive pulmonary disease (COPD), ischemic heart disease (IHD) and liver dysfunction, alcohol or cigarette consumption, and medications, including steroids usage, was recorded. All surgeries were performed by consultant surgeons. All patients underwent an ileostomy reversal with a hand-sewn ileo-ileal anastomosis, and rectus sheath closed with interrupted full thickness Prolene-1 sutures. For skin, patients in group B had a conventional skin closure in interrupted manner with Prolene-2/0, and patients in group A had PSC with Vicryl-2/0. Both groups were compared for incidence of SSIs, patient satisfaction in terms of cosmetic, intestinal obstruction/leakage, and hospital stay using the guidelines of the Centres for Disease Control and Prevention (CDC) for the diagnosis of superficial SSI [14] and Patient and Observer Scar Assessment Scale (POSAS)[15]. The assessment was done at 1 and 3 months. Data was analysed using SPSS version 20, and frequencies and percentages were calculated for demographic variables. Chi square test was used to compare qualitative variables, and t test was used to compare quantitative variables. $P<0.05$ was taken as significant.

Results

Of the 72 patients, there were 37(51.4%) in group A and 35(48.6%) in group B. Overall, there were 50(69.4%) males and 22(30.5%) females (Table 1). Infection occurred in 2(5.4%) group A patients and in 8(22.8%) group B patients ($p=0.023$).

There was no significant difference in operative time and post-operative complications between the groups ($p>0.05$). Also the difference in terms of mean hospital stay was also not significant ($p>0.05$).

Patients in group A were more satisfied at 3 months post-surgery than patients in group B ($p=0.001$) though there was no significant difference at 1 month (Table 2; Figure).

Discussion

The RCT compared PSC and LC techniques for stoma closure. The demographics of the patients were equally distributed in both the groups And pre-existing co-morbidities and body mass index (BMI) were also similar at baseline. Both the groups were similarly distributed for general characteristics and aetiologies of the stoma formation.

The SSI rates were significantly low in the PSC group compared to the LC group. These results are in agreement with recent systemic reviews favouring the PSC technique over LC for stoma reversal in terms of lower SSI rates (16-18). Two studies (6,8) showed significant reduced SSI rates (6.7% and 2.4%) in PSC group compared to LC group (38.7% and 29.6%). In the current study, all patients with SSIs were managed with simple opening of the incision site without any need of re-operation.

The 2nd most crucial variable in the current study was cosmesis and patient satisfaction, for which POSAS score was used. The score overall satisfaction at 1 month was entirely satisfactory for both the groups, but at 3 months, patients were more satisfied in the PSC group than in the LC group. Like the current study, Camacho-Mauries et al. [15] found higher patient satisfaction scores in the PSC group (70% vs. 20%; p=0.0001), but Reid et al. [6] found no differences between the groups. There was a significant difference between the scar length in the two groups (PSC 35mm vs. LC 53mm; p=0.046).

Studies have reported that the hospitalisation period after ileostomy reversal did not differ according to the wound closure technique [6, 13, 18]. But in the current study, there was reduced hospital stay in PSC group compared to the LC group (4 vs. 6). However, the difference was statistically non-significant. Also, no significant difference was found in mean operative time and other post-operative complications, like anastomotic leak and hernia formation.

The limitation of the current study is that it was conducted at a single centre. Besides, the study was underpowered due to a small sample. Finally, the follow-up was limited to 90 days only.

Conclusion

After stoma closure, PSC was associated with a lower incidence of wound infection and higher patient satisfaction compared to LC.

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Table 1: Demographic details and co-morbidities.

Demographic Parameters	Purse-string Closure (n=37)	Linear Closure (n=35)	P value
Median age(years)	41.3	45.9	0.887
Male	25(68%)	25(71%)	0.365
Female	12(32%)	10(29%)	0.454

Diabetes	5	4	1
Hypertension	9	7	0.642
Asthma	1	0	1
BMI	23.81	23.76	0.767

BMI: Body mass index.

Table 2: Inter-group comparison.

Perioperative Outcome	Purse String Closure (n=37)	Linear Closure (n=35)	P value
Mean duration of surgery(min)	**142.3**	**150**	**0.889**
Mean Hospital stay(days)	**5**	**7**	**0.076**
SSI	**2**	**8**	**0.023**
Anastomotic Leak	**0**	**0**	**1**
Hernia Formation	**0**	**1**	**0.848**
POSAS Score 1 Month	**40**	**44**	**0.067**
POSAS Score 3 months	**18**	**32**	**0.001**

SSI: Stoma site infection; POSAS: Patient and Observer Scar Assessment Scale.

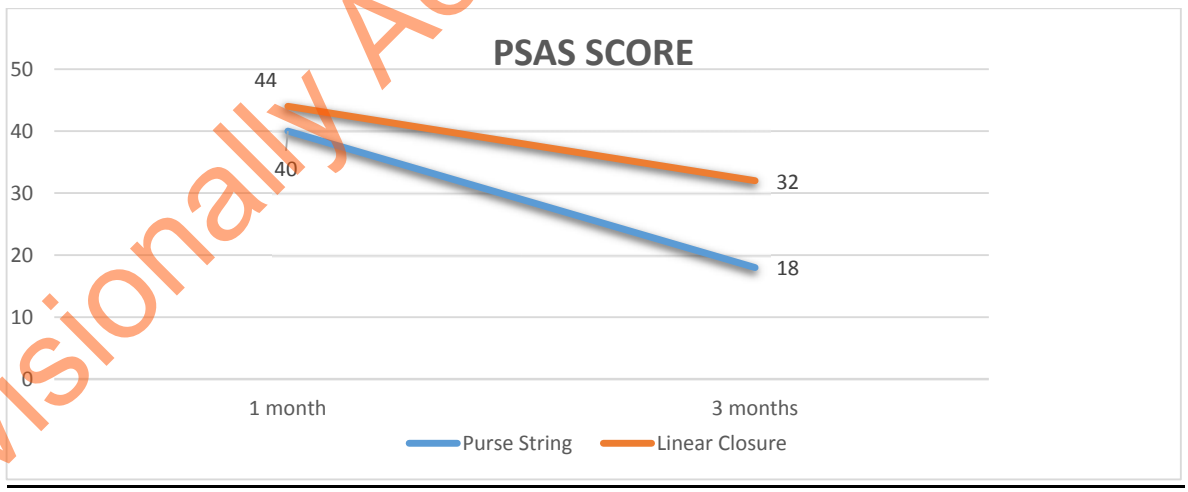

Figure: Comparison of Patient Scar Assessment Scale **(PSAS) score in both groups.**