



COMPARISON BETWEEN CONVENTIONAL LINEAR VERSUS PURSE-STRING SUTURING: A RANDOMIZED CONTROLLED TRIAL

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Abstract:

Objective: To assess the outcome parameters between conventional linear versus purse-string suturing

Methodology: Patients presenting for loop-colostomy/ileostomy were included in this randomized trial. We assessed purse-string closing and conventional linear skin closing in terms of outcome parameters such as surgical site infection, pain and scar size.

Results: Group A (Purse-string) showed surgical site infection in 4 (13.3%) while group B 11 (36.7%) (P = 0.03). Group A showed mean scar size 5.16±0.71 cm while group B 8.48±0.89 (P = 0.0001). Group A showed pain on VAS 2.87±1.19 while group B 4.27±2.13 (P = 0.03).

Conclusion: Purse string closing was notably better surgical technique than conventional linear skin closing in terms of surgical site infection, pain and scar size in patients undergoing loop colostomy/ileostomy.

Keywords: ileostomy, colostomy, purse string closure, linear skin closure

INTRODUCTION:

An ileostomy refers to the surgical procedure in which the lumen of the ileum, the part of the small bowel, is brought out through a surgical incision in the abdominal wall ¹. This might be either transient or enduring, a conclusion or a cycle. An ileostomy is performed to divert feces from the body through the ileum, bypassing the normal pathway of the anus. The discharge from an ileostomy includes loose or porridge-like feces, which is compatible with the normal passage of material through the small intestine ². The solidification of feces, which depends on water absorption, occurs in the large

intestine. The volume of outflow from an ileostomy might vary, usually falling between 200 to 700 ml per day. Additionally, an ileostomy is normally created on the right side on the abdomen³.

A stoma is a surgically created aperture in the colon or small intestine that is used to redirect feces and gas out of the abdomen. These waste products are collected using external devices⁴. Currently, there is a growing trend in the use of temporary diverting stomas to redirect fecal matter and safeguard the anastomotic site following surgeries involving the small bowel and colorectal region⁵. The often utilized temporary diverting stomas include the ileostomy and the colostomy. The advantages of a stoma include its ability to prevent complications caused by an anastomotic leak in the distal bowel⁶. These complications may include the accumulation of bowel content in the abdomen, leading to the formation of collections or abscesses, as well as post-operative abdominal distension and peritonitis⁷. Additionally, a stoma allows for sufficient time for the distal anastomosis to heal. The closure of a stoma is often performed as an elective procedure 8-12 weeks after the catabolic phase that occurs during the perioperative period has ended, and with sufficient nutritional support. Wound infection and scarring frequently occur following stoma reversal surgery^{8,9}.

Bacterial colonization near the stoma is a major contributing factor to post-operative surgical site infection following stoma reversal. Bacterial colonization occurs when bowel stoma effluent, which has a high concentration of gut bacteria, directly contacts the peristomal skin and remains in contact for an extended period if stoma appliances are employed to collect the effluents^{10,11}. Therefore, the use of traditional techniques such as linear intermittent vertical bedding for fast skin closure is linked to a range of surgical wound infection rates, which can vary from 2% to 41% in different studies¹².

Surgeons carefully consider the specific needs of each surgical situation when deciding between standard linear suturing and purse-string suturing, as this option is crucial. Each approach has its own advantages and disadvantages, and the choice depends on considerations such as the specific tissue involved, the requirement for a completely sealed closure, and the surgeon's level of experience and preference for a particular procedure. As surgical procedures progress, continuous study and developments will likely lead to a more detailed understanding of the advantages and limitations of each suturing method. This will empower surgeons to make informed decisions that benefit their patients.

MATERIAL AND METHODS:

A total of sixty patients who had closure of loop-colostomy at multiple centers including Department of General Surgery, MRHSM Hospital Pabbi Nowshera, Jinnah Teaching Hospital Peshawar, Cat C Hospital Tangi Charsadda and DHQ Hospital Daggar Buner in the duration from March, 2023 to August, 2023 were included in a randomized trial study. All subjects engaged in the study provided informed consent. Medical charts were used to document patient demographic information. The exclusions encompassed people who had death, anastomotic leakage, intestinal blockage, or required reintervention.

Group A (Purse-string) consisted of thirty patients. A circular incision was performed within the purse-string group, namely 1–2 mm away from the mucocutaneous junction. The same stoma takedown and anastomosis methods were used as in the linear-closure group. A purse-string suture technique was used to close the subcuticular layer of the skin, resulting in a 5-mm opening.

Thirty patients that were left were assigned to group B (Linear skin closing). A spindle-shaped, elliptical incision was made in the linear-closure group, which included the mobilisation of the stoma. After removing a section of the large intestine, the connection between the remaining parts was established using either handsewn or stapled techniques, or by employing the fold-over method. Afterwards, a sequential linear closure was performed on the fascia of the rectus abdominis muscle, and during the closure of the skin, the subcutaneous tissues were secured using interrupted stitches.

Patients were booked for a follow-up appointment to evaluate the presence of surgical site infection, measure the size of the scar, and assess the level of pain.

SPSS 23 was used for analyzing the data. Independent samples T test and Chi Square tests were applied for comparison of the outcome parameter. P value was set at < 0.05 to be significant.

RESULTS:

Sixty patients partook in this study. Mean age in group A was 34.57±9.66 years while 33.73±10.26 years in group B. Mean BMI in group A was 23.96±1.48 kg/m² while 23.73±1.38 kg/m² in group B. Mean operative time in group A was 96.20±11.86 mins while 102.13±11.77 mins in group B. Gender wise distribution demonstrated that there were 17 (56.7%) male patients in group A while 13 (43.3%) female patients and in group B 20 (66.7%) were male while 10 (33.3%) were female patients. Regarding the outcome parameter, surgical site infection was found in 4 (13.3%) patients in group A while 11 (36.7%) patients in group B (P = 0.03). Mean scare size was notably lower in group A 5.16±0.71 cm while 8.48±0.89 in group B (P = 0.0001). Pain score on VAS scale was notably lower in group A 2.87±1.19 while 4.27±2.13 in group B (P = 0.03).

Figure 1 Gender wise distribution

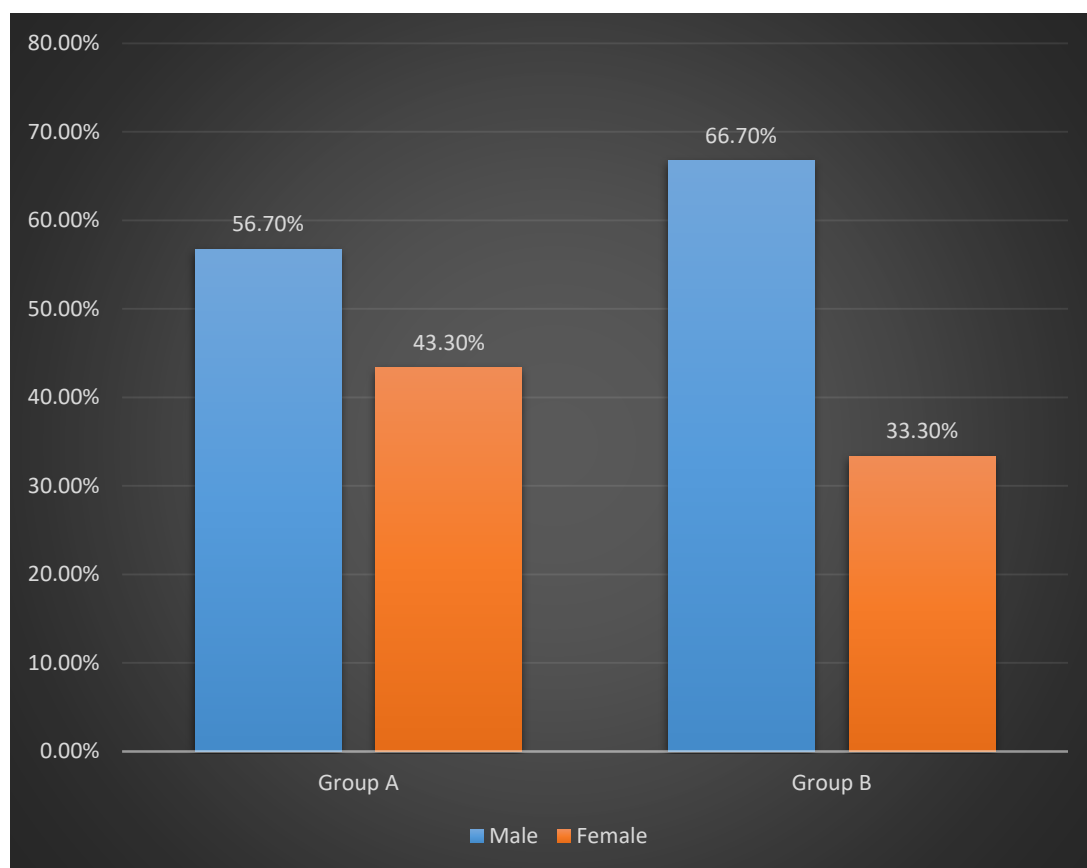


Table 1 Basic demographics

Groups		Age (Years)	BMI (kg/m ²)	Operative time (Mins)
Group A (Purse-string closing)	Mean	34.57	23.9693	96.20
	N	30	30	30
	Std. Deviation	9.666	1.48816	11.868
Group B (Linear skin closing)	Mean	33.73	23.7363	102.13
	N	30	30	30
	Std. Deviation	10.269	1.38075	11.770

Table 2 Comparison of outcome parameter between both groups

Outcome parameters	Group A (Purse-string closing)	Group B (Linear skin closing)	P value
Surgical site infection	4 (13.3%)	11 (36.7%)	0.03
Scar size (cm)	5.16±0.71	8.48±0.89	0.0001
Pain score (VAS)	2.87±1.19	4.27±2.13	0.03

DISCUSSION:

Stoma reversal procedures face various obstacles, including skin maceration, surgical site infection (SSI), and the formation of excessive scars, all of which lead to reduced patient satisfaction. Despite attempts to reduce these risks, such as administering antibiotic prophylaxis before and after surgery and using monofilament suture material, the occurrence of wound infections remains high, leading to less than ideal cosmetic results. Purse-string sutures have been identified as a potential approach to address these problems related to skin closure procedures¹³.

Purse-string sutures are expected to decrease the occurrence of surgical site infections (SSI) by promoting unobstructed drainage of wound fluids and potentially allowing for early identification of infections. Purse-string closure is anticipated to result in reduced scar diameters when compared to traditional linear closure procedures. Nevertheless, it is crucial to do a thorough assessment of parameters including the duration of the operation, amount of blood loss, and level of postoperative pain. Therefore, a carefully planned and executed study is necessary to provide evidence for the claimed benefits of this approach¹⁴.

The presence of an enterostoma has a substantial impact on the patient's Quality of Life (QOL). Post-stoma reversal, the occurrence of surgical site infection (SSI) presents a significant difficulty, manifesting as a continuous release of fluid from the incision at the specific location. This problem causes significant discomfort for the patient and can continue to negatively affect their quality of life even after the stoma is reversed. Continued endeavours to reduce SSI after stoma closure require the investigation of several factors that have an impact. There has been a recent surge in interest about skin closure techniques, including purse-string closure, because of their significant potential influence on wound healing.¹⁵

We conducted this trial on 60 patients presenting for loop-colostomy/ileostomy, we divided the patients randomly using blocked randomization in two groups. Patients in group A had purse-string closing while patients in group B had conventional linear skin closing. Age wise distribution and gender wise distribution did not reveal any notable difference between both groups. BMI in both groups showed no difference as well. Similar findings have been reported by a study, they reported no notable difference between purse-string closing group vs conventional linear skin closing group in terms of demographics as mentioned.¹⁶

The mean pain on VAS scale revealed that in purse-string closing group patients had notably lower pain score than the conventional linear closing group. A study demonstrated similar results in their comparison of purse-string vs conventional linear group.¹⁶

In our study we observed that the scar size was notably lower in purse-string closing group than the conventional linear group. Similar findings have been demonstrated by a study which showed that the skin scar size after healing was significantly smaller in the purse-string closing group when compared with conventional linear closing group.¹⁷

Regarding the SSI we observed that the frequency was significantly lower in purse-string closing group than conventional linear skin closing group. Similar observations have been reported by the aforementioned study as well¹⁶. Another study which was conducted in Pakistan demonstrated similar findings.¹⁸

CONCLUSION:

In conclusion we state that purse string closing is an effective surgical technique in terms of outcome parameters such as surgical site infection, pain and scar size than conventional linear skin closing in patients undergoing loop colostomy/ileostomy.

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