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### Original Article

# Prospective Randomized Clinical Trial of Wound Closure Technique after Ileostomy Closure

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#### ABSTRACT

**Background:** Surgical site infection (SSI) is a frequent problem following contaminated surgery. Reversal of ileostomy is one such type of surgery. There are various techniques described to deal with it and still debated in existing literature. The common methods described are primary closure, delayed primary closure, just packing of wound; circumferential subcuticular wound closure or purse string closure of wound. There is wide variation in wound infection rate in literature and no common consensus is found. Therefore, we conducted a study to compare linear subdermal closure with primary closure of wound after ileostomy reversal. **Aim:** To demonstrate that the technique of linear subdermal closure of wound after ileostomy closure is safe and more effective in reducing wound infection. **Materials and Methods:** Sixty four patients underwent ileostomy closure from May 2010 to May 2012. We randomly divided the patients in two groups. Group A (n = 34) underwent subdermal closure of wound and group B (n=30) underwent primary closure of wound. Primary outcome was measured for wound infection (SSI) and secondary outcome was measured for wound healing. **Result:** There was no wound infection in group A (0%). In group B the wound infection occurred in 4 patients (13.3%). There was significant reduction in SSI rate of subdermal closure (p = <0.05). There was no difference in wound healing and mean duration was 9 days (range 7-11 days) in both the groups. **Conclusion:** The linear subdermal wound closure produced less wound infection as compared to primary closure.

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## 1. Introduction

Surgical site infection (SSI) is a frequent problem after contaminated surgery. Reversal of ileostomy is considered as a contaminated surgery. Review of the literature shows SSI incidence of 0 to 41% [1-5]. After the anastomosis, the bowl loop is returned back to peritoneal cavity, the sheath is closed and the skin can be primarily closed, left completely open or left partially open. So there are different techniques of wound closure after ileostomy reversal and there is a wide variation in wound infection rate in literature. No common consensus is found for optimal method of wound closure after ileostomy takedown. Even there is a wide variation in SSI rate in the same method of wound closure. For example if we

look at SSI rate after primary closure of skin, Vermulst [3] and Milanchi[5] found 36% & 40% respectively while Harold [4] found it 0%. Similarly there are differences in other methods of wound closure and different comparative studies also show different results [table 1]. The comparison is limited because wound infection is not always defined in the studies. Reasons for divergent findings are not clear. In an attempt to clarify this issue, we conducted a prospective randomized clinical trial wound closure technique in which we closed the wound with linear subdermal closure and compared the SSI rate with linear primary closure.

## 2. Materials and Methods:

Sixty four patients underwent ileostomy closure from May 2010 to May 2012. The reasons for stoma formation were tabulated in table 2. Ileostomy reversals were usually performed after 10 - 12 week after stoma construction. The standard

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technique of ileostomy closure includes a peristomal elliptical skin incision, mobilization of the proximal and distal limbs of the bowel down to the peritoneal cavity and anastomosis of the two limbs to each other. After the anastomosis, the bowel loop is returned back to peritoneal cavity, the sheath is closed and the skin can be primarily closed or left partially open by subdermal closure. Primary closure was done by interrupted mattress suture of 2-0 nylon. The subdermal closure was done by interrupted suture of 2-0 vicryl]. After explaining the both procedures of wound closure, the option was left over to patient. In this way whole population of patients were randomly divided in two groups. Group A underwent linear subdermal closure and group B underwent linear primary closure of wound. There was no demographic difference between two groups. All the operations are done by same team in same hospital with same technique except closure of wound. Primary outcome was measured for wound infection (SSI) and secondary outcome was measured for wound healing. Surgical site infection was defined as per CDC guidelines. Statistical analysis was done by chi square test. Statistical significance was set at p value = < 0.05. A minimum of 30 days follow up was observed to include all SSI that might have delayed presentation.

### 3. Results:

Subdermal linear closure (Group A) was performed in 34 patients and primary linear closure (group B) was performed in 30 patients. There was no demographic difference in two groups. There was no wound infection (SSI) in group A while in group B it was seen in 4 patients (13.3%). So there was significant reduction ( $p < 0.05$ ) in SSI rate in subdermal linear closure. There was no difference in wound healing and mean duration was 9 days (range 7-11 days) in both the groups.

**Table 1. Surgical Site Infection (SSI) rate after ileostomy reversal**

Year	First author	Methods used for wound closure	SSI rate%
1999	Sutton CD [10]	Open (partial)	4.0
		Closed (primary)	14.9
2002	Sutton CD [10]	Closed (circumferential subcuticular)	0.0
2005	Lahat G [1]	Open	20.0
		Closed (primary)	10.0
2005	Wong KS [6]	Open (partial)	0.4
		Closed (primary)	9.3
2006	Vermulst N [3]	Open (left open)	5.0
		Closed (primary)	36.0
2009	Milanchi S [5]	Closed (primary linear)	40.0
		Closed ((circumferential subcuticular)	0.0
2010	Harold DM [4]	Open /delayed primary closure	5.3
		Closed (primary)	0.0
2010	Baraza W [7]	Closed (primary)	8.0
2010	Reid K [11]	Closed (purse string)	6.6
		Closed (primary)	38.7

**Table 2. Reasons for stoma formation**

Reasons	Group A (n = 34)	Group B (n = 30)
Enteric perforation	20	15
Abdominal trauma	6	9
Tubercular perforation	3	2
Caecal gangrene	3	1
Sigmoid volvulus	1	2
Ileocolic intussusception	1	1
Total (n = 64)		

#### 4. Discussion:

Reversal of ileostomy is a type of contaminated surgery and chances of SSI are more with these types of surgeries. Wound infection was the most common complication among overall complication of ileostomy reversal [7,8] while Chow A et al [9] said in a review of 48 studies that small bowel obstruction was most common complication (7.2%) followed by wound sepsis (5.0%). There are wide variations in SSI rate and method of wound closure. There is no common consensus about it. The comparison is limited because wound infection is not always defined in the studies [10]. The methods commonly used for wound closure fall in two category i.e. primary closure and secondary closure. Among secondary closure there are various subtype e. g. wounds left open, delayed secondary suturing, partial wound closure and purse string closure. Now we will discuss SSI rate of different methods. If we look at SSI rate after primary closure it ranges from 0% to 40 %. Harold [4] reported 0% SSI rate while Vermulst [3] and Milanchi 5 reported 40% and 36% respectively. Other studies have got figures in between this wide range. In left open wound or delayed primary closure group few studies [3, 4, 6] show lower SSI rate i.e. 0.4% to 5.3% while Lahat [1] shows higher SSI rate (20%) in this category. In purse string closure group, Milanchi [5] & Sutton [7] shows 0% SSI rate while Reid [8] shows 6.6% SSI rate. If we look at overall SSI rate most of the studies show higher SSI rate in primary closure group as compared to open or partial closure group. There are certain drawbacks in keeping the wound open or partially open. This wound needs frequent dressings which increase the cost and burden of work in hospital. So it is more inconvenient and for some patient it is difficult to get arrange for good dressing clinic in rural areas and they have to stay in hospital till the wound get healed or fewer dressing are needed. The scar after secondary closure have poor cosmetic outlook as compared to primary closure. Despite these drawbacks we still prefer open method because the SSI rate is mostly higher in primary closure and to treat these infected wound cost more and also give poorer outcome. The reason for higher SSI rate in primary group might be because of retention of bacterial contamination in closed superficial wound space. The ileostomy site skin and subcutaneous tissue is usually inflamed, oedematous and potentially contaminated. The wound at this site ooze serous fluid which is a good culture media for bacterial proliferation. When we do closure of wound by interrupted subdermal suture, this allows free drainage of discharge. As this oedema subside in few days and the open dermal layer heals quickly. So this technique provides benefits of both primary and secondary closure. At one ends it gives free drainage and on other hand wound margins remain in approximation and heal quickly.

Some surgeon [11-13] advocated purse string closure. This purse string technique can be difficult in some patients with thick abdominal wall or having fibrosed skin due to continuous sub acute inflammation and infection at ileostomy site. If we try forcefully to do, this may lead to cut through stitches or result in a larger open defect after closure. In our technique this difficulty does not arise because we make elliptical wound and close it by linear interrupted

subdermal suture. It is easy to close elliptical wound in linear fashion. The results of present study show that subdermal closure of wound after ileostomy reversal is safe and successful by abolishing wound infection (SSI). The limitation of our study is small scale population. Future large scale randomized trial at multiple centers may help to define ideal method of wound closure for such type of patients.

#### 5. Conclusion:

The subdermal linear closure of wound produced less SSI as compared to primary closure.

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