

Clinical Outcomes of Patients undergoing Intracutaneously and Transcutaneously Sutured Ileostomy to Prevent Stoma Related Complications- A Cohort Study

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ABSTRACT

Introduction: Ileostomy plays an important role in the emergency settings when faecal diversion procedure would be lifesaving. As it is known that each procedure has some complications, ileostomy is no different than having a plethora of complications ranging from early to late complications.

Aim: To determine outcomes in patients undergoing intracutaneously compared with transcutaneously sutured ileostomy to prevent stoma related complications.

Materials and Methods: A prospective cohort study was conducted on 130 patients who received a loop ileostomy from October 2018 till August 2020. Patients were placed in either transcutaneously sutured ileostomy group (n=70) or intracutaneously sutured ileostomy group (n=60), on the basis of surgeon's choice. Patients were followed for a period of three months after surgery and its outcomes (complications like peristomal dermatitis, ischaemia,

prolapse etc.) were assessed and compared using Statistical Package for the Social Sciences (SPSS) version 23.0 (IBM Corp.) and independent sample's t-test.

Results: The mean age for intracutaneously sutured ileostomy was 38.62±19.01 years and that for transcutaneously sutured ileostomy was 33.89±13.25 years. There was no significant difference between the groups in terms of age (p=0.420). There was no significant difference between the various groups in terms of distribution of gender (p=0.753). Nearly half of the patients (43.9%) suffered from peristomal leakage 33 (55%) in intracutaneously sutured ileostomy and 24 (34.3%) in transcutaneously sutured ileostomy (p-value- 0.018) leading to peristomal dermatitis.

Conclusion: Transcutaneous suturing technique have shown to decrease incidence of peristomal leakage leading to skin irritation (peristomal dermatitis). Other stoma related complications did not differ between the two techniques.

Keywords: Emergency, Peristomal dermatitis, Tubercular, Typhoid perforation

INTRODUCTION

Each year approximately 150,000 ileostomies and colostomies are performed in the United States. Around 800,000 people presently live with a bowel stoma [1]. Ileal perforation peritonitis continues to be a common surgical emergency in developing countries like India [2]. Ileostomy plays an important role in the emergency settings, when faecal diversion procedure would be lifesaving procedure. As it will help surgeons to reduce duration of surgery in patients having gross faecal contamination, multiple/large perforation, unhealthy bowel with malnourished status or co-morbidities. Temporary loop ileostomy is excellent safeguard for distal anastomosis. Ileostomy has a plethora of complications ranging from early to late complications. Complications in ileostomy patients can be noted in more than 70% of patients [3]. Complication rates are specified to loop ileostomies ranging from 5.7-41% and reoperation rates for loop ileostomies differ widely [4-9]. Peristomal skin irritation in the early postoperative period is the most common complaint [10]. Up to 70% of new ileostomies have unrecognised peristomal skin irritation [11,12].

The stoma is secured to prevent faecal leakage which is resulted by adhering the peristomal skin to the stoma plate. There is no universal method for suturing the stoma to the skin. The methods include transcutaneous suturing with the stitches exposed, or intracutaneous suturing by keeping the resorbable stitches below the skin surface. Transcutaneous technique is technically easier, but the puncture holes in the skin might allow faeces to penetrate. This causes skin irritation and early release of the stoma plate. This cohort study was designed to determine outcomes in patients undergoing intracutaneously compared with transcutaneously sutured ileostomy to prevent stoma related complications.

MATERIALS AND METHODS

This prospective cohort study was conducted on 130 patients who received a loop ileostomy from October 2018 till August 2020 admitted at Hamidia Hospital, Bhopal, Madhya Pradesh, India. Patients were placed in either transcutaneously sutured ileostomy group (n=70) or intracutaneously sutured ileostomy group (n=60) on the basis of surgeon's choice. The study was approved by the Ethical Clearance Committee of the hospital (Letter no. 36148050/MC/IEC/2018 dated 14/11/2018).

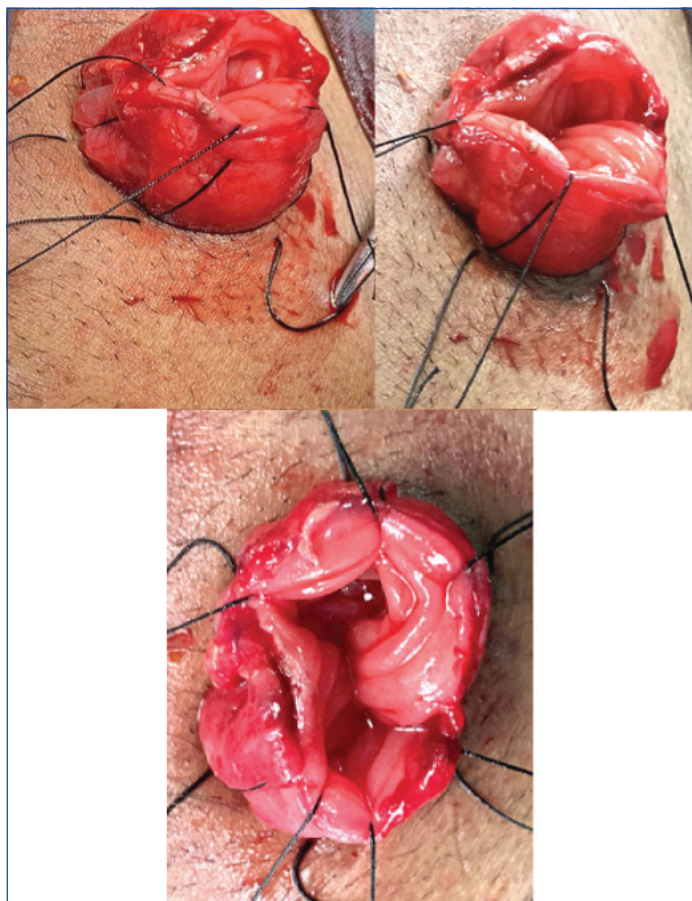
Inclusion criteria: All the patients between 13-80 years of age, who received a temporary loop ileostomy and who gave written informed consent to be part of the study. Patients were recruited from Out Patient Department (OPD) and Emergency Department.

Exclusion criteria: Patient not willing for surgery, double barrel ileostomy, permanent ileostomy, split ileostomy, colostomy, sigmoid colostomy were excluded in this study.

Study Procedure

Patients were placed in either group 1 (transcutaneously sutured ileostomy) or group 2 (intracutaneously sutured ileostomy) [Table/Fig-1,2]. They were followed for a period of three months after surgery, as complication occur mostly at this early postoperative stage and most of the stoma closure are done after this period [13]. Patients visited the OPD on one week, and two week and one, two and three months after the surgery. The frequency and severity of any regular [Table/Fig-3] from the appliance were recorded by the patient's relative and the doctor on regular OPD visit in a diary. Patient was asked about any complication according to a pre decided questionnaire. Patients were also asked to keep a diary of how many stoma products they

used each day. Data on the type and number of stoma materials used and any complications were recorded. Re-admissions and reinterventions were also documented.



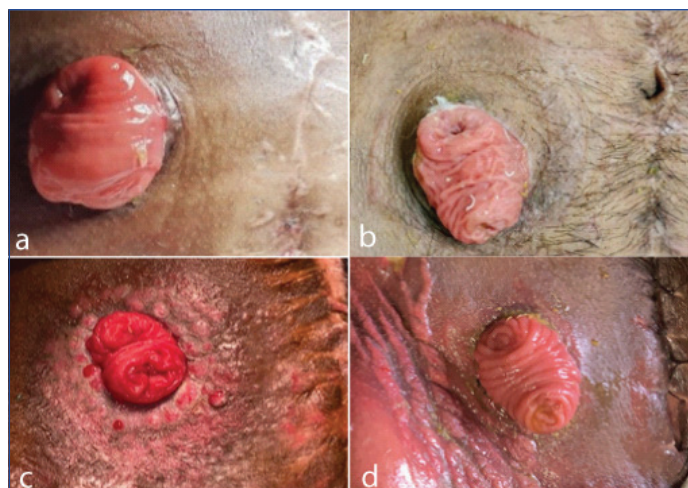
[Table/Fig-1]: Stoma maturation in transcutaneously sutured ileostomy.



[Table/Fig-2]: Stoma maturation in intracutaneously sutured ileostomy.

STATISTICAL ANALYSIS

The data were collected and recorded on a printed proforma including patient's demographics, operative findings, complications etc. Data were coded and recorded in MS Excel spreadsheet program. SPSS version 23.0 (IBM Corp.) was used for data analysis.



[Table/Fig-3]: Severity of faecal leakage under the stoma plate leading to peristomal dermatitis. (a) Minimal skin irritation; (b) Mild skin irritation; (c) Moderate peristomal dermatitis; (d) Severe peristomal dermatitis.

Group comparisons for continuously distributed data were made using independent sample's t-test when comparing two groups. If data were found to be non-normally distributed, appropriate non parametric tests in the form of Wilcoxon test were used. Chi-square test was used for group comparisons for categorical data. In case the expected frequency in the contingency tables was found to be <5 for >25% of the cells, Fisher's-exact test was used instead. Linear correlation between two continuous variables was explored using Pearson's correlation (if the data were normally distributed) and Spearman's correlation (for non-normally distributed data). Statistical significance was kept at $p < 0.05$.

RESULTS

Out of 130 patients, 60 underwent intracutaneously sutured ileostomy and 70 underwent transcutaneously sutured ileostomy. More than half of the patients belonged to the group age below 40 years (70%) that underwent loop ileostomy using intracutaneous (61.7%) and transcutaneously method (77.1%) [Table/Fig-4].

Parameters	Suturing technique of stoma		p-value
	Intracutaneous (n=60)	Transcutaneous (n=70)	
Age (years)	38.62±19.01	33.89±13.25	0.420 ¹
Age (years)			
≤20	15 (25.0%)	11 (15.7%)	0.043 ²
21-30	12 (20.0%)	25 (35.7%)	
31-40	10 (16.7%)	18 (25.7%)	
41-50	7 (11.7%)	5 (7.1%)	
51-60	9 (15.0%)	6 (8.6%)	
61-70	2 (3.2%)	5 (7.2%)	
71-80	4 (6.7%)	0 (0.0%)	
81-90	1 (1.7%)	0 (0.0%)	
Gender			
Male	46 (76.7%)	52 (74.3%)	0.753 ³
Female	14 (23.3%)	18 (25.7%)	

[Table/Fig-4]: Demographic data.

¹: Wilcoxon-mann-whitney U test; ²: Fisher's-exact test; ³: Chi-square test

Co-morbid conditions like diabetes mellitus and hypertension were predominantly present in the groups who underwent loop ileostomy. There was a significant difference between the groups with history of DM [Table/Fig-5]. There was a significant difference between the various groups in terms of distribution of type of case ($\chi^2=27.458$, $p < 0.001$) [Table/Fig-6].

On studying the pathologies that led to formation of temporary stomas, it was found that typhoid related perforation of ileum was the most common aetiology and it accounted for 31 (23.8%) of

Parameters	Suturing technique of stoma		p-value (chi-square test)
	Intracutaneous (n=60)	Transcutaneous (n=70)	
Diabetes mellitus	12 (20.0%)	5 (7.1%)	0.030*
Hypertension	13 (21.7%)	10 (14.3%)	0.272
Tuberculosis	28 (46.7%)	13 (18.6%)	<0.001*
Typhoid	6 (10.0%)	8 (11.4%)	0.793
Drug history			0.676
None	27 (45.0%)	38 (54.3%)	
Alcohol	12 (20.0%)	11 (15.7%)	
Smoking	9 (15.0%)	11 (15.7%)	
Smoking+Alcohol	12 (20.0%)	10 (14.3%)	

[Table/Fig-5]: Association between suturing technique of stoma and presence of a co-morbidity history.
*significant

Parameters	Suturing technique of stoma		p-value
	Intracutaneous (n=60)	Transcutaneous (n=70)	
Routine	27 (45.0%)	4 (5.7%)	<0.001
Emergency	33 (55.0%)	66 (94.3%)	

[Table/Fig-6]: Association between suturing technique of stoma and type of case.
chi-square test

these cases followed by ileocaecal tuberculosis 21 (16.2%). There was a significant difference between the various groups in terms of distribution of diagnosis ($\chi^2=35.779$, $p<0.001$) [Table/Fig-7].

Diagnosis	Suturing technique of stoma			Chi-squared test	
	Intracutaneous n (%)	Transcutaneous n (%)	Total n (%)	χ^2	p-value
Typhoid ileal perforation	9 (15.0%)	22 (31.4%)	31 (23.8%)	35.779	<0.001
Ileocaecal tuberculosis	16 (26.7%)	5 (7.1%)	21 (16.2%)		
Tubercular ileal perforation	2 (3.3%)	15 (21.4%)	17 (13.1%)		
Ileal stricture	9 (15.0%)	4 (5.7%)	13 (10.0%)		
Ileocaecal mass	6 (10.0%)	0 (0.0%)	6 (4.6%)		
Tubercular caecal perforation	4 (6.7%)	1 (1.4%)	5 (3.8%)		
Blunt trauma abdomen	1 (1.7%)	2 (2.9%)	3 (2.3%)		
Colonic perforation	2 (3.3%)	0 (0.0%)	2 (1.5%)		
Other*	11 (18.3%)	21 (30.0%)	32 (24.6%)		
Total	60 (100%)	70 (100%)	130 (100%)		

[Table/Fig-7]: Various pathologies that led temporary loop ileostomy formation.
*Comprises of other pathological causes leading to formation of ileostomy i.e., band, intussusception, post-op adhesions, subacute intestinal obstruction, appendicular perforation

Fisher's-exact test was used to explore the association between 'Suturing Technique of Stoma' and 'Nutritional Status' as more than 20% of the total number of cells had an expected count of less than 5. There was a significant difference between the various groups in terms of distribution of nutritional status ($p=0.037$) [Table/Fig-8].

On studying the overall stoma related complications between two groups, it was found that patients who underwent intracutaneously sutured ileostomy 33 (55%) had more peristomal dermatitis than transcutaneously sutured ileostomy 24 (34.3%); $p<0.05$ [Table/Fig-9]. Other complications were necrosis, prolapse [Table/Fig-10,11]. Other complications which were absent in both the groups were peristomal abscess, fistula, retraction, granulomas, parastomal hernia, and ileostomy stenosis.

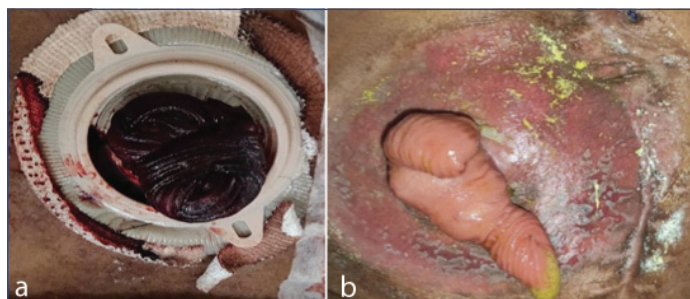
Parameters	Suturing technique of stoma		p-value (Fischer's-exact test)
	Intracutaneous (n=60)	Transcutaneous (n=70)	
Normal	27 (45.0%)	47 (67.1%)	0.037
Low BMI	2 (3.3%)	2 (2.9%)	
Low albumin	14 (23.3%)	13 (18.6%)	
Low albumin+Low BMI	17 (28.3%)	8 (11.4%)	

[Table/Fig-8]: Association between suturing technique of stoma and nutritional status.
Normal BMI >18.5; Low BMI <18.5; Albumin-normal value->3.4 g/dL

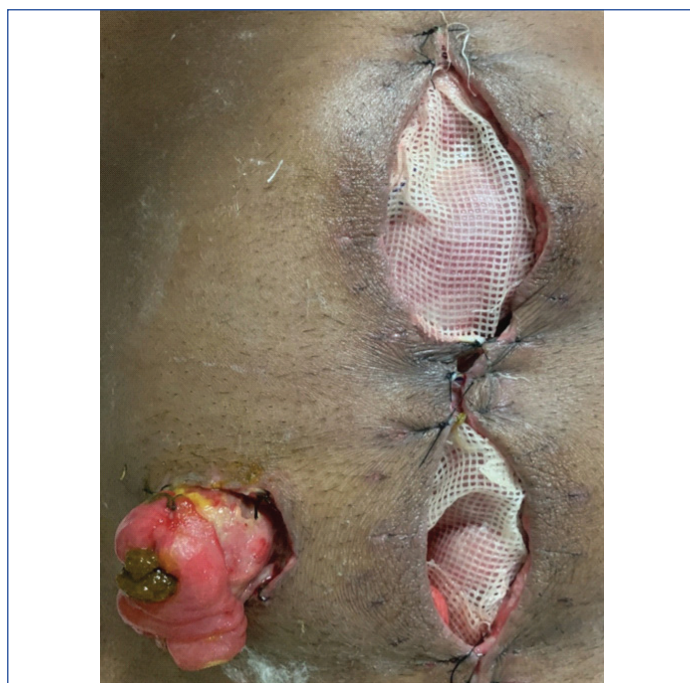
Complications	Suturing technique of stoma		p-value
	Intracutaneous (n=60)	Transcutaneous (n=70)	
Skin Irritation (Peristomal dermatitis)	33 (55.0%)	24 (34.3%)	0.018 ¹
Necrosis	2 (3.3%)	3 (4.3%)	1.000 ²
Prolapse	0 (0.0%)	1 (1.4%)	1.000 ²
High output	1 (1.7%)	1 (1.4%)	1.000 ¹

[Table/Fig-9]: Association between suturing technique of stoma and stoma-related complications (n=130).

¹: Chi-Squared test; ²: Fisher's-exact test



[Table/Fig-10]: Complication in other category. a) Loop stoma necrosis; b) Moderate peristomal dermatitis with prolapse.



[Table/Fig-11]: Burst abdomen with mucocutaneous dehiscence in intracutaneously sutured ileostomy.

DISCUSSION

The present study was aimed to compare both the techniques to reduce complication rates. A total of 130 temporary loop ileostomy were formed during the study. Out of which 60 intracutaneously sutured ileostomy and 70 transcutaneously sutured ileostomy were done in routine and emergency. In this study, about more than half of the patient's belonged to the most active group (age below 40 years

(70%) that underwent loop ileostomy using intracutaneous (61.7%) and transcutaneous method (77.1%) and males were predominantly involved in both the groups [Table/Fig-4]. Co-morbid conditions like diabetes mellitus and hypertension were predominantly present in the groups who underwent loop ileostomy. There was a significant difference between the groups with past history of DM ($\chi^2=4.698$, $p=0.030$) [Table/Fig-5]. Typhoid perforation of ileum was the most common aetiology and it accounted for 31 (23.8%). There was a significant difference between the various groups in terms of distribution of diagnosis [Table/Fig-7].

In the study by Bakx R et al., the most common aetiology for which temporary stomas were constructed was colorectal anastomosis for colorectal carcinoma that accounted for more than 60% of cases [14]. Diverticulitis and ulcerative colitis were next in the frequency. In the present study, typhoid perforation of small bowel was the most common pathology, which led to overall stoma formation in 23.8% of the cases. Total patients that presented with peritonitis accounted for more than 60% of cases.

Next important causes that led to maximum number of stoma formation after typhoid perforation were abdominal tuberculosis, abdominal trauma and bowel ischaemia. The incidence of abdominal tuberculosis has been reported to be negligible in a report from developed country [15].

The overall incidence of the cases that presented with peritonitis in the study was >80%. This means that, it was actually the peritonitis and poor general condition of the patients, which refuted primary repair of the bowel in these cases [16]. Moreover, the patients in the country usually suffer from many nutritional deficiencies such as anaemia, hypoproteinaemia and low body weight etc., these factors may delay the recovery after any surgery [17,18].

Stoma related complications: On studying the stoma related complications between two groups, it was found that patients who underwent intracutaneously sutured ileostomy have more stoma related complications than transcutaneously sutured ileostomy.

The most common stoma related complication in this study was peristomal dermatitis, which was also the most common complication reported in another study [10]. Majority of the complications were mild to moderate in severity. Peristomal dermatitis is most likely due to the stomal plate or due to the actual faecal leakage seeping through the appliances.

Sier MF et al., concluded that intracutaneous suturing of an ileostomy is associated with more peristomal leakage than transcutaneous sutured ileostomy. Overall stoma related complications did not differ between the two techniques [19].

In the present study, intracutaneous method of suturing of the ileostomy was not found to be superior to transcutaneous suturing with regard to skin irritation (stomal dermatitis). In fact, the overall leakage rate was significantly higher in the intracutaneous group than transcutaneous group.

When the mucosa of the newly matured ileostomy appears dusky it indicates ischaemia. The incidence ranges from 1-21% [3,20-22]. In the present study, necrosis of stoma was present in 2 (3.3%) of patients who underwent intracutaneously sutured ileostomy and in 3 (4.3%) of patients who underwent transcutaneously sutured ileostomy. Fisher's-exact test was used to explore the association between suturing technique and necrosis (week one). There was no significant difference between the various groups in terms of distribution of necrosis (week one) ($p=1.000$) [Table/Fig-10].

Complications like prolapse of temporary loop stoma was present in transcutaneously sutured ileostomy 1 (1.4%) at the end of one month and absent in intracutaneously sutured ileostomy. The reported incidence of prolapse is between 4-10% and probably increases with the time [14,23]. Now-a-days, ileostomy prolapse

occurs in approximately 5-10% of patients but in reality it is likely to be underestimated [24].

Limitation(s)

The limitation of this study was probably the small size of cohorts and that a follow-up period of three months was relatively short. However, a large multicentre trial needs to be undertaken to further confirm the findings of present study. All the facts and figures mentioned here may considerably vary from those of large series covering wide range of time.

CONCLUSION(S)

Transcutaneous suturing technique has shown to decrease incidence of peristomal leakage leading to skin irritation (peristomal dermatitis). Other stoma related complications did not differ between the two techniques. Complications were more common in the patients who underwent stoma surgeries in emergency as compared to patient who underwent stoma surgeries as elective procedure.

Meticulous care and attention to advanced techniques and methods will reduce the postoperative stoma related complication. Postoperative education regarding stoma care and its resumption of its normal activity plays a vital role in reducing postoperative complications. Multidisciplinary follow-up also helps in seeking out complications and associated morbidities at an earlier time associated with these procedures.

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