

Complications following ileostomy closure: an evaluation of the causal factors

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Abstract

Objectives: To evaluate the causal factors for complications of ileostomy reversal.

Study design: An observational study.

Setting and duration: Surgical "E" Unit Khyber Teaching Hospital, Peshawar from August 2006 to July 2007.

Methodology: This study included 46 consecutive patients who underwent ileostomy reversal over a one year period. We excluded patients younger than 12 years, patients undergoing closure within 6 weeks and patients with an additional, unrelated surgical intervention. Follow-up was done for all patients at weekly intervals for one month. The occurrence of surgery-related complications within 30 days of reversal was the main outcome measure.

Results: A series of 46 ileostomy closures was analyzed to evaluate factors contributing to morbidity and mortality. There were no deaths, but there was a 10.9 percent complication rate (5 patients) with wound infection (4.35%) and anastomotic leakage (4.35%) and ileus (2.17%) being the most frequent complications. The significant factors contributing to complications were primary closure of the stoma site, anastomotic site closure technique, type of stoma and surgeon's experience.

Conclusion: We concluded that ileostomy closure is associated with few complications but no mortality. Anastomotic site closure techniques, type of stoma, surgeon experience and skin closure technique were the predictors of complications.

Keywords: Ileostomy closure, anastomotic leak, ileostomy stroma

Introduction:

In general surgery stoma formation is a common procedure in both elective and emergency surgeries. Colostomies were used in the late 1800s to treat intestinal obstructions¹. Intestinal stomas were considered drastic procedures because of its high complication rates. The need for stomas has been increased with the improvement in surgical techniques.

An ileostomy is a life saving procedure which enables individuals to enjoy a full range of daily life activities. Ileostomies are necessary when the ileum distal to the stoma or the large intestine is either diseased or injured.

An ileostomy may be either temporary or per-

manent depending upon the indication for surgery. Temporary ileostomy is usually taken down after certain time. Although it lowers the operative risk of the initial indication but is associated with certain morbidity and mortality after its closure^{2,3,4}. Regarding the complications the reported series show conflicting results. So morbidity rates vary from 2.4% to 48.2% after closure of temporary stomas^{5,6}.

Commonest surgical complications following stoma closure are wound infections, anastomotic leak, paralytic ileus, small bowel obstruction and bleeding. Different patient and technique related risk factors influencing the complications following stoma closure².

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These complications have an effect on the patient's health and increase post operative hospital stay⁷ as well as in hospital costs.

Methodology:

This study was carried out in the Surgical E Unit of Khyber teaching Hospital, Peshawar from August 2006 to July 2007. All consecutive patients undergoing ileostomy closure after 8 weeks of ileostomy construction were included in the study. Patients younger than 12 years, those undergoing closure within 6 weeks and an additional, unrelated surgical intervention were excluded.

Demographics, indication for temporary ileostomy and operative details were noted. Distal loopogram using Barium was performed in all patients prior to closure. Patients had routine mechanical bowel preparation of the proximal and distal bowel with cessation of oral feeding the day before operation and lavage with mannitol solution orally administered and saline irrigation of the distal loops prior to surgery. All patients received parenteral antibiotics (Ceftriaxone and metronidazole) at the time of induction which was continued for 5 days.

Consent was taken from all patients for laparotomy if required. A circumstomal elliptical incision was made and the stoma was mobilized from surrounding fascial and peritoneal adhesions. After freshening the enterotomy margins, leaving the mesenteric side intact and closing the enterotomy in a transverse fashion, using a single layer, hand sewn extramucosal, interrupted technique with delayed absorbable suture material. Muscle gap closed with prolene 0 interrupted stitches. All skin incisions were closed primarily with interrupted 2/0 prolene and aseptic dressing applied.

Complications during hospital stay and those noted during a one month weekly follow-up after discharge were noted. Wound infections, anastomotic leakage, and paralytical ileus were considered surgical complications.

Definitions:

1. Wound infection was defined using the Centers for Disease Control and Prevention criteria. In this definition, superficial infection occurs within 30 days after operation and involves only skin or subcutaneous tissues.
2. Anastomosis leak was considered when there was evidence of generalized peritonitis, enterocutaneous fistula or radiographic evidence of a leak.
3. Paralytical ileus was defined as the inability to tolerate oral intake a minimum of 5 days postoperatively together with a need for nasogastric decompression and an absence of bowel sounds.

Several surgery-related risk factors were recorded. The outcome was the presence of surgery-related complications within 30 days. Data was analyzed using SPSS version 10.0. A P value less than 0.05 was considered statistically significant.

Results:

The study involved 46 patients. All patients underwent an emergency operation. The age range of these patients was 14-80 years with a mean age of 42.8 years and S.D 1.6. 28 patients (61%) were male and 18 patients (39%) were female. Exteriorization of a typhoid ileal perforation was the most frequent indication for ileostomy 15 (32.6%). This was followed by abdominal tuberculosis 11 (23.9%), penetrating abdominal trauma 7 (15.2%), bowel gangrene 7 (15.2%), blunt abdominal trauma 2 (4.3%), large bowel obstruction 2 (4.3%), post laparotomy 1 (2.2%), post abortion ileal perforation 1 (2.2%).

Ileum was brought as a loop in majority of the patients followed by double barrel ileostomy, ileo-colostomy and end ileostomy with distant mucous fistula. (Table 1)

The median interval between stoma construction and stoma closure was 14 weeks (range 7-35, mean 15 ± 6.8) Forty two (42) closures were performed via peri-ileostomy elliptical incision while four (4) needed a laparotomy. All the anastomosis were done by extramucosal, in-

Table 1: Types of Ileostomy

Type of stoma	No. of patients
Loop ileostomy	29 (63.0%)
Double barrel ileostomy	14 (30.4%)
Ileocolostomy	02 (04.3%)
End ileostomy with distant mucus fistula	01 (02.2%)

interrupted, single layer technique using delayed absorbable suture material.

Loops were reversed by transverse closure after refashioning the margins while in rest of the cases a short segment of the bowel was resected and end-to-end anastomosis was performed. Median duration of surgery was 60 minutes (range 45-120 min). Intra-peritoneal drains were inserted at the discretion of the operating surgeon. Corrugated drains in wounds were used in 19(41.3%). 18 stoma closures (39.1%) were directly supervised, and 28 stoma closures (60.9%) were performed by consultants. The mean postoperative stay was 6 days. (Median 5, range 4-15, S.D±2.21 days). There was no operative mortality.

Surgery-related complications were observed in five patients (10.9%). Wound infection and anastomotic leakage were the most frequent complications. Leaks occurred in 2 patients (4.35%), of whom 1 required relaparotomy. The other had a low output fistula that responded to conservative treatment. Wound infection was seen in 2(4.35%) patients who were treated by simple drainage and oral antibiotics according to culture and sensitivity. Ileus occurred in 1 patient (2.17%) which was managed conservatively Table 2.

Discussion:

Transient small bowel stoma formation is a common surgical procedure in both elective and emergency situations to protect a distal anastomosis or to avoid intraperitoneal intestinal anastomosis if the environment is hostile. It is generally recommended that temporary stoma be closed within 9-12 weeks⁸. But some patients poorly tolerate temporary stoma because of poor fitting of pouch leading to surrounding skin excoriation, dehydration, electrolytes imbalance

and nutritional deficiency so early closure may be opted⁹.

Ileostomy closure may be associated with mortality and morbidity. The reported series have shown conflicting results regarding the morbidity and mortality rates. But the overall complication rate of ileostomy closure range between 2.4%-48.2 percent^{1,10}. Different factors have been held responsible for the complications after ileostomy closure. Such as the skin and anastomotic site closure techniques, surgeon's expertise, type of stoma and interval between primary surgery and closure^{11,12}.

Surgical complications requiring reoperation and those can be managed conservatively were considered morbidity in our study.

Wound infection is a common complication following stoma closure. It varies from 1.3%-14.2% depending upon skin closure technique^{13,14}. Different techniques have been used to close the skin wound. The infection rate of wound closure by secondary intention is low but gives a very ugly scar and prolongs the hospital stay. Primary closure is usually associated with a high infection rate¹⁰. But, if broad spectrum antibiotics are used along with primary closure give good results in terms of infection rate cosmetically and hospital stay. Delayed primary closure has also low infection rate at the wound site¹⁵. Lee JR et.al; have observed low infection rate if purse string technique is used instead of linear closure¹⁶.

A disastrous complication of intestinal anastomosis is anastomotic leak resulting in peritonitis, which is associated with high morbidity and mortality. The complication rate with 5-8% leakage at the anastomotic site has been documented^{10,17}. It has been observed that Time interval from the creation to the closure has a significant effect on the complication rate ($p < 0.0001$)^{15,18}. The anastomotic leakage was low in those who underwent closure after 90 days than those with less than 30 days interval¹⁵. Surgeon's experience is another factor modifying complication rate of stoma reversal. Low anastomotic leakage has

Table 2: Patient related risk factors for complications after ileostomy closure

Risk factors	With Complications (n=5)	Without complications (n=41)	p-value
Age in years (median)	49(15-80)	38 (14-65)	0.12
Gender			
Male	03(40%)	31(75.6%)	0.128
Female	02(60%)	10(24.4%)	
Type of stoma			
Loop ileostomy	01(20%)	28(68.3%)	0.079
Double barrel ileostomy	02(40%)	10(24.4%)	
Ileocolostomy	01(20%)	02(4.9%)	
End colostomy	01(20%)	01(2.4%)	
Reason for ileostomy			
Typhoid perforation	01(20%)	15(36.6%)	0.421
Abdominal tuberculosis	01(20%)	10(24.4%)	
Penetrating abdominal trauma	00(0%)	07(17.1%)	
Bowel gangrene	02(40%)	05(12.2%)	
Blunt abdominal trauma	01(20%)	01(2.4%)	
Large bowel obstruction	00(0%)	02(4.8%)	
Post-laparotomy Ileal perforation	00(0%)	01(2.4%)	
Post-abortion ileal perforation	00(0%)	01(2.4%)	

Table 3: Operation technique related risk factors for complications after ileostomy closure.

Risk factors	With complications n=5	Without complications n=41
Median Interval(weeks) from construction to closure	14 (10-21)	14 (7-35)
Type of anastomosis		
End to end closure	03	06
Enterotomy closure	02	35
Surgical approach		
Relaparotomy	02	02
Closure at ileostomy site	03	39
Surgeons experience		
Supervised trainee	03	15
Consultant.	02	26
Drains		
Used	03	15
Not used	02	26
Duration of surgery in min		
Median (range)	60(45-120)	60(45-90)

been seen in hands of experienced surgeons¹⁹. Stoma closure can be either extra-peritoneal or intra-peritoneal through the same site. Extra-peritoneal closure was performed to minimize intraperitoneal contamination following anastomotic break down. But it was associated with a high enterocutaneous fistula and Incisional hernia formations and was reserved for special cases¹⁷.

Those who had relaparotomy and anastomotic closure had a higher complication rate than those whose closure was confined to the stoma

site. Different anastomosis closure techniques have been used to control anastomosis line complications. It has been seen that loop closure has got less complications at the suture line than the divided stomas¹⁵. This is most likely due to less mesenteric dissection is needed in loop closure than divided stomas. But according to S.A Garcia-Botello et.al, there are no statistically significant differences in morbidity in closure techniques (p=0.892)²⁰.

Paralytic ileus and small bowel obstruction are the other complications which have been observed after stoma reversal. The incidence reported varies between different series 4%-16.6%.^{10,20} Paralytic ileus is most probably due to electrolytes imbalance and small bowel obstruction due to post operative adhesions. Both of them usually respond well to conservative treatment and surgery is rarely indicated.

Conclusion:

Ileostomy reversal is not free of complications. But it is concluded that anastomotic site closure techniques, type of stoma, surgeon experience and skin closure technique were the predictors of complications. Loop, enterotomy closures with extra-mucosal technique have better results than resection and end to end anastomosis. The risk of wound infection and dehiscence is low with Delayed primary skin closures than primary closures.

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