FREQUENCY OF SURGICAL SITE INFECTION FOLLOWING INTESTINAL STOMA CLOSURE

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ABSTRACT

Objective: The aim of the study is to find the frequency of surgical site infection following intestinal stoma closure

Material and methods: This study was conducted in surgical C unit, Lady Reading Hospital Peshawar. Through a Descriptive case series study design, consecutive 139 patients requiring stoma closure were included in the study between January, 2011 to June, 2012. Closure was done on the next day of admission by a senior resident, registrar or consultant blinded from the details and inclusion of the patient in the study. Patients were advised to report to OPD if they develop wound infection in between follow up visits.

Results: There were 139 patients with intestine stoma who underwent stoma closure and were observed for wound infection, in which 104 (74.82%) were male and 35 (25.18%) were female patients. colostomy was done in 78 (56.1%) patients and ileostomy was carried out in 61 (43.9%) of patients. The age of patients included in study ranged from 13 to 70 years. Average age was 35.69 years ±16.5SD. 11(7.9%) wound infections were observed during the study. After 14-days of post-op follow up, wound infection was recorded in 9 (6.5%) patients, at 21 days of follow-up it was seen in 5 (3.6%) patients and at 30th day of post-op follow up wound infection decreased to just 3 (2.2%). Majority of patients were discharged at day 5 post operatively, average hospital stay was 4.96 days ± 2.06SD with a range of 3-10 days.

INTRODUCTION

An intestinal stoma is a surgically created opening of the bowel onto the body surface.[1] Temporary ostomies can be created from small or large bowel in a variety of manners and serves a valuable role in persons undergoing surgery for acute infectious events, malignancy or trauma.[2] Temporary faecal diversion is recommended with a low colorectal, coloanal or ileoanal anastomosis.[3] Despite the major advancements in the field of intestinal surgery, construction of an intestinal stoma is still a common and one of the most frequent operations in visceral surgery.[4,5] Temporary stoma creation is an essential part of emergency and elective colonic surgery.[6] Surgical patients frequently need some type of intestinal stomas for a wide spectrum of disorders. Maintaining effective and enough decompression of gastrointestinal tract, securing distal bowel segments and anastomosis are the primary goals of ostomy formation as well as providing a minimum complication rate of closure.[7]

Traditionally it was considered to be the safest method of treatment of colonic injuries and was practiced as a routine in World War-II, Korean and Vietnam wars.[1] Despite new operation techniques and a more restrictive use of stomas, stoma formation remain an often necessary procedure.[4] Stoma closure is so often considered a "minor" procedure but it is associated with significant morbidity and mortality.[4-6,8] The morbidity of stoma closure includes bowel obstruction, anastomosis leak/fistula/stricture, intra-abdominal abscess, wound infection, stomal site hernia and intestinal hemorrhage.[2] The commonest complication of stoma closure is wound infection/sepsis.[5,6,8-10] Wound infection remains the commonest post-operative complication which not only prolongs the hospital stay, increases cost of treatment but can also lead to septicemia and long term complications like incisional hernia.[11] It is the most common nosocomial infection accounting for 28% of all such infections.[12] It remains a major clinical problem in terms of morbidity, mortality and cost of treatment.[13-16] Patients who develop wound infection are up to 60% more likely to spend time in an ICU, 5-times more likely to be re-admitted to the hospital and 2-times more likely to die than are patient without wound infection.[17] The incidence of wound sepsis ranges from 2 to 37% but most series report an incidence of approximately 10%.[8]

Surgical site infection has a tendency to occur more often in the colostomy group [5-15% in colostomy vs. 0.5-6% in iliostomy],[2] as in the pre closure period, and this might be due to the nature of microbial flora in the stoma.[18] This part of the world is in a state of war being faced with the menace of terrorism resulting in heavy casualties. In such circumstances stoma surgery is an essential part of emergency abdominal surgery which contributes to elective stoma closure surgery. The aim of this study is to determine the frequency of surgical site infection (SSI) following stoma closure.

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OBJECTIVE

The aim of this study is to find the frequency of surgical site infection following intestinal stoma closure.

MATERIALS AND METHODS

This study was conducted in surgical C unit of PGMI, Lady Reading Hospital, Peshawar from January 2011 to June, 2012. A total of 139 patients were enclosed in the study. All adults patients both male and female who required intestinal stoma closure were included in the study. Patient on steroids, having diabetes mellitus were excluded from the study. Patients requiring stoma closure were booked and admitted through OPD. Pre-operative distal loopogram was done to check any distal pathology like stricture or leakage in patients who required stoma to protect distal anastomosis. Detailed history, clinical examination, routine pre-operative investigations like CBC,ECG,X-ray chest, blood sugar, HBsAg and Anti HCV were done in each case pre-operatively.

Mechanical bowel preparation was done the day before surgery. Proximal loop was prepared using 200ml 20% mannitol solution mixed with 1-litre fruit juices taken orally. Distal loop was cleaned by orthograde lavage using normal saline and Kleen enemas per rectally. Informed written consent signed by the patient and the operating surgeon was taken for surgery following explanation to the patients of their inclusion in this study.

Closure was done on the next day of admission by a senior resident, registrar or consultant blinded from the details and inclusion of the patient in the study. Prophylactic antibiotics (ceftriaxone 1gm+metronidazole 500mg) were administered intravenously after induction of anaesthesia. Elliptical incision was given around stoma and deepened into the peritoneum. Upon full mobilization of the loop, gut continuity was restored using polyglycolic acid 3/0 suture in extra-mucosal single interrupted layer. Both layers of rectus sheath were closed with polypropylene no.1 in continuous layer. Skin was approximated with polypropylene 2/0 suture in simple interrupted layer.Patients were kept nil by mouth and started on i/v antibiotics (as mentioned earlier) and fluids for 2-3 days post-operatively and/or till they pass stools and flatus. Daily progress including bowel sounds, passage of stool and flatus and any complications were noted. Patients were discharged from the hospital when they started oral intake, stable clinically and there were no complications which were decided by the attending surgeon.

All patients were followed up on day 14th, 21st and 30th after surgery. All cases were evaluated for post-operative fever, pain (in wound), and redness (erythema), swelling of wound margins (cellulitis) and/or discharge of pus from wound, during stay in the hospital and on follow up visits. All the qualitative variables like gender, wound infection, type and site of stoma, indications of stoma, were analyzed for percentages and frequencies. Mean + standard deviation was calculated for quantitative variables like age, duration of hospital stay. For gender male to female ratio was calculated. The results were presented through tables, cross tabulation, graphs and charts.Data were stored and analyzed by statistical program SPSS version 11.

RESULTS

In this study, 139 patients with intestinal stoma closure were observed, in which 104(74.82%) were male and 35(25.18%) were female patients. Male to female ratio was 2.9:1 (Fig 1). The study included both temporary colostomies and iliostomies, in which

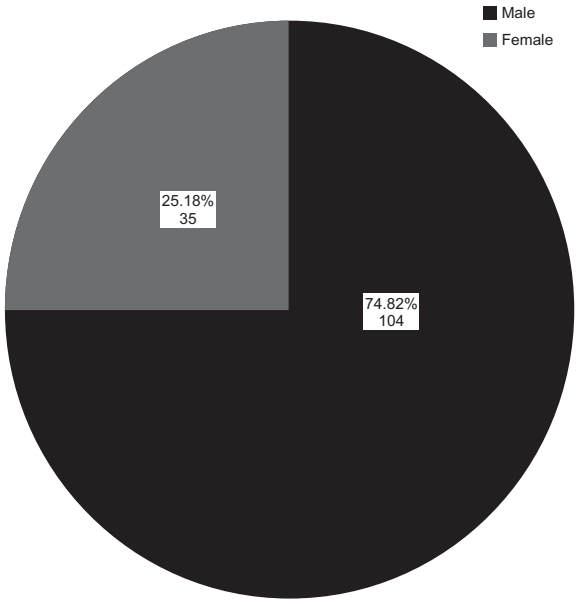

Fig no: 1. Gender distribution

colostomy closure was done in 78(56.1%) patients while ileostomy closure was carried out in 61(43.9%) patients. Out of a total 78-colostomies,18 were end-colostomy,28-loop colostomy and rest were double barrell. Out of 61(43.9%) iliostomies,20 were double barrel,30 were loop and the rest(11) were ilio-colostomies. Patient's age was divided into five categories, out of which most common age group for ileostomies was 13–20 years and 21–30 years for colostomies. Majority of the patients were of the age less than 30 years. Thirty three (23.7%) patients were in the age range of 13-20 years, 42 (30.2%) patients were of age range 21-30 years, 12(8.6%) patients presented at the age of 31-40 years while 28(20.1%) patients were included in age group of 41-50 years and 24 (17.3%) were more than 50 years of age. The age group included in study ranged from 13 to 70 years. Average

Table no: 1. Post op wound infection

		No. of patients	Percent age
Wound infection at hospital	Yes	11	7.9%
	No	128	92.1%
Wound infection at 1 4th post operative day	Yes	9	6.5%
	No	130	93.5%
Wound infection at 21st post operative day	Yes	9	6.5%
	No	134	96.4%
Wound infection at 30th post operative day	Yes	8	5.88%
	No	136	97.8%

Table no: 2. Hospital stay

	Frequency	Percent	Cumulative Percent
3.00 - 4.00	34	24.5	75.5
5.00 - 6.00	71	51.1	51.1
7.00 - 8.00	17	12.2	87.8
9.00+	17	12.2	100.0
Total	139	100.0	

Table no: 3. Indication of stoma

	No. of Patients	Percent age
Penetrating injury/ blunt injury (gunshot)	79	56.83
Intestinal Tuberculosis	9	6.47
Typhoid ileal perforation	14	10.07
Diversion (Carcinoma Colon)	4	2.88
Iatrogenic colonic injury	3	2.16
Anal sphincter injury	1	0.72
Rectal Foreign body	1	0.72
Sigmoid Volvulus	18	12.13
Adhesive bowel obstruction	10	7.19
Total	139	100.00

age was 35.69 years $\pm$ 16.5SD (Table 2). Wound infection was observed in 11(7.9%) patients pos-operatively during stay in the hospital and subsequent follow-ups. After 14th day of post op follow up, wound infection was recorded in 9(6.5%) of patients, at 21 days of follow-up it was seen in 9(6.5%) and decreasde to 8(5.88%) at 30th day of post-op follow up. (Table 1)

Average hospital stay was 5.63 days $\pm$ 2.06SD with a range of 3-10 days. Majority of the patients i.e 71(51.1%) were discharged at 5-6 day post-operatively, 34(24.5%) patients were discharged at 3rd- 4th post-op day, 17 (12.2%) patients were sent to home with in 7-8 days and 17(12.2%) patients have more than 9-days of hospital stay post-operatively.(Table 2).There were 5(45.5%) patients of age more than 40 years who presented with stoma site wound infection, 2(18.2%) patients with wound infection had age of 31-40 years, 1(9.1%) patient had age of 21-30 years and 3(27.3%) patients had age less than or equal to 20 years . Gender wise distribution shows that the infection in hospital was found more in males than females. Out of 104 male patients, 9(8.7%) patients developed stoma site wound infection while out of 35 female patients, 2 (5.7%) patients were found to have wound infection post operatively.

In majority of patients,the indication for temporary stoma creation was penetrating/blunt trauma abdomen i.e 79(56.83%) cases.the other indications included sigmoid volvulus in 18(12.13%) patients, adhesive bowel obstruction in 10(7.19%) patients, intestinal tuberculosis in 9(6.47%) patients, typhoid ileal perforation in 14(10.07%) patients, carcinoma colon 4(2.88%) patients, iatrogenic colonic injuries in 3(2.16%) patients and anal sphincter injury in 1(0.72%) patient. (Table 3).

DISCUSSION

Faecal diversion remains an effective option to treat a variety of gastrointestinal and abdominal conditions. Ileostomy and colostomy are commonly made intestinal stomas in surgery[19]. Wound infection and anastomotic leak are the commonest complications of intestinal stoma closure.

In my study males were three times more common to have stoma than females.it is due to the fact that our society is male predominant and they take part more in social activities including earning and so are more exposed to trauma and diseases as compared to females who are housewives in majority. Compared to ulcerative colitis in western world, the main indications of stoma formation was penetrating/ blunt injury 79(56.83%), followed by sigmoid volvulus 18(12.13%), 10 (7.19%) patients presented with adhesive bowel obstruction, intestinal tuberculosis was found in 9(6.47%), typhoid ileal perforation 14(10.07%), carcinoma colon accounted for 4(2.88%) patients iatrogenic colonic injury occurred in 3(2.16%)

patients. 1(0.72%) patients required defunctioning colostomy for anal sphincter injury[20]. This was in contrast to a study reported from Karachi in which main indication was typhoid perforation, accounting for two third of all cases. Other less common included iatrogenic perforation, rectal cancer, tuberculosis, blunt abdominal trauma and anastamotic leakage.[21] Tuberculous abdomen is quite common in this part of the world. The incidence of perforated tuberculous ulcer in operated cases varies from 10.5-39% whereas the incidence of intestinal stricture and ileoceacal mass were 66% and 20% respectively.[22] Our results are also contrast to these studies because this part of country has extremely hit under terrirsom and extremism that is why the pentrating injuries are found in majority of cases in our study.

Reported complication rates after stomas closure ranges from 2.4% to 50%[23, 23]. A comparison between these complication rates is difficult because of the different definitions of complications. We have included all deviations from the normal postoperative course as complications. In the stomas created at Patan Hospital, 39% of patients had pre-takedown complications, out of which 26% were superficial wound infections, and 13% had signs of paralytic ileus. None of the patients required any major surgical interventions. No significant comparison could be made on the occurrence of complications between the ileostomy and colostomy groups, neither in the loop nor in the end group.

One of the other study shows that Stomas have risks and costs of their own in cluding local, systemic complications and a second hospitalisation for closure. Major complications like sepsis, intraabdominal abscesses, wound infection or dehiscence and pneumonia are important indicators of clinical outcome but gut related complica-tions are often used to gauge effectiveness and risks of gut procedures. Blunt trauma by roadside accidents res-ulted in 22.4% colostomies. In a report by Bugis et al,[25] blunt trauma resulted in 2 – 15% colonic injuries. In the present study colostomy was made in 14% cases of anorectal malignancy, 12% sigmoid volvulous and only 2% cases of adhesive obstruction study. This is in com-parison to a study done by Memon et al[5] and they reported colostomy formation in 9.7% cases of acute intestinal obstruction.[26]

Most of the complications in the present study appeared in stomas constructed by residents or less experienced senior registrar in emergency. A surgeon trained in stoma formation observing all tech-nical details usually give good results.[23] In reversal of 62 stomas, there were three anaestomatic leakage and nine cases of wound infection. This was in accordance with a study that showed a morbidity of 16% including extra abdominal complications.[24]

There is no recognized optimal timing for reversal of temporary ileostomies. However, most surgeons would advocate early reversal of ileostomies in medically fit and willing patients. The vast majority of patients experience an overall improvement in quality of life, physical function and social function following stoma reversal. A patient's general medical fitness, which includes age and co-morbidity, may worsen after major surgery and is important in planning any further surgical procedures. A further factor is the patients' experience of the primary procedure, particularly if they suffered any post-operative complications[27]. In the present study, 69% of stomas were reversed within 12 weeks. There were no significant differences in outcome among early or delayed closure; although some authors have mentioned increasing the delay from creation to reversal may result in fewer complications while others argue that early reversal is feasible[28-30].

A routine contrast study is not practiced in Patan Hospital. Among the 23 patients, only 1 had a distal loopogram for suspicion of obstruction as multiple inter-loop adhesions were noted in the index operation. The loopogram revealed contrast passing normally up to the rectum. In patients with an ileostomy, with a smooth postoperative course, a radiological examination of the anastomosis prior to ileostomy reversal appears unnecessary[31]. Routine gastrograffin enema in the absence of a clinical suspicion of anastomotic failure would appear to be of little value[32].

Prospective comparison between primary closure and delayed primary closure of the wound has unexpectedly shown less wound infection in primary closure than in delayed primary closure[33].

Post reversal complications have been reported to be between 20 and 48%[32, 34, 35], wound infections and anastomotic leakage being the most common surgical complications. The results are comparable to our study.

The mean hospital stay after stoma reversal was 7 days with the patients undergoing loop ileostomy reversal being discharged earlier (mean 3 days). There was no readmission. This practice significantly reduces the use of hospital resources and decreases economic cost without compromising care[36].

CONCLUSION

Advantages of stoma creation clearly outweigh the disadvantages considering the very low percentage of serious complications associated with stoma creation and reversal. Our study did not find any differences in the complication rates associated with the type of stoma formation, timing of reversal. Wound infection was observed as compard to other national and international studies. Male were three times more than females and wound infectin was seen more in males.

We therefore conclude that stoma reversal can be done safely at an earlier date, with minimal requirement of special anesthesia and minimal access to the abdomen, and that early discharge is safe without expecting serious complications and readmissions.

REFERENCE

1. Haq AU, Ahmad A. A study of complications related with colostomy closure. Ann KE Med Coll 2006;12:2616.
2. Mackeigen JM, Cataldo PA. Ostomy take down. In: Mackeigen JM, Cataldo PA, eds. Intestinal stomas: principles, techniques, and management. 2nd ed. New York: Informa Health Care, 2004:211-3.
3. Alves A, Panis Y, Lelong B, Donsset B, Benoist S, Vicaut E. Randomized clinical trial of early VS delayed temporary stoma closure after proctocolectomy. Br J Surg 2008;95:693-8.
4. Renzulli P, Candinas D. Intestinal stomas-indications, stoma types, surgical technique. Ther Umsch 2007;64:517-27.
5. Rajput A, Samad A, Khanzada TW. Temporary loop ileostomy: prospective study of indications and complications. Rawal Med J 2007;32:159-62.
6. Pokorny H, Herkner H, Jakesz R, Herbst F. Mortality and complications after stoma closure. Arch Surg 2005;140:956-60.
7. Anadol A, Topgül, Koray, Santulli enterostomy revisited: indications in adults. World J Surg 2006;30:19358.
8. Sutton CD, Williams N, Marshall LJ, Lloyd G, Thomas WM. A technique for wound closure that minimizes sepsis after stoma closure. ANZ J Surg 2002;72:7667.
9. Iqbal P, Saddique M, Baloch TA. Closure of ileostomy-a study of 74 cases Pak J Surg 2008;24:98-101.
10. Kaiser AM, Israelit S, Klaristenfeld D, Selvindoss P, Vukasin P, Ault G, et al. Morbidity of ostomy takedown. J Gastrointest Surg 2008;12:437-41.
11. Siddiqui K,Khan AAF. Comparison of frequency of wound infection: Open Vs laparoscopic cholecystectomy. J Ayub Med Coll Abbottabad 2006;18:21-4.
12. Parker MC, Wilson MS, Menzies D, Sunderland G, Clark DN, Knight AD, et al. Surgical and clinical adhesions research (SCAR) Group. "The SCAR-3 study: 5-year adhesion-related readmission risk following lower abdominal surgical procedures.". Colorectal Dis. 2005;**7**:551–8
13. Petrosillo N, Drapeau CM, Nicastri E, Martini L, Ippolito G, Moro ML, et al. Surgical site infections in Italian hospitals: a prospective multicenter study. BMC Infect Dis 2008;8:34.
14. Sangrasi AK, Leghari AA, Memon A, Talpur AK, Qureshi GA, Memon JM. Surgical site infection rate and associated risk factors in elective general surgery at a public sector medical university in Pakistan. Intern Wound J 2008;5:74-8.
15. Smith RL, Bohl JK, McElearney ST, Friel CM, Barclay MM, Sawyer RG. Wound infection after elective colorectal resection: Ann Surg 2004;239:599-605.
16. Petherick ES, Dalton JE, Moore PJ, Cullum N. Methods for identifying surgical wound infection after discharge from hospital: a systematic review. BMC Infect Dis 2006;6:170.
17. Khan SA, Rodrigues G, Kumar P, Rao PGM. Current challenges in adherence to clinical guidelines for antibiotic prophylaxis in surgery. J Coll Physicians Surg Pak 2006;16:435-7.
18. Lertsithichai P, Rattanapichart P. Temporary ileostomy versus temporary colostomy: a meta-analysis of complications. Asian J Surg 2004;27:202-9.
19. Mivano G, Yanai T, Okazaki T, Kobavashi H, Lane G, Yamataka A. Laparoscopy assisted stoma closure. J Laparoendosc Adv Surg Tech A. 2007;17:395-8.
20. Leung TT, MacLean AR, Buie WD, Dixon E. Comparison of stapled versus handsewn loop ileostomy closure: a meta-analysis. J. Gastrointest Surg. 2008:12:939-44.
21. Wong KS, Remzi FH, Gorgun E. Loop ileostomy closure after restorative proctocolectomy. Outcome in 1504 patients. Dis Colon Rectum 2005;48:243-50.
22. Gunnarsson U, Karlbom U, Docker M, Raab Y, Pahlman L. Proctocolectomy and pelvic pouch is a diverting stoma dangerous for the patient? Colorectal Dis. 2004;6:23-7.
23. Vermulst N, Vermeulen J, Hazebrock EJ, Coene PP, van-der-Harst E. Primary closure of the skin after stoma closure. Management of wound infections is easy without (long term) complications. Dig Surg 2006;23:2558.
24. Menegaux F, Jordi-Galais P, Turrin N, Chigot JP. Closure of small bowel stomas on postoperative day 10. Eur J Surg. 2002;168:713-5.
25. Mansfield SD, Jensen C, Phair AS, Kelly OT, Kelly SB. Complications of loop ileostomy closure: A retrospective cohert analsysis of 123 patients. World J Surg. 2008;23:88-92.
26. Thalheimer A, Bueter M, Kortuem M. Thiede A, Mever D. Morbidity of temporary loop ileostomy in patients with colorectal cancer. Dis Colon Rectum 2006;49:1011-7.
27. Tjandra JJ, Chan MK. A sprayable hydrogel adhesion barrier facilitates closure of defunctioning loop ileostomy: a randomized trial. Dis colon Rectum. 2008:51:956-60.
28. Salum M, Wexner SD, Nogueras JJ et al. Does sodium hyaluronate and carboxymethycellulose-based bioresorbable membrane (seprafilm) decrease operative time for loop ileostomy closure?. Tech Coloproctol. 2006;10:187-90

29. Kong-Weng-Eu, MMed, David G. Layne. A randomized controlled trial of 0.5% ferric hyaluronate Gel (Intergel) inthe prevention of Adhesions following abdominal surgery. Annals Surg. 2003;567-70

30. Ming-Zhe Chang, Chien-Chung TSA. Tc-99m(V)-DMSA in wound infection after closure of an ileostomy. Annals nuclear med 2000;19:733-6.

31. Khair G, Alhamarneh O, Avery J, Cast J, Gunn J, Monson JRT, Hartley J. Routine use of gastrograffin Enema prior to the Reversal of a loop ileostomy. Dig Sur 2007;24:338-41.

32. Araujo SE, Nahas SC, Seid VE, Marchini GS, Torricelli FC. Laparoscopy assisted ileal pouch anal anastomosis: surgical outcomes after 10 cases. Surg Laparosc Endosc Percutan Tech. 2005;15:321-4.

33. Dowson HM, Bong JJ, Lovell DP. Reduced adhesion formation following laparoscopic versus open colorectal surgery. British J surg.1998;95:909-14.

34. Jakobsen HL,Harvald TB, Rosenberg J. No-trocar laparoscopic stoma creation. Surg Laparosc Endosc Percutan Tech 2006;16:104-5.

35. Tsang WWC, Chung, CC. Laparoscopic sphincter preserving total mesorectal excision with colonica-J-pouch reconstruction: five year results. Annals surg 2006;243:353-8.

36. Brand MI, Dujovny N. Preoperative Considerations and Creation of Normal Ostomies. Clin Colon Rectal Surg. 2008;21:5-16.