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Original Research Article

How temporary is temporary ileostomy: variables delaying reversal of an ileostomy

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ABSTRACT

Background: Temporary diversion ileostomy are done to protect distal bowel anastomosis giving adequate time for the bowel repair to heal. Here we studied the reversal time for different temporary ileostomy done and found the factors causing delay in reversal of ileostomy.
Methods: In a retrospective cohort of patients, data was collected from the MRD and the operating registry of department of general surgery from January 2013 to December 2017. Parameters like reversal time interval between creation to closure, type of ileostomy, timing of stoma creation, ostomy created with primary index surgery or subsequently, primary etiology that led to creation of ileostomy, ileostomy done on elective list or as an emergency and postoperative complications like anastomotic leak, surgical site infection, intra-abdominal collection were recorded.
Results: Of 107 cases, 3 were planned permanent ileostomy and 2 lost follow up. About 77 underwent reversal with mean reversal time of 74.47days, 25 (24.50%) were nonreversed. 51 underwent ileostomy during their second surgical procedure (secondary stoma). End ileostomy, adjuvant chemotherapy, intra-abdominal collection and a secondary stoma caused a delay in the reversal of ileostomy.
Conclusions: Although it is said that temporary ileostomies are reversed within 6 to 12weeks time, but reversal time is considerably delayed as what would be anticipated. Ileostomy carries considerable morbidity and psychological impact on lifestyle of patient. Non-reversal of ileostomy should be an important part of pre-procedural counselling because considerable number of ostomies may not be reversed which were deemed to be temporary initially.

Keywords: End ileostomy, Intra-abdominal collection, Loop ileostomy, Reversal time, Secondary stoma, Temporary ileostomy

INTRODUCTION

Ileostomy is where the lumen of ileum is brought through the abdominal wall via a surgical opening, typically located on the right lower quadrant of abdomen and planned as distal as possible to allow enough length for absorption of nutrients. Adequate care is taken to spout the stump to get the effluents away from contact with skin. Preprocedural counselling is very essential and a detailed explanation of the future course remains crucial for the psychological well-being of the patient.[1]

Diversion ileostomy could be a loop ileostomy consisting an afferent loop and efferent loop or end ileostomy which has a single lumen of proximal emptying limb and distal limb is closed. Diversion stoma is done to relieve intestinal obstruction or protect the anastomosis in the distal part of bowel, giving it adequate time to heal.

Benefits of defunctioning stoma are clear. While creating diversion ileostomy the intention is to reverse it within 6 to 12weeks.[2] No set protocols exist for definitive timing of stoma reversal and varies from institution to institution. Early ileostomy closure reduces postoperative nausea and vomiting.[3] Early reversal benefits the patient, improves the quality of life and decreases the health care cost. Despite the benefits of early reversal, reversal time was considerably longer (between 13 to 37weeks).[2] However there is also risk of morbidity following stoma reversal in particular a risk of Surgical Site Infection (SSI) and anastomotic leak and the need for re-creation of ileostomy does exist.[4,5]

Although stoma reversal is considered a simple procedure all diversion ileostomies initially planned as temporary may not be reversed. 3-25 % of them may become permanent.[3]

Delayed reversal may be due to prolonged recovery from index surgery, post-operative complications, surgical site infection, and adjuvant chemotherapy treatment.[3] The aim of our study was to study the indications for ileostomy, nature of temporary ileostomy, reversal time for loop and end ileostomy, frequency of reversal and also analyze the various factors delaying reversal of an ileostomy.

METHODS

All the ileostomies constructed from January 2013 to December 2017 in Kasturba medical college, Manipal, a tertiary referral Centre in coastal Karnataka, India were studied. Patient were followed until August 2018. All patients who had undergone loop ileostomy or end ileostomy with an intention of reversal were included in the study cohort. Pediatric patients were excluded from our study. All the eligible patient's records were accessed from the medical records database (ileostomy code 5.462 for ileostomy creation, 5.465 for ileostomy closure). Patient details were noted. Also, surgery department operating registry was searched for ostomy creation and reversal to ensure that all patients during the study period were included.

Procedure

Reversal of ileostomy was done by consultant surgeon, under spinal with epidural anesthesia or general anesthesia, depending on the case as per the choice of consultant anesthetist. All patients received antibiotic prophylaxis amoxicillin with clavulinic acid 1.2g IV preoperatively.

Loop ileostomy closure was done through a peri-ostomy elliptical incision, by careful dissection ileal loop was delivered into the ostomy wound while end ileostomy closure was done through a formal midline laparotomy. Adhesiolysis was done and bowel continuity restored by staple or hand sewn 2 layered anastomosis.

Data collection was done using the standard data extraction form. Hospital numbers of patients who underwent ileostomy year wise was obtained from medical record database with the permission of the medical superintendent after obtaining clearance from the Institution Ethics Committee (Ref: IEC 593-2018). Age, gender, previous primary surgery if any, creation of ostomy (elective vs emergency), indication for ostomy (benign causes like typhoid perforation, trauma, enterocutaneous fistula, colo-cutaneous fistula, sigmoido-uterine fistula vs malignancy), nature of ostomy (loop vs end), hospital stay during stoma creation, time interval between stoma creation to reversal, hospital stay during reversal, post-operative complications like (surgical site infection, intra-abdominal collection, electrolyte imbalance, respiratory tract infection, sepsis), non-reversal of stoma were recorded.

Statistical analysis

Data was collected from patient medical records and entered into Excel (Microsoft corp., USA). Descriptive statistical analysis which includes frequency distribution, percentages, mean and standard deviation were calculated wherever relevant.

Means of the continuous variables were compared using student t-test. Categorical variables were analyzed and compared using chi-square test. Significant level was considered at $P<0.05$. Statistical analysis was done using SPSS v 20.0 (IBM corp., Chicago).

RESULTS

From January 2013 to December 2017, 107 ileostomies were undertaken, of which 102 were intended to be temporary. Below flow chart depicts overall patient statistics of our study (Figure 1).

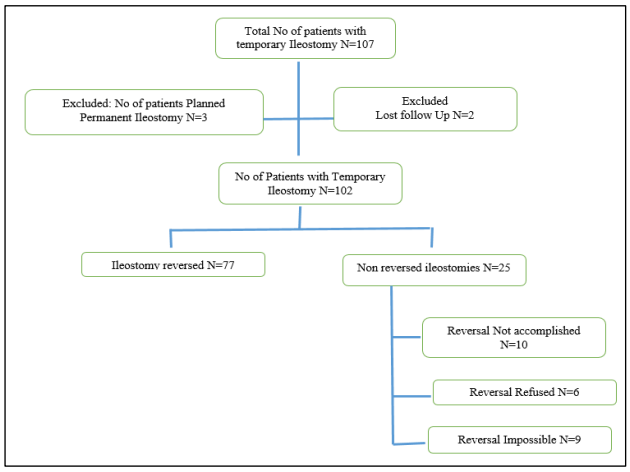

Figure 1: The number of included patients.

Baseline demographics of patients included are showed in Table 1. Many patients in our study underwent loop ileostomy to protect the downstream anastomosis while

end ileostomy was undertaken when there was suspicion of anastomotic leak or an unknown cause of sepsis where the primary leak had to be repaired and concomitant bowel exteriorization had to be undertaken (Table 1).

Table 1: Demographic details.

Variables	All patients
No of patients	107
Male/female	67/40
Age	43.78 (18 to 76)
Ileostomy	
Loop	84 (80.76%)
End	20 (19.3%)
Permanent end	3 (2.8%)
Surgery	
Elective	44
Emergency	63
Etiology	
Benign	59
Malignant	48
Previous primary surgery	
Yes	51
General surgery	40
OBG	11
No	56
Reversal Time	74.47 (±28-336) days

Based on the timing of surgery undertaken, cases were classified as planned elective cases or an emergency case. Based on primary etiology, they were categorized into malignancy, which included carcinoma of colon and rectum, or benign etiology, which included cases of fecal peritonitis due to hollow viscous perforation due to various etiology and internal fistulae like enterocutaneous fistula, sigmoido-uterine fistula, colo-cutaneous fistula.

Our study included patients that were referred to us from the gynecology department as a result of complication from primary gynecological surgery, which were 11 in number, and were included in benign etiology.

Of the 102 intended temporary ileostomies, 77 were reversed with a mean reversal time of 74.47days. 25 (24.5%) stoma were non-reversed at the end of the study.

Ten patients (9.80%) died in the post-operative period because of sepsis, respiratory failure, multi organ dysfunction and were grouped as reversal was not accomplished. 6 patients refused reversal and 9 patient's reversal was impossible because of high co-morbidities or advanced stage of disease.

Delayed stoma reversal was defined as closure of stoma after a 6month period. In our study 8 cases had delayed stoma reversal. 6 among them were loop ileostomy and 2 were end ileostomy (Table 2).

Stoma reversal rates for each of the category of the stoma are shown in the above table. Reversal rates for loop ileostomy are better than that for end ileostomy (64 vs 12), among the reversed ostomies loop ostomies are reversed in statistically significant proportion when compared to end ileostomy.

Elective cases were reversed in higher proportion as compared to cases done as emergency (82.92% vs 69.84%), but reversal time for elective and emergency done cases were statistically insignificant. Mean reversal time for all ostomies was 74.47 days (min 28 days- max 336 days).

Table 2: Ostomy reversal rates.

Category	Total	No reversed	In %	Mean reversal time
Loop	84	64	76.19%	99.95 (±60.03)
End	20	12	60%	108.73 (±58.04)
Malignant	48	31	64.58%	113.28 (±83.63)
Benign	59	46	77.96%	97.59 (±46.36)
Elective	41	34	82.92%	108.83 (±80.88)
Emergency	63	44	69.84%	101.34 (±50.29)

Table 3: Factors affecting the reversal.

Ostomy Category	P value*
Reversal done Y/N vs gender (male/female)	
Reversal done Y/N vs surgery (emergency/elective)	0.559
Reversal done Y/N vs stoma type(loop/end)	0.035*
Reversal done Y/N vs diagnosis (malignancy/benign)	0.130
Stoma type (primary/ secondary) vs diagnosis (malignancy/benign)	0.007*

Chi square test, $P < 0.05$.

Table 4: Factors affecting the reversal.

Ostomy Category	P value*
Reversal done Y/N vs gender (male/female)	
Reversal done Y/N vs surgery (emergency/elective)	0.559
Reversal done Y/N vs stoma type(loop/end)	0.035*
Reversal done Y/N vs diagnosis (malignancy/benign)	0.130
Stoma type (primary/ secondary) vs diagnosis (malignancy/benign)	0.007*

Chi square test, P < 0.05.

All the possible causes of delay in reversal of stoma like, timing of surgery (elective or emergency), type of stoma (loop or end), primary etiology (benign vs malignant), stoma timing (primary stoma vs secondary stoma), adjuvant chemotherapy received or not, post-operative complications like SSI, anastomotic leak, intra-abdominal collection were analyzed (Table 3).

The above categorical variables shown in table were analyzed by chi-square test. P value <0.05 was considered to be statistically significant. Among the 76 patients who underwent stoma reversal, 63 were loop ileostomy which were reversed in higher proportion as compared to an end ileostomy. P value for loop stoma to be reversed was 0.035, statistically significant. A loop ostomy had 5 times higher likelihood of reversal as compared to end ileostomy (Figure 2).

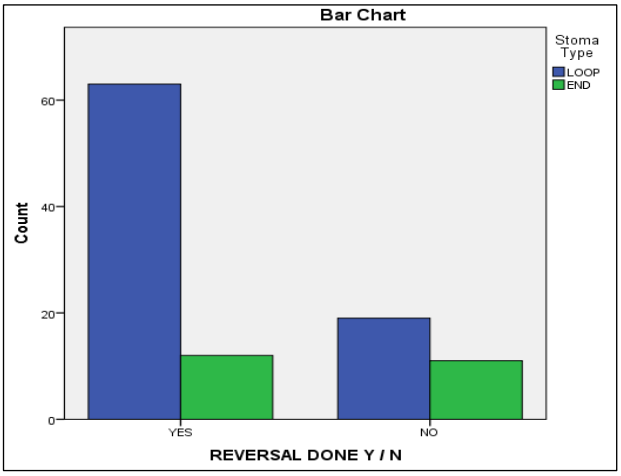

Figure 2: Type of stoma and the number underwent reversal.

Primary stoma was created at the time of index surgery and a secondary stoma was created after a complication of primary surgery, be it for a benign primary etiology or malignant primary etiology. Primary stoma was a planned stoma as compared to a secondary stoma which was made to mitigate the sepsis or downstream anastomotic leak.

After analysis by chi-square test, it was noted that a primary stoma was reversed earlier as compared to secondary stoma, with a statistically significant value of P=0.007 and the incidence of primary stoma were high in malignancy, whereas the incidence of secondary stoma was high in benign conditions (Table 4) (Table 5).

Table 5: Primary/secondary stoma pre-operative diagnosis cross tabulation count.

		Pre-operative diagnosis		Total
		Malignancy	Benign	
Primary/ secondary stoma	Primary	33	22	55
	Secondary	17	35	52
Total		50	57	107

Mean reversal time was compared with other variables using the student t-test. Among patients who underwent chemotherapy and who had intra-abdominal collection, were found to be have a statistically significant delayed reversal time when compared to other variables like surgical site infection, anastomotic leak, benign or malignant etiology.

Reversal time for patients with intra-abdominal collection was 148.50days (SD=67.893) when compared to patients with no abdominal collection of 98.99days (SD=62.608), P value 0.039 found to be statistically significant (Table 6).

Of the 48 cases only 13 cases received chemotherapy i.e. only about ¼th of the cases received adjuvant chemotherapy and mean reversal time was delayed in them as expected. Mean reversal time was 152.77days (SD=102.915) for those who received chemotherapy as compared to those malignant cases who did not receive chemotherapy which was 94.17 days (SD=48.91) with P value of 0.002, which was statistically significant.

Our study also evaluated other probable causes of delay in reversal of ostomy based on the etiology like benign cases or malignant cases, based on the setting of creation of ostomy emergency vs elective cases. But no statistical difference could be noted based on this categorization when compared by chi-square test. Other probable surgical causes, which we anticipated could cause delay in timing of reversal like surgical site infection, anastomotic leak was also analyzed by student t-test. In

our study we found these variables were not statistically significant with P value of 0.625 and 0.347 for surgical site infection and anastomotic leak respectively.

Table 6: Factors affecting the reversal.

Parameter	Mean reversal time	P value*
Adjuvant chemo		
Yes	152.77±102.91	0.002*
No	94.17±48.91	
Surgery		
Elective	108.83±80.88	0.667
Emergency	101.34±50.29	
Stoma type		
Loop	99.95±60.03	0.652
End	108.73±58.04	
Aetiology		
Benign	97.59±46.36	0.341
Malignant	113.28±83.63	
SSI		
Yes	94.22±64.03	0.625
No	105.54±64.97	
Intra-abdominal collection		
Yes	148.50±67.89	0.039*
No	98.99±62.60	
Anastomotic leak		
Present	123.33±64.00	0.347
Absent	101.63±64.65	
Previous surgery		
Primary	92.96±69.48	0.073
secondary	118.94±55.35	
Secondary stoma		
Gen surgery	122.70±55.24	0.445
OBG	104.43±57.61	

*Student t test, a P<0.05.

DISCUSSION

Temporary diversion ileostomy is made to protect distal anastomosis and with an intention to reverse it within 8 to 12weeks duration. Primary intention of diversion is to obtain adequate healing of the anastomosis and prevent fecal contamination providing adequate recovery time from the index surgery. Diversion would also help in intra-abdominal resolution of inflammation, decrease in tissue edema, softening of intra-abdominal and peri-stomal adhesions.[6,7] Diversion must be balanced with stoma related complications. If reversal time is prolonged, could give rise to stoma related complications and impair the quality of life of the patient.[8]

In our study we found the reversal rate for loop ileostomy to be 76.19% and end ileostomy to be 60% i.e. 64 of 84 loop ostomies were reversed and 12 of 20 end ostomies were reversed. Sier et al, found reversal rates to 71% and 43% for loop and end ostomies respectively. Reversal rate of loop ileostomy was comparable to observed by Sier et al while reversal rate of end ileostomy was higher than them. Rates of stoma closure amongst patients with defunctioning ileostomies have been variably reported, from 68% to 75.1% and as high as 91.5% in one report.[9-11] Over all mean reversal rate was 73.52% in our study which was comparable to what was observed in the previous studies. These facts should help the operating surgeon in choosing the stoma type and make use of them in informed decision making. Loop ileostomies have a higher chance of being reversed than end ileostomies, also a loop ileostomy made as primary stoma has a higher likelihood of reversal when compared to a secondary stoma.

Non-reversal of stoma at the end of study period has ranged from 9 to 25% in various studies.[4-6] We found non-reversal rate of 24.5%, which was on the higher side of what was observed in various studies. Of the non-reversed ileostomies, n=8 were end ileostomy and n=17 were loop ileostomy. High incidence of non-reversal observed may be due to the inclusion of secondary stoma which were made as a life saving measure. Recovery of the patient after construction of the secondary stoma from sepsis, multiorgan failure took longer period and many patients did not recover from the post-operative complication which explains the high non-reversal rate encountered in our study. Patients with secondary stoma constructed in our study was 47.66% which was considerably large due to variety of cases involved. End ileostomy has a higher likelihood of nonreversible as compared to loop. End ileostomies are made after intestinal resection and when immediate reanastamosis is considered to be unsafe.[12-14] Loop ileostomies are closed locally, whereas end ileostomy require a formal laparotomy, more chance of concomitant injury to the normal bowel due to adhesions and also require longer time of surgery. Perhaps when an end ileostomy is reversed, may be followed by a diversion loop ileostomy, to minimize the risk of leak. Hence the above factors decrease the reversal rates for end ileostomy. Results from recently published large studies have demonstrated that there is a risk between 18% and 25% for defunctioning ileostomies to become permanent.[15-18]

Adjuvant post-operative chemotherapy delays stoma reversal.[19,20] In our study 13 patients underwent chemotherapy and were reversed after a mean time of 152.77days. Approximately 20 % of our patients had delayed stoma reversal due to chemotherapy. In a study by Peter Waterland and colleagues, they encountered that 1/3rd of the patient population had delayed reversal due to chemotherapy. The morbidity of adjuvant chemotherapy, adverse effects of chemotherapy would be expected to delay the timing of closure. Those patients who underwent chemotherapy were also noted to have increased hospital stay.

Intra-abdominal collection following index surgery were identified when the patient had a delayed recovery. There would be a doubt of intra-abdominal abscess or a non-abscess fluid collection, which were thought to be due to

anastomotic leak. Symptomatic anastomotic leakage was identified as an independent risk factor for non-reversal and was similar finding in many studies.[20-22] We found that cases which had anastomotic leak in our study, did have a delayed reversal but was not statistically significant, p=0.347. Investigations should be performed to rule out an abscess vs a non-abscess collection. Sier MF et al, reported that patients with intra-abdominal abscess had delayed reversal than patients who did not have a collection, p value 0.021, which was confirmed by our study where we found the reversal time to be delayed with a P value 0.039.[3]

National bowel cancer audit project (NBOCAAP) 2013, UK revealed that no. of patients with stoma after 18months follow up was nearly 1/3rd. Delay in reversal was 7months, mortality rate 10% and a non-reversal rate of 40%. In our study, we came across Non-reversal rate of 23.36% i.e. 1 in 4 ileostomies made were non-reversed with a mortality of 9.34%, most of the deaths were in the immediate post-operative period.[23] The major limitation of this study was that it is a retrospective study, single center study. We advocate multiple studies with larger study population for conforming the facts of our study.

CONCLUSION

We conclude from our study that loop ileostomy carries a higher and early reversal as compared to an end ileostomy. Approximately 24% of ileostomies were non-reversed, which amounts to 1 in 4 ileostomy, non-reversal has to be a part of preoperative counseling. Post-operative complications like intra-abdominal collection, adjuvant chemotherapy were factors that led to a delayed reversal. Stoma constructed during the index surgery carries early reversal rate than a stoma formed during subsequent procedures.

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