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Study of Closure of Gastrointestinal (Small Intestinal) Stomas at Different Intervals

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Abstract: *A gastrointestinal stoma is an artificial opening in the abdominal wall to divert the gastrointestinal secretions and waste products to the exterior. A stoma can be made in the esophagus (esophagostomy) stomach (gastrostomy), the jejunum (jejunostomy), the ileum (ileostomy), the caecum (caecostomy) and the colon (colostomy). 64 patients were included in the study in which closure of ileostomy was done during the period of June 2017 to August 2018. Out of 64 patients included in this study, early closure was done in 30 patients and late closure in 34 patients. Stoma related complication rate in the late closure ileostomy group (88.23%) was more than that in the early closure ileostomy group (16.66%). Complications requiring re-operation were almost equivalent in both the groups. Higher rate of minor complications (33.34%) after early ileostomy closure especially wound infection & abscesses and fever. Average operative time was found higher in the late ileostomy closure group (100 minutes) than that in the early closure ileostomy group (75 minutes). Average duration of hospital stay after closure was higher in the late closure ileostomy group (14 days). No case of mortality was found in both the groups.*

Keywords: *Stoma, early closure, late closure.*

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I. Introduction

Stoma is a Greek word for mouth or opening (Stedman's Medical Dictionary. 27th Ed, 2000). A gastrointestinal stoma is an artificial opening in the abdominal wall to divert the gastrointestinal secretions and waste products to the exterior.

The earliest stomata were generally constructed inadvertently or overtly in the course of battle or conflict and prior to modern surgery it was known that most of these intestinal injuries were lethal (Dinnick T, 1934; Cromar C.D.L., 1968; Richardson R.G., 1973).[1,2,3]

A stoma can be made in the esophagus (esophagostomy) stomach (gastrostomy), the jejunum (jejunostomy), the ileum (ileostomy), the caecum (caecostomy) and the colon (colostomy).

Dragstedt attempted to avoid the serositis problem by skin grafting the ileostomy. That procedure was called "Dragstedt ileostomy" (Hardy KJ, 1989; Cataldo PA, 1999).[4,5] Circle and Turnbull further explored the metabolic consequences of ileostomy and described the 'Mucosal grafted' ileostomy in 1954.[6] Pride of place in making ileostomy construction easy and trouble free must go to Bryan Brook who described his technique of eversion ileostomy in 1952. Turnbull and Weakley were the first surgeons who described the loop ileostomy, in 1971 (Shipp JD, 1974).[7]

An ileostomy is the prosthesis fashioned by the surgeon after he has amputated the rectum and colon (proctocolectomy) or to defunction an anastomosis or fecal fistula distally.

Progress in anastomotic technique has greatly reduced the number of indications for temporary small bowel stomas. Stomas are however still needed if there is a high risk of anastomotic leak (after low colorectal, coloanal or ileoanal anastomosis) or when the local (ruptured abscess, generalised peritonitis, distended colon)or general (long term corticotherapy) conditions dictate further protection of the anastomosis (Wexner SD et al, 1993; Edward DP et al, 2001).[8,9] Ileostomy is generally preferred over colostomy since it provides excellent deviation of fecal matter without creating a risk of injury to the vascular arcade (Phang PT et al, 1999).[10] A stoma may also be needed in other situation e.g. after emergency bowel resection if immediate anastomosis is too hazardous or because of other problems (generalised peritonitis, mesenteric ischaemia, prolonged shock, major malnutrition) (Hanisch E et al, 1999).[11]

Diversion of the fecal stream by construction of a stoma is still a common procedure in gastrointestinal surgery, despite a trend to avoid stomas, especially in emergency surgery. The construction of a stoma is associated with decreased physical and psychological well being and poor quality of life. Although stoma may

be regarded as an invisible prosthesis, in the dressed person it is the persons ectopic anus and not surprisingly patients concentrate on the stoma and regard their operation as 'ostomy' surgery rather than a resection of part of their gut (Devlin H.B., 1973).[12]

Restoration of intestinal continuity is usually performed after 8-12 weeks. However during this time, stoma related complications occur in a quarter of patients, with adverse effect on quality of life (Thalheimer A, et al, 2006).[13]

According to Prospective study in France, early closure of small bowel stoma is feasible and it reduces the total duration of hospitalisation without major morbidity, however a higher rate of wound abscess is noted after early closure than late closure, but this difference is not significant (Galais PJ et al, 2003).[14]

A Randomised clinical trial of early versus delayed temporary stoma closure after proctectomy showed that early stoma closure is feasible in selected patients with reduced hospital stay, bowel obstruction and medical complications but a higher wound complication rate (Thalheimer A et al, 2006).[13]

II. Aims & Objectives

This study was undertaken with the following aims and objectives: -

1) To know the outcome (morbidity/mortality) of small intestinal stoma closure at different intervals after its creation.
2) To know the (rate of) complications associated with small intestinal closure at different intervals after its creation.
3) To know the optimal time of closure of stoma.

III. Materials & Methods

After approval from Institutional Ethics Committee of Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India, 64 patients were included in the study in which closure of ileostomy was done during the period of June 2017 to August 2018. Informed written consent was obtained from the patients. Out of 64 patients included in this study, early closure was done in 30 patients and late closure in 34 patients.

The method of study included clinical, pathological, radiological and endoscopic examination followed by closure of small intestinal stoma.

Different types of small gastrointestinal stomas were constructed for different indications. These could be temporary or permanent stomata. A temporary small GI stoma was constructed either in acute situation that the patient is obstructed or perforation or injury to the intestine or as a prophylactic maneuver to 'cover' distal surgeries.

The standard operative technique of ileostomy closure includes a peristomal skin incision, mobilization of the proximal and distal limbs of the bowel down to the fascia and peristomal cavity and anastomosis of the two limbs to each other. Currently the most common technique to achieve closure is resection of the ileostomy and a handsewn anastomosis. After the anastomosis, the bowel is inserted back into the skin can be left partially open, completely open or primarily closed.

All cases were reassessed postoperatively and managed accordingly. All patients were instructed to report at 1, 2, 3 and 6 months after ileostomy closure, and even earlier in cases of postoperative complications.

IV. Results

Table –1: Stoma related complications

Complications	**Early closure (n=30)**		**Late closure (n=34)**	
	No. of cases	**%**	**No. of cases**	**%**
Dermatological (skin excoriation, bleeding, infection)	3	10	10	29.41
Bad positioning	0	0	2	5.88
Electrolyte imbalance	1	3.33	8	23.53
Stomal prolapse	0	0	1	2.94
Parastomal hernia	0	0	2	5.88
Stomal retraction	1	3.33	3	8.83
Stomal bleeding	0	0	1	2.94
Stomal stricture	0	0	1	2.94
Stomal blockage	0	0	1	2.94
Stomal necrosis	0	0	1	2.94
Total	5	16.66	30	88.23

Above table showing that stoma related complication rate in the late closure ileostomy group (88.23%) was more than that in the early closure ileostomy group (16.66%).

Table – 2: Complications requiring re-operation

Complications	**Early closure (n=30)**		**Late closure (n=34)**	
	No. of cases	**%**	**No. of cases**	**%**
Anastomotic leakage	1	3.33	0	0
Anastomotic stenosis	0	0	1	2.94
Intestinal injury	1	3.33	0	0
Small bowel obstruction	0	0	1	2.94
Postoperative haemorrhage	0	0	0	0
Stomal site incisional hernia	0	0	1	2.94
Total	2	6.66	3	8.82

Complications requiring re-operation were almost equivalent in both the groups.

Table – 3: Minor complications

Complications	**Early closure (n=30)**		**Late closure (n=34)**	
	No. of cases	**%**	**No. of cases**	**%**
Paralytic ileus	1	3.33	1	2.94
Abdominal sepsis	1	3.33	2	5.88
Wound infection & abscesses	4	13.33	2	5.88
Fever	4	13.33	2	5.88
Total	10	33.34	7	20.58

Above table showing higher rate of minor complications after early ileostomy closure especially wound infection & abscesses and fever.

Table – 4: Average operation time (minutes)

Group	**Average operative time (minutes)**
Early closure (n=30)	75
Late closure (n=34)	100

Average operative time was found higher in the late ileostomy closure group (100 minutes) than that in the early closure ileostomy group (75 minutes).

Table – 5: Average duration of hospital stay (days)

Group	**Average duration of hospital stay (days)**
Early closure (n=30)	11
Late closure (n=34)	14

Average duration of hospital stay after closure was higher in the late closure ileostomy group.

Table – 6: Mortality rate

Group	**Mortality**	
	No. of cases	**%**
Early closure (n=30)	0	0
Late closure (n=34)	0	0

No case of mortality was found in both the groups.

V. Discussion

A total of 64 cases with ileostomy admitted in the Department of Surgery, RIMS, Ranchi between June 2017 to August 2018 for closure have been brought under this study. Early closure was done in 30 patients and late closure in 34 patients. The observations made are being discussed here in comparison with the finding of other workers.

Stoma related complications:

Stoma related complications included dermatological (skin excoriation, bleeding, infection), bad positioning, electrolyte imbalance, stomal prolapse, parastomal hernia, stomal retraction, stomal bleeding, stomal stricture, stomal blockage and stomal necrosis etc.

In this study, in the early ileostomy closure group, stoma related complications were observed in 5 patients (16.66%) while in the late closure group complications were observed in 30 patients (88.23%).

Alves et al (2008)[15] observed 1% stoma related complications in the early ileostomy closure group done in 95 patients at 8-10 days after stoma creation. They found 12% stoma related complications in the late closure group done at 62-69 days in 91 patients. Tang et al (2003)[16] found 2% stoma related complications in the early ileostomy closure group done in 46 patients at 21 days. Senapati et al (1993)[17] observed 6% stoma related complications in the late closure group. Rathnayake et al (2008)[18] observed 23% stomal complications in the late closure group. Bakx et al (2003)[19] found 42% stomal complications in the late closure group.

Thus the finding of this study in the early closure group is much higher than the observations made by above authors is may be because of poor stomal care and poor nutrition. The finding in the late closure group is similar to Gooszen et al (1998).[20]

Complications requiring re-operation:

Complications requiring re-operation included anastomotic leakage, anastomotic stenosis, intestinal injury, small bowel obstruction, postoperative haemorrhage (intraperitoneal bleeding and per rectal haemorrhage) and stomal site incisional hernia.

In this study, in the early ileostomy closure group, complications requiring re-operation were observed in 2 patients (6.66%) while in the late closure group complications requiring re-operation were observed in 3 patients (8.82%).

Alves et al (2008)[15] observed 8% complication rate requiring re-operation in both early and late ileostomy closure group. Jordi Galais et al (2003)[21], Menegaux et al (2002)[22], Tang et al (2003)[16], Moran (1997)[23] observed 0% complication rate requiring re-operation, in the early ileostomy closure group.

Lewis et al (1990)[24], Senapati et al (1993)[17], Hallbook et al (2002)[25], Carisen & Bergan (1999)[26] found complication rate requiring re-operation 5%, 5%, 7% and 9% respectively in the late closure group.

Thus the finding of the present study in the early closure group is consistent with the finding of Alves et al (2008)[15] and in the late closure group it is similar to and Carisen & Bergan (1999)[26], Hallbook et al (2002)[25] and Alves et al (2008).[15]

Minor Complications:

Minor complications included paralytic ileus, abdominal sepsis, wound infection, abscess and fever. In the present study, in the early ileostomy closure group, minor complications were observed in 10 patients (33.34%) while in the late closure group minor complications were observed in 7 patients (20.58%).

Alves et al (2008)[15] found 34% and 48% minor complications in the early and late ileostomy closure group respectively. Jordi Galais et al (2003)[21] observed 20% and 4% minor complications in the early and late closure group respectively.

Lewis et al (1990)[24], Gooszen et al (1998)[20], Senapati et al (1993)[17], Menegaux et al (2002)[22], Van de Pavoordt et al (1987)[27], Hallbook et al (2002)[25], Rathnayake et al (2008)[18], Bakx et al (2003)[19], Carisen & Bergan (1999)[26] observed minor complications rate 5%, 19%, 19%, 10%, 17%, 7%, 10%, 16%, 10% in the late ileostomy closure group.

Finding of the present study is similar to Alves et al (2008)[15] in the early closure group and with the findings of Van de Pavoordt et al (1987)[27], Senapati et al (1993)[17], Gooszen et al (1998)[20] and Bakx et al (2003)[19] in the late closure group.

Average operative time (in minutes)

In this study, average operative times were 75 minutes and 100 minutes in the early and late closure groups respectively. Alves et al (2008)[15] found 94 and 95 minutes average operative time in the early and late ileostomy closure group respectively.

Tang et al (2003)[16] observed 33 minutes and Moran MR (1997)[23] observed 74 minutes average operative time in the early ileostomy closure group while Bakx et al (2003)[19] found 59 minutes average operative duration in the late closure group.

Finding of the present study in the early closure group is similar to the finding of Moran MR (1997)[23] and with Alves et al (2008)[15] in the late closure group.

Average duration of hospital stay after ileostomy closure:

In the present study, average duration of hospital stay after ileostomy closure in the early and late closure groups were 11 days and 14 days respectively.

Menegaux et al (2002)[22] found 24 and 36 days of average hospital stay after early and late ileostomy closure. Jordi Galais et al (2003)[21] found average duration of hospital stay 12 and 13 days after early and late ileostomy closure respectively. Alves et al (2008)[15] observed average duration 16 &18 days of hospital stay after closure in the early and late ileostomy closure group respectively.

Thus the finding of this study is similar to Jordi Galais et al (2003)[21] in the early closure group and with the Jordi Galais et al (2003)[21] in the late closure group.

Mortality rate:

In the present study, mortality was nil in both the groups (early and late closure).

Moran (1997)[23], Menegaux et al (2002)[22], Jordi Galais et al (2003)[21], Bakx et al (2003), Tang et al (2003)[16], Alves et al (2008)[15] observed no case (0%) of mortality in the early ileostomy closure group.

VI. Conclusion

Stoma surgery is a life saving measure and should be viewed as a major surgery because of its implication to the patients and the community. Diversion of the fecal stream by constructing a stoma is still a common procedure in gastrointestinal surgery despite a trend to avoid stomas, especially in emergency surgery. Stoma surgery is associated with high complication rate and decreased physical, psychosocial and sexual wellbeing and poor quality of life. So here the question arises about the optimum time interval for the closure of temporary GI stomas.

Ileostomy closure and restoration of intestinal continuity are usually performed 8-12 weeks after its construction i.e. late closure. This period of time allows the patient to recover, the inflammation, induration and edema within the abdomen and in the ostomy orifices to resolve and the intraabdominal adhesions to recognize. During this time period, the inflammation and hypervascular phase ends, making the adhesion less fibrotic and vascular.

Reasons for delayed closure also include anastomotic leak or fistula, postoperative radiotherapy, recurrences or progressive malignant disease and prolonged recovery and medical complications.

This additional wait for late closure allows the patient to regain nutritional and immunological status after a major operation and will also reduce the risk of thromboembolic complications.

Early closure of small bowel stoma (ileostomy) can be performed without major complication in suitable patients. Early closure is usually performed only when patients nutritional status is considered optimal and there is no signs of active infection (includes wound erythema, induration and wound abscesses), or organ failure (includes pneumonia, cardiac arrhythmia, pyoderma gangrenosum etc) and especially in high output cases.

Early closure during the same hospital admission produces less stoma related complications and shortens the duration of hospital stay, but it can be recommended only in selected patients.

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