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Evaluating outcomes in patients of jejunal stoma

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ABSTRACT

Background: In managing patients with intraabdominal emergency such as perforation of bowel due to trauma, intestinal tuberculosis or in patients with mechanical obstruction with strangulation, we are sometimes left with no other option but to constitute a jejunostomy as the patients general condition is very critical or there is intraabdominal sepsis with high chances of anastomotic leak and eventual mortality. In this article we have evaluated outcomes of jejunal stoma in terms of morbidity and mortality.

Methods: Study conducted in the Department of Surgery, VMMC and Safdarjung Hospital, New Delhi. 25 patients were evaluated in study for a period of 18 months between October 2018 and April 2020. Patient demographics, preoperative diagnosis, treatment strategies, surgical procedures, and the post-operative course were evaluated.

Results: It was observed that the most common pathologies for formation of jejunostomy were trauma and tuberculosis. patients were readmitted, most commonly due to cause being dehydration and dyselectrolytaemia.80% patient had clavien dindo grade 1 pre-operative complications. Mean time for stoma closure was 5.4 weeks. Most common complication after closure of stoma was Surgical site infection i.e.,9 patients (36%). Overall mortality was 2 (8%).

Conclusions: It is concluded from our study that if jejunostomy has to be made due to unavoidable circumstances then the patient requires regular clinical assessment of nutritional parameters and aggressive corrections of any abnormalities and an early closure of stoma. This shows that knowledge of clinical course of patient with jejunostomy can help us to better manage these patients.

Keywords: Complications, Jejunal stoma, Outcomes

INTRODUCTION

A stoma is an opening, either naturally or surgically created which connects a portion of the body cavity to the outside environment. Stomas formed from the bowel are named in relation to their location within the gastrointestinal tract. A stoma from proximal small bowel (less than 200 cm remaining of small bowel is referred as jejunostomy, one formed from the distal small bowel an ileostomy. Ileostomy is usually preferred because it is well tolerated as it results in minimal or negligible

nutritional and metabolic disturbances. However in managing patients with intra-abdominal emergency such as perforation of bowel due to trauma, intestinal tuberculosis or in patients with mechanical obstruction with strangulation, we are sometimes left with no other option but to construct a jejunostomy as the patients general condition is very critical or there is intra-abdominal sepsis with high chances of anastomotic leak and eventual mortality. Jejunostomy carries a high morbidity and mortality as the stoma output is very high because jejunal mucosa is highly permeable resulting in

rapid water and sodium fluxes, so the jejunal contents become iso-osmolar. Approximately 4 litres of endogenous secretions pass the duodenojejunal junction daily (0.5 litres saliva, 2 litres of gastric juice and 1.5 litres of pancreatobiliary secretion) and digestion in upper jejunum adds further secretions so jejunostomies are always a high output stoma. 1,2 The loss of gastrointestinal contents including digestive juices, water, electrolyte and nutrients through the stoma may precipitate or accentuate dehydration, dyselectrolytemia, acid base imbalance and malnutrition which in turn might progress to hypovolemia, cardiac arrhythmia, immune incompetence, sepsis, pulmonary complications, hepatic or renal insufficiency.³ The management of jejunostomy is associated with a high morbidity and mortality, primarily due to inadequate nutrition, sepsis, fluid and electrolyte disturbance and skin digestion.4

To manage these patients aggressive support with oral, intravenous electrolyte solution to maintain fluid and electrolyte balance and nutritional support in the form of oral, enteral parenteral feed is required. These stomas need to be closed at the earliest opportunity to offset these problems and hasten early recovery. This may or may not be feasible depending on the intra-abdominal condition, as there may be continued intra-abdominal sepsis and poor general condition of the patient.

This study was aimed at assessing the outcomes of jejunal stomas and its eventual complications, time taken to close these stomas and final outcomes in terms of morbidity and mortality.

METHODS

It was an observational study conducted in the Department of Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi. 25 patients were studied for a period of 18 months between October 2018 and April 2020.

Sample size

Previously researchers have performed studies to assess the clinical outcomes ofpatients of proximal jejunostomy. The efficacy in terms of complication free rate found in these articles ranges from 70% to 85%. Therefore, assuming (p)=80% as the efficacy of proximal jejunostomy with 10% margin of error, the minimum required sample size at 5% level of significance is 61 patients.

Formula used:

$$n = \frac{Z^{2} pq}{d^{2}} = 1.96*1.96*0.80*0.20$$

(0.10*0.10)

= 61.46

where p is the observed efficacy (in terms of complication free)

$$q=1-p$$

d is the margin of error,

 $Z_{\frac{\alpha}{2}}$ is the ordinate of standard normal distribution at $\alpha\%$

level of significance

Since our study is time bound and needs completion within a specified period. Therefore, the proposed study is going to undertake with a smaller sample size of 25 cases.

Inclusion criteria

All patients presenting to surgical emergency department in whom stoma was made within 200 cm from duodenojejunal junction.

Exclusion criteria

Patients under the age of 12 years, over the age of 60 years with co-morbid conditions as Chronic Obstructive Pulmonary Disease (COPD), Coagulopathies, Diabetes Mellitus (DM), chronic kidney disease, coronary artery disease, of mesenteric ischemia undergoing extensive bowel resection were excluded from the study.

Informed consent were obtained from all the participants of this study. A detailed history and clinical examination of these patients were recorded and those meeting our criteria were included in this study. During surgery the bowel length was measured by a sterile scale with bowel in non-stretched position along the anti-mesenteric border and type of jejunostomy made namely: End jejunostomy, Loop jejunostomy, double barrel jejunostomy.²

These patients underwent strict monitoring of their fluid electrolyte imbalance and nutritional status. They were provided adequate fluid/nutritional support by oral/parenteral route as indicated. The patients who were able to maintain the fluid electrolyte balance and nutritional status on only oral or enteral nutrition were discharged and were planned for an early closure. Readmission due to any complication in these patients were recorded.

Those patients who needed parenteral fluid/nutritional support continued to remain admitted in the ward. These patients were evaluated for early closure of stoma one month after initial surgery when all these below listed criteria are met:

Absence of intra-abdominal sepsis as documented byno fever, TLC normal range, responding to nutrition, no

evidence of organ failure, absence of ileus &on imagingthere is no infective collection; absence of central line sepsis; absence of respiratory infections such as pneumonia; Patient responding to nutritional support as evidenced by body weight which is at least static, no electrolyte derangements & albumin level which is either increasing or at least stable over a period of 1-2 weeks.

The patient would then be taken up for stoma closure by stapler technique and followed up for a period of 1-month post operatively to look for any post-operative complications such as anastomotic leak, wound dehiscence, surgical site infection, pneumonia and mortality

Statistical analysis

Descriptive statistics will be analysed with SPSS version 17.0 software. Continuous variables will be presented as mean± SD. Categorical variables will be expressed as frequencies and percentages. The Pearson's chi-square test or the chi-square test of association will be used to determine if there is a relationship between two categorical variables. P<0.05 will be considered statistically significant.

RESULTS

The total number of patients enrolled in study was 25 (18 males; 7 females) whose mean age was 32.32±14.02.the most common indication for surgery was tuberculosis 9 (36%), traumatic 9 (36%) followed by typhoid 7 (28%). the most common type of jejunostomy made was loop jejunostomy 16 patients followed by double barrel 7 patients and 2 patients had end jejunostomy. The patients were divided into two groups based on bowel length proximal to stoma.

Table 1: Clinical characteristics of patients.

	Remaining Bowel length			
Patients	≤100 cm	ı >.	100cm	
Number of cases	16 (64%) 9	(36%)	
Mean age	31. 38±1	4.57 34	4.00±13.66	
Male : Female	10:6	8:	1	
Pathology	Typhoid 7 (28%), Traumatic 9 (36%), tubercular obstruction 4 (16%), tubercular perforation 5 (20%)			
Types of Jejunostomy Double Bowel : End : Loop	6:2:8	1:0:8		
Mode of nutrition-	Oral (40%)	Oral+PS (16%)	Oral+PS+PN (44%)	
Average Bowel length	148.5 cm	95 cm	53.18 cm	

First group ≤100 cm and second group >100 cm. The patients were managed on oral/parenteral saline/parenteral nutrition. The patients who required only oral nutrition for nutritional support had average bowel length of 148.5 cm, patients having average bowel length of 95 cm required oral+PS, and patients who required oral+ps+pn were having very small average functioning bowel length (53.18 cm) Table 1.

During the hospital stay the patients were monitored for any complications before closure and the complications were graded according to clavien dindo classification. Most of the patients had CD grade I complications 20 (80%), 9 patients (36%) had CD grade II complications and 3 patients (12%) had CD grade IVA complications which were managed in the ward. All the patients (9) who had bowel length >100 cm was able to maintain the fluid electrolyte balance and nutritional status and they were discharged and none of them was readmitted due to any reason. Among 16 patients who had <100 cm of remaining bowel length 4 patients continued to remain admitted in the ward for nutritional support and management of complications. Rest 12 patients were discharged, who needed readmission for correction of dehydration, dyselectrolytaemia and treatment of sepsis, renal insufficiency, pulmonary complications.

Table 2: Clinical outcome.

	Remaining bowel length		
Patients	≤100 cm	>100 cm	
Pre-closure Complications	CD grade I – 20 (80%), CD grade II 9 (36%), CD grade III 0 (0%), CD grade IV A 3 (12%)		
Discharge Yes/No	12:4	9:0	
Readmission Yes/No	4:8 (12 patients discharged) Dehydration, dyselectrolytaemia, sepsis, renal insufficiency, pulmonary complications	0:9	
anastomotic leak (Grade III)	3	0	
Wound dehiscence	4	3	
SSI Grade I	5	4	
Pneumonia Grade II	2	0	
Motility (Grade v)	2	0	
Time for Closure	7.13 week±1.36	3.78±0.67	

All the patients were planned for early closure of stoma. Those patients who had bowel length >100 cm an early

closure could be achieved and the average time taken for closure was 3.78 weeks. In patients with bowel length <100 cm the time taken for closure was longer, average being 7.13 weeks though these are the patients who needed an early closure. After closure the most common complication was surgical site infection 9 patients (36%), followed by wound dehiscence 8 patients (28%), anstomotic leak 3 patients (12%), pneumonia 2 patients (8%), 2 patients (8%) had mortality. These complications had no significant correlation with length of bowel (Table 2).

DISCUSSION

This study was conducted prospectively to evaluate the outcome of these jejunostomies. As these stomas need to be closed at the earliest to reverse these derangements, we assessed the feasibility of early closure by estimating time taken to close these stomas and also final outcomes in terms of morbidity and mortality.

It was observed that mean age of surgery was 32.32±14.02 years, which is similar to the studies conducted by Gupta et al, Shetty et al, Alam et al.⁵⁻⁷ However it was significantly different from other studies like the study conducted by Baker et al that had, Alam et al the causative diseases are TB, typhoid, traumatic, which occur in younger age group whereas in the western population the main causative diseases are ulcerative colitis and Crohn's disease which is predominant in the older age group.⁵⁻⁸ In our study of 25 patients 18(72%) were males and 7(28%) were females, similar to other studies such as Alam et al, where males were 60% and females 40%.⁷

In this study we noted that the most common cause of jejunostomy formation was tubercular obstruction and perforation 9(36%), followed by traumatic 9 (36%) and typhoid (28%) which was significantly different from other studies of western world such as Baker et al.8 The commonest indication was colorectal cancer (45%), IBD (Crohn's disease, ulcerative colitis). Tuberculosis and typhoid fever occur worldwide, primarily in developing nations whose sanitary conditions are poor. As india being a developing country, the prevalence of these diseases is more than western world. In the study by Nagar et al in which the most common indication for surgery was mesenteric ischemia (71%) followed by Intestinal perforation (20%) and intestinal obstruction (6%). We excluded mesenteric ischemia as it results in extensive bowel resection.

The daily requirements of jejunostomy patients was fulfilled through oral feeding, parenteral feeding, Enteral feeding. In our study oral +PS+PN was required in 11 (44%) patients which had average bowel length of 53.18 cm, oral +PS was required in 4 (16%) of the patients having average bowel length of 95 cm. Oral nutrition was sufficient enough in 10 (40%) of the patients with average bowel length of 148.5 cm. The results are similar

to Baker et al in which parenteral infusion was required in 62.5% of the patients with <200 cm of small bowel.⁸ In study by Nagar et al 17% required parenteral nutrition rest managed by distal bowel refeeding.⁹ In study by Shetty et al 9 out of 10 patients required management with parenteral nutrition for a median of 11 months (0-18).⁶

It was observed in our study that out of these 25 patients 21 patients got discharged. The four patients who could not be discharged had $\leq \! 100$ cm remaining bowel length. These patients required continuous admission for parenteral saline and total parenteral nutrition. In resource poor countries like India home parentral saline and total parenteral nutrition cannot be administered so the patient needs to admitted for longer durations.

One important aspect of our study was, that it assessed the feasibility of early closure by estimating time taken to close these stomas It was observed in our study that mean Stoma closure time was 5.4 weeks. In patients with remaining bowel length ≤100 cm the mean stoma closure time was 7.13±1.36 weeks while for the patients with >100cm, mean stoma closure time was 3.78±0.67. Further, it was observed that there was a significant difference in mean stoma closure time between the two (p value of <0.001).In patients with ≤100 cm bowel more time is taken to close because these patients have more nutritional derangements and decrease in weight which take more time to be corrected and also they develop certain complications which needed to be managed before the patient could be taken for surgery, though an early closure is required in these patients to offset the nutritional and electrolyte imbalance Not many studies have looked into the time taken to close the stoma. In study by Alam et al they closed all stomas within 8 weeks but the study does not mention the length of bowel.7In study by Shetty et al all jejunostomies were subsequently closed by a local approach without the need for full laparotomy after a median of 11 (range 9-18) months after formation.6

In our study the complications after formation of jejunostomy were classified according to Clavien Dindo classification. 20 (80%) patients had grade I pre-op complications, 9 (36%) had grade II pre-op complications and 3 (12%) had grade IVA pre-op complications. The similar results of pre op complications were shown in other studies by Nagar et al in which most patient (80%) had grade II complications, 6% had grade IV complications and 3% had grade III complications.⁹

In our study 4 out of 25 patients required readmission. 4 (16%) patients had readmission in which dehydration and dyselectrolytaemia were the main causes. Other causes being sepsis, renal insufficiency, pulmonary complications. Our results were similar to other studies such as Nagar et al in which 10 (32%) patients required hospital readmission, the most common cause being electrolyte imbalance and other causes were generalized

weakness and wound complications. In the study by Arenas et al electrolyte imbalance is the cause of 43% of hospital readmission. Once jejunostomy patients are discharged from hospital they do not have accessibility to parentral saline and losses are more these patients eventually become dehydrated and over time dyselectrolytaemia occurs and a vicious cycle of dehydration renal insufficiency occurs. Eventually the patient requires readmission.

In our study the major post-operative complications were Surgical site infection (grade I) 9 (36%), wound dehiscence (grII) 7 (28%), anastomotic leak (gr III) 3 (12%), pneumonia (gr II) 2 (8%) and mortality (gr V) 2 (18%). Our results were similar to other studies Alam et al which studied all types of stoma including ileostomy closure in which anastomotic leak was found in 29 (8.3%), wound complications were found in 72 (20.51%), In Nagar et al mortality was 5 (16%) which is very similar to our study.^{7,9} The postoperative complication had no significant correlation with length of remaining bowel.

We had a mortality of 2 patients (8%) in our study. One of the patients died in the preoperative period as bowel length was extremely small 35 cm and the patient developed grade I, II, IVA complications. The other patient had 35cm of remaining small bowel length. The patient developed preoperative complications, managed conservatively and after stabilisation of parameters stoma closure was done at 9 weeks but postoperatively the patient had grade I, II, III complication [anastomotic leak]and patient died. In extremely small bowel in range of 30-35 cm the patients losses are so severe that it is difficult to maintain the nutritional status and they develop many preoperative complications which despite best of management sometimes eventually leads to mortality.

Limitation

The limitations of this study being small sample size it requires large sample size with multipal hospitals participating so that the results could be formulated and proper guidelines can take shape.

CONCLUSION

Hence it is concluded from our study that if jejunostomy has to be made due to unavoidable circumstances then the patient requires regular clinical assessment of parameters, their corrections. The patient can be discharged once parameters are stabilised. It is possible to close the stoma early specially in patients with bowel length >100 cm. Even in patients with ≤ 100 cm bowel length the stoma

could be closed on an average before 8 weeks with an minimal morbidity and mortality. This shows that knowledge of clinical course of patient with jejunostomy can help us to better manage these patients. However as our study sample size was small, a large scale study with bigger sample size is recommended to come to a definite conclusion.

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