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To Study Association Between Perioperative, Operative And Patient's Factors And The Complications During Stoma Closure In Pediatrics Patients

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ABSTRACT

Background: Stoma closure is a frequent elective procedure in pediatric surgery. Despite the benefits for the child, this procedure is associated with serious risks such as surgical site infection (SSI), anastomotic dehiscence, postoperative small bowel adhesions, and even mortality.

Objective: The aim of this study was to audit the complications of stoma closure. The primary outcome was to determine the complication rate. The secondary outcome was to determine other associated factors.

Method: This prospective observational study done in department of surgery SMS medical college Jaipur from January 2022 to January 2024, all patients at pediatric age group [less than 18years of age]. Individual patient records were reviewed to extract information prospectively. Inclusion criteria were all patients with previous stoma constructed during both elective and emergency surgery during the above time period. The following information was extracted from the patient records: patient demographics, indication for ileostomy, comorbidity status, length of hospital- stay, duration of stoma, time taken to achieve bowel movement after closure, performance status of the patient.

Results: A total of 160 patients were included in the study. The median time to achieve bowel movement post closure was 3 days (range 2-16 days). The overall complication rate was 47.5%. Major complications were seen in 35% and Minor complications accounted for 25% (36/160). four patients (2.5%) died after closure from medical complications. The median follow-up duration was 10 (0–81) months. Two patient (1.6 %) died; the patient had colonic atresia and had undergone ileostomy for perforation during the neonatal period.

Conclusion: stoma closure is associated with significant morbidity. While different surgeons used different preoperative antibiotic regimens, abdominal closure methods, times to NG tube removal, and times for oral feeding initiation, none of these affected the postoperative course and prognosis. In conclusion, ostomy is an important procedure that has both psychological and social impacts on the children and their families. The preoperative inpatient period and duration of antibiotic use in children can be decreased by standardization of the procedures used through the implementation of practice guidelines for each clinic and the procedure can be performed with an aesthetically more acceptable incision.

Keywords: *oop ileostomy, complications of closure, morbidity, mortality, small bowel obstruction, RVF= rectovaginal fistula,*

1. INTRODUCTION

Stoma closure is a frequent elective procedure in paediatric surgery. Despite the benefits for the child, this procedure is associated with serious risks such as surgical site infection (SSI), anastomotic dehiscence, postoperative small bowel adhesions, and even mortality. However, there is no consensus in the literature regarding preoperative mechanical bowel cleansing (MBC), duration of pre- and postoperative antibiotic use, administration of routine nasogastric (NG) decompression, and time of postoperative oral feeding initiation for these patients. The approach to these issues thus depends on the preference of the attending surgeons. However, the benefits of the covering ileostomy have to be weighed against the problems associated with its closure.

The most commonly reported complications after ileostomy closure include bowel obstruction, surgical site infection, anastomotic leaks, fistulae formation and incisional hernia formation (3)-(9). Furthermore, it requires another hospital admission, and also utilizes the same if not more resources post operatively than the primary procedure necessitating its formation (1). This study aimed to evaluate the application and outcomes of ostomy closures and to determine the effect of personal differences among surgeons on the postoperative course of patients.

Aims- The aim of this study was to document the incidence of and identify risk factors for postoperative complications after stoma closure at SMS Medical college and hospital, Jaipur.

2. PATIENTS AND METHODS

This prospective observational study done in department of surgery SMS medical college Jaipur from January 2022 to January 2024, all patients at pediatric age group [less than 18years of age]. Individual patient records were reviewed to extract information prospectively. Inclusion criteria were all patients with previous stoma constructed during both elective and emergency surgery during the above time period.

The following information was extracted from the patient records: patient demographics, indication for ileostomy, comorbidity status, length of hospital- stay, duration of stoma, time taken to achieve bowel movement after closure, performance status of the patient, experience level of surgeon performing the operation (junior consultant or registrar), duration of the surgery, type of anastomosis performed (hand sewn or stapled) and whether the patient required re-operation or not.

The complications observed were divided into 3 main groups, major, minor and medical complications. The major complications included the occurrence of SBO, anastomotic leaks, fistulae, hernia and stricture. Minor complications included surgical site infection, bleeding per rectum and occurrence of a stitch granuloma. Medical complications included pneumonia, UTI, line sepsis, cardiac complications, renal failure, anemia, DVT and allergic reaction to medication. The frequency of these complications was then recorded for each patient.

Surgical technique- All patients were posted to surgery after confirmation of distal loop patency in contrast study with bowel preparation. A single dose of prophylactic antibiotics was given 60 minutes prior to the skin incision. A peristomal skin incision was used. Standard stoma closure was performed using either a single layer hand sewn end to end anastomosis with vicryl 4/0 absorbable suture or a functional end to end anastomosis with a 60mm linear GIA stapler. All operations were performed either by a registrar under the supervision of a junior consultant, or by a junior consultant with a registrar as the first assistant.

Data analysis- All the data was entered into an Excel data work sheet directly. The data was then coded and double entered into a statistical software package (Stata version 12.1) for analysis. Descriptive statistics were utilized to analyses the data. The chi squared test and its variants, Student's t- test and logistic regression was used to analyses the variables and their outcomes.

3. RESULTS

There were 176 patients who underwent closure of ileostomy between January 2022 to January 2024. 16 patients were excluded due to insufficient data so finally 160 patients included in study. There are 90 males and 70 female patients.

There are 9.3 % patients had superficial SSI, and 1.1 % patient had an organ/cavity infection. 8.2 % patients had small bowel adhesions, and 1 % patient had an incisional hernia as a postoperative complication. The patient with an incisional hernia underwent a further surgery at a later date. No anastomotic dehiscence was observed in our patient series.

The median duration of preoperative antibiotic use was 3 (1–10) days in the oral antibiotic group and 2 (1–3) days in the IV antibiotic group. The median postoperative duration of antibiotic use was 8 (4–18) days in the no preoperative antibiotics group, 7 (5–15) days in the IV antibiotic group, and 7 (3–41) days in the oral antibiotic group. The incidence of SSI and postoperative complications did not differ according to the preoperative antibiotic regimen.

When differences among surgeons were examined, no significant difference was observed in surgical duration, duration of pre- and postoperative antibiotic use, time to the first post- operative stool passage, and postoperative inpatient period.

However, a significant difference between surgeons was observed in the time of NG tube withdrawal, and the time of oral feeding initiation. There were no significant differences among surgeons in the ostomy type employed, primary diagnosis, performance of abdominal exploration, and incidence of SSI and postoperative complications, but a significant difference was observed in the abdominal closure method used and the preoperative antibiotic regimen prescribed.

The median follow-up duration was 10 (0–81) months. Two patient (1.6 %) died; the patient had colonic atresia and had undergone ileostomy for perforation during the neonatal period. The patient developed small bowel adhesions and underwent two further surgeries but died on the 40th day after ostomy closure. [table no- 1,2]

Table- 1 indications and operative factors

Parameters		N [%]
Stoma level	Left transverse colostomy	68 [43.33]
	Right transverse colostomy	16 [10]
	Sigmoid colostomy	18 [11.3]
	Ileostomy	58 [35%]
Stoma type	Divided	98 [62]
	Loop	48 [30]
	Hartmann's pouch	14 [10]
Primary diagnosis	Anorectal malformation	69 [43]
	Hirschsprung's disease	41 [25.5]
	Intestinal perforation	34 [21.5]
	Rectal trauma	11 [7]
	Colonic atresia	2 [1.4]
	Meconium ileus	2 [1.4]
	Others	1 [0.6]

Table- 2 Data of the patients regarding durations [median/mean± standard deviation (minimum–maximum)]

Parameters	Median/mean
Age	27.5 months
Time between the opening and closure	50 weeks
Surgical duration	160±47 min
Preoperative hospitalization period	3 days
Preoperative antibiotic use duration	3 days
Postoperative antibiotic use duration	8 days
First postoperative stool passage	3 days
NG tube withdrawal time	5 days
Oral feeding initiation time	6 days
Postoperative hospitalization period	8 days

4. DISCUSSION

The mean duration of stoma closure varies from 77 to 133 min in the literature [3, 4]. In our series, the mean duration of ostomy closure was 160±47 min. The relatively long duration may be because the procedures were performed by relatively inexperienced residents. However, the surgical duration did not influence the incidence of complications in our series. Although extended surgical duration has been identified as an independent risk factor for SSI by some studies due to prolonged exposure to microorganisms in the operating environment and diminished efficiency of antimicrobial prophylaxis, other studies have shown that the duration of ostomy closures does not have an effect on the incidence of complications, which is supported by our findings [5, 6]. The duration of ostomy closure was longer when Hartmann's pouch was employed versus separated and loop ostomies, which is similar to previous reports, and therefore, avoidance of the use of Hartmann's pouch, if possible, will be less traumatic for the patient [7]. Moreover, no specific indication exists for Hartmann's pouch ostomy in pediatric surgery.

MBC was performed routinely in our study in order to reduce the fecal burden; however, the necessity of this procedure is controversial. A review in 2011 reported no supporting evidence for MBC or the use of rectal enemas and stated that bowel cleansing in colonic surgery can be safely eliminated [8]. Many studies have suggested that anastomotic leakage is even more frequent in patients undergoing bowel cleansing [9]. There is no consensus on the optimal duration of antibiotic use after elective colorectal surgery [10]. No difference was found between the duration of postoperative antibiotic use and the incidence of SSI and postoperative complications according to the preoperative antibiotic regimen used in our study. We therefore believe that changing to antibiotic use at induction may be useful for decreasing the duration of preoperative hospitalization, amount of antibiotic used, and consequently the possible side effects.

Surgeons classically use an NG catheter to speed up the return of bowel function after abdominal surgery, prevent lung complications, reduce the risk of anastomotic leakage, in- crease patient comfort, and shorten the inpatient period [11]. These theoretical advantages have not been supported by properly planned studies. In fact, some studies have shown a lower incidence of atelectasis and pulmonary complications in patients who did not undergo NG decompression [12]. The routine postoperative use of an NG catheter is reportedly un- necessary in most major abdominal operations in children [11, 12]. An NG catheter was used routinely in our series, and the routine catheter withdrawal time varied depending on the sur- geon's preference despite the lack of other influencing factors, such as intestinal adhesions.

SSI is a serious cause of morbidity in patients after surgery. Although there are surgeons who prefer secondary closure to prevent SSI as colostomy closure is a contaminated procedure, primary skin closure can be performed safely [13, 14]. All our incisions were closed primarily, and no subcutaneous drain was placed. Our SSI rate was 9.2 %. Rates of SSI due to ostomy closure vary between 0 and 36 % in the literature [4, 5, 14, 15]. The mean SSI rate was 14 % (17/118) in a similar study where the incisions were primarily closed after ostomy closure in children, and SSI rates did not differ according to bowel cleansing and preoperative and postoperative antibiotic regimens, which supports our own findings [10].

Prospective studies have revealed that closing abdominal incisions using mass or layered closures with PGA sutures does not change the outcome in children, and non- absorbable sutures are not necessary [16]. The cosmetic and functional outcome of ostomy closure scars is important in children, and it is sometimes the only visible reminder of the underlying disease [17]. Closing the layers one by one also prevents the creation of a dead space. Mass or secondary closure that produces aesthetically worse results and more pain should be avoided [14].

The habit of leaving a patient hungry after abdominal surgery is under discussion. Oral feeding is classically initiated when postoperative distention decreases and gas or stool pas- sage begins. In cases where intestinal anastomosis is per- formed, the patients are not allowed oral feeding until the surgeon feels that the anastomosis is safe. Randomized studies have shown that early feeding of adults after lower gastrointestinal surgery reduces hospitalization and complications [18]. Experimental peritonitis models have also demonstrated the healing effect of early enteral feeding [3]. Early feeding after ostomy closure in children has similarly been shown to stimulate bowel movements without increasing complications [3]. Children can be given clear liquids on the first day if there is no distension or vomiting [14].

Patient factors such as age, gender, performance status, ethnicity, hypertension, diabetes, pathology and annual income did not influence the development of complications. Perioperative factors such as experience level of the surgeon, type of closure and duration of surgery did not contribute to development of complications. This is in keeping with the literature (1), (14), (15), (16). Pre-operative radiotherapy and chemotherapy also did not influence the development of complications in the rectal cancer group, which has been quoted in the literature as a significant contributor for the development of minor complications (17).

5. CONCLUSION

While different surgeons used different preoperative antibiotic regimens, abdominal closure methods, times to NG tube removal, and times for oral feeding initiation, none of these affected the postoperative course and prognosis. In conclusion, ostomy is an important procedure that has both psychological and social impacts on the children and their families. The preoperative inpatient period and du- ration of antibiotic use in children can be decreased by standardization of the procedures

used through the implementation of practice guidelines for each clinic and the procedure can be performed with an aesthetically more acceptable incision.

Limitations-

-Small sample size

-Single center study

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