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Original Research Article

A clinical study of colostomies in infancy and childhood in a tertiary centre

Chinmoy Mallik, Sabuj Pal*, Pradip Kumar Mohanta

Department of General Surgery, College of Medicine and JNM Hospital, Kalyani, West Bengal, India

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***Correspondence:**
Dr. Sabuj Pal,
E-mail: prateeklean@gmail.com

ABSTRACT

Background: The word stoma is derived from the Greek word stoma meaning mouth or opening. Intestinal stoma are surgically created opening that connect part of gastro-intestinal tract with the anterior abdominal wall. The use of various types of colostomies can be lifesaving. Since at our centre we regularly perform colostomies in treatment of various conditions in paediatric age group, this clinical study was undertaken.
Methods: This clinical study was conducted in the Department of General Surgery at College of Medicine and JNM Hospital, Nadia. The study was conducted during the period from August 2018 to July 2019. The patients aged day 1 to 12 years were admitted.
Results: In the one year study period, 33 cases of paediatric colostomies were performed. 17 (51.5%) were male and 16 (48.5%) were females. Majority of the patients at the time of colostomy were in the early neonatal period. A total of 22 (66.6%) cases underwent colostomy at our hospital and 11 (33.4%) patients had undergone colostomy elsewhere. Majority of the cases who had undergone colostomy were of sigmoid loop variety and 9 patients (27.3%) had transverse loop colostomy. A total of 12 patients (36.36%) suffered post colostomy major complications needing attention.
Conclusions: The child is a socio-psycho-biological unit and colostomy leads to substantial psychological trauma for the child and parents. Careful examination is the key to diagnosis and initial management. An appropriately indicated, properly constructed temporary stoma is frequently unavoidable and lifesaving.

Keywords: Colostomies, Anorectal malformations, Hirschsprung's disease, Loop colostomy

INTRODUCTION

The word stoma is derived from the Greek stoma meaning mouth or opening.[1] Intestinal stoma are surgically created opening that connect part of gastro-intestinal tract with the anterior abdominal wall. As a method of treating intestinal obstruction, colostomies date back to the latter part of the 18th century and some of the first survivors of this procedure were children with imperforated anus. Despite sporadic early success, the use of stomas in the large intestine and later the small intestine in children evolved slowly.[2] Surgeons were understandably reluctant to perform these drastic procedures, which were associated with major complications.[3,4]

The idea of performing colostomy was first bought up by Litre in 1970, when he observed a 6 day old dead baby with an imperforated anus and suggested that a colostomy could have possibly been lifesaving.[5,6]

Technically colostomies are end colostomy which includes intra peritoneal, extra-peritoneal, eversion colostomy and trephine end colostomy; and loop

colostomy which includes delayed colostomy, defunctional loop colostomy.

Primary purpose of colostomies may be for decompression, diversion or evacuation. According to site, colostomy may be right transverse, left transverse or sigmoid colostomy.[2,7]

Temporary and occasionally permanent stomas of the small and large intestine are used in the management of a wide verity of surgical and non-surgical pathologic conditions in new born infants and children. With the exception of feeding access, more than one half of stomas are placed in the neonatal period and another one fourth in infants younger than 1 year of age. An appropriately indicated, properly constructed temporary stomas is frequently unavoidable and lifesaving. The common indications of colostomies are high forms of imperforate anus with complex pelvic mal formations, Hirschsprung's disease, colonic atresia, colonic or anorectal trauma and malignant conditions.[2,7] The use of various types of colostomies can be lifesaving.

Since at our centre we regularly perform colostomies in treatment of various conditions in paediatric age group, this clinical study was undertaken.

Objectives

The aim of the study was to study the indications of colostomies in paediatric age group, to analyze the site and type of colostomies done for various indications, to evaluate the common complications of colostomy and analyze their causes and clinical management of them and lastly, to evaluate the bowel habit after the closure of colostomy.

METHODS

This clinical study was conducted in the Department of General Surgery at College of Medicine and JNM Hospital, Nadia. The study was conducted during the period from August 2018 to July 2019. The patients aged day 1 to 12 years were admitted through general surgery OPD or emergency requiring colostomy for different indications were included in this study and the patients with colostomy done outside and subsequently referred to our Institution were also included in this study.

Each of the admitted patients in this study was subjected to a detailed history, thorough clinical examination, investigations and pre-operative work-up. The cases were subjected to operative procedures, results were tabulated and outcome analysed.

A colostomy was made according to the disease. In emergency cases when patient presented with features of acute intestinal obstruction. They were first resuscitated followed by pre-op investigations and finally colostomy.

In postoperative period, moist oxygen inhalation was administered for 2-4 hours; antibiotics varied from single pre-operative dose to 1-5 days course; IV fluids were infused to correct dehydration and to maintain adequate urine output, till patient's colostomy began to function or return of peristalsis; intermittent nasogastric suctioning; Oral feeding was initiated when peristalsis returned or colostomy functioned or nasogastric suction was nil; dressing was removed on 2nd or 3rd day and local antibiotic ointment applied for 5-7 days.

Before discharging a patient of colostomy a good bowel wash was mandated. The patients were discharged usually on the 7th or 10th postoperative day. The patients usually were readmitted after of 3-6 months, when the primary disease was dealt with and the colostomy closure was done after 6-8 weeks of this procedure on an elective basis.

Follow-up was done on OPD basis, with specific emphasis given regarding any surgical complication, care of colostomy, maintenance of local hygiene, vaccination and growth of the child.

Data analysis and statistics

The data collected was entered in MS Excel 2016. The data was analyzed by IBM SPSS version 22.0 (licensed). Proportions were calculated.

Ethical issue

This study started after the clearance from ethical committee of College of Medicine and JNM Hospital. All the operative procedures followed were standard procedures. Written informed consent was taken from the participants or guardians before enrolment.

RESULTS

In the one year study period, 33 cases of paediatric colostomies performed were studied in COM and JNM hospital, Kalyani. Total number of patients in the study was 33, of which 22 were performed primarily in our hospital and 11 were performed elsewhere.

Sex distribution

Out of the 33 patients included in the study, 17 (51.5%) were male and 16 (48.5%) were females.

Age distribution

Average age was lowest for anorectal agenesis without fistula with a mean age of 2 days and highest in Hirschsprung's disease of 6 months. Result shows that high anomalies presented earlier within first 3 days of birth. Anovestibular fistula presented at a later date at around 6 months as stool becomes solid. Average presentation of Hirschsprung's disease is around 3 months

to 6 months year except one patient who presented on the 7th day after birth (Table 1). Majority of the patients at the time of colostomy were in the early neonatal period (Table 2).

Table 1: Average age at initial presentation.

Pathological condition	Average age
Recto urethral fistula	3 days
Recto vesical fistula	2.2 days
Anorectal agenesis without fistula	2 days
Anovestibular fistula	2.1 months
Cloacal anomaly	8.5 days
Hirschsprung's disease	6 months

Table 2: Age distribution.

Age	Number of patients N (%)
Early neonatal period (1-7 days)	14 (42.4)
Neonatal period (1 week-1 month)	3 (9)
Post neonatal infant (1 month-1 year)	11 (33.3)
Children (>1 year)	4 (12.1)

40% of colostomy done in early neonatal period was for anorectal malformations (ARM). In post neonatal period, most of the colostomy was done for Hirschsprung's disease (50%).

Table 3: Clinical features in anorectal malformations.

Type of ARM condition	Total N (%)	Clinical feature	Number of patients with clinical feature
Rectourethral fistula	5 (15.5%)	No anal opening	5
		Passage of meconium per urethra	5
		Acute distension of abdomen	2
Rectovesical fistula	3 (9%)	No anal opening	3
		Passage of meconium per urethra	3
Anovestibular fistula	7 (21.1%)	Passage of stool through vestibule	7
		Abdominal distension	2
Anorectal agenesis without fistula	3 (9%)	No anal opening	3
		No passage of meconium	3
		Acute distension of abdomen	3
Cloacal anomaly	4 (12.1%)	Single anal opening	4
		Passage of urine, meconium through a single opening in the perineum	4

Initial presenting complaints

22 patients presented with clinical features representing ARM (66.7%) (Table 3).

Table 4: Clinical features in Hirschsprung's disease.

Presenting clinical feature	Number of patients
Delayed passage of meconium	10
Constipation	11
Passage of hard beaded stool after enema	10
Failure to thrive	5
Abdominal distension	6
Fever	2
Diarrhoea	1

In Hirschsprung's disease, which comprised of 11 (33.3%) cases predominant presenting feature were constipation, delayed passage of meconium and passage of hard beaded stool after enema. Diarrhoea was present only in 1 patient (Table 4).

Operative procedure

A total of 22 (66.6%) cases underwent colostomy at our hospital and 11 (33.4%) patients had undergone colostomy elsewhere.

Type of colostomy

Majority of the cases who had underwent colostomy were of sigmoid loop variety and 9 patients (27.3%) had transverse loop colostomy (Table 5).

Table 5: Type of colostomy.

	No. of patients (N)	%
Sigmoid loop colostomy	24	72.7
Transverse loop colostomy	9	27.3

Time of colostomy

26 patients (78.8%) had been operated on emergency basis while 7 patients (21.1%) underwent elective colostomy.

Complications

A total of 12 patients (36.36%) suffered post colostomy major complications needing attention. However there were no deaths during the study period. Complications after colostomy were categorized immediate, early and late. Majority of early complications were surgical site infections seen in 7 patients (23.1%) and in late complications majority was prolapse seen in 7 patients (23.1%) (Table 6).

Table 6: Post colostomy complications.

		N (%)
Immediate	Bleeding	Nil
	Ischemia	Nil
Early	Postoperative sepsis	3 (9.9)
	Ischemia	1 (3.3)
	Small bowel herniation	Nil
	Wound infection	7 (23.1)
	Intestinal obstruction	Nil
Late	Skin excoriation	14 (46.2)
	Prolapse	7 (23.1)
	Stenosis	2 (6.6)
	Colocutaneous fistula	Nil
	Retraction	1 (3.3)
	Wound hernia	1 (3.3)
	Bleeding	1 (3.3)
	Suture sinus	2 (6.6)

Management of complications of colostomy

Immediate: No immediate complications such as bleeding or ischaemia have been seen in 33 patients.

Early: Postoperative sepsis occurred in 3 patients and treatment was conservative with intravenous fluids, nasogastric suction, intravenous antibiotics, moist oxygen inhalation, indwelling catheterizations, IV/IM analgesic and H_2 blocker, and all the patients responded. We founded one patient of ischaemia of loop colostomy-diagnosed at evening of the surgery day and subsequently refashioning of colostomy done at emergency on that night. Patient recovered well. Postoperative wound infection was seen in 7 patients and were treated with anti-microbial according to the sensitivity of the isolate organism.

Late: Most common late complications were skin excoriation seen in 14 patients related to the stoma effluent or the appliance itself. It was treated by changing the appliance, to keep the area dry by exposing it to the air. A short course of cortisone cream locally and some form of antifungal medication in peristomal skin applied. Most of the prolapse of colostomy was seen in transverse colostomy. Stenosis was seen in 2 patients and had refashioning of colostomy. Retraction was seen in 1 patient and required treatment by surgical correction. Hernia at wound site was seen in 1 patient, which was asymptomatic. No intervention was done immediately. Suture sinus was seen in 2 patients. In both the patients, colostomy was done outside and the suture material was non-absorbable silk. Suture material removed with local antibiotic ointment application as both of these patients having no symptoms of systemic infection. Late bleeding was seen in 1 patient following local trauma, treated conservatively.

Complications after colostomy closure

Immediate: Sepsis was seen in 2 patients with ileus, abdominal distension, fever, and increased respiratory rate. These were treated conservatively. No case of fistula was seen. 2 patients of Hirschsprung's disease developed features of intestinal obstruction. First one was 15 month boy and closure of his transverse colostomy done after 2 months of definitive surgery (Soave's operation), developed abdominal distension with repeated vomiting from 4th postoperative day. Straight X-ray abdomen showed multiple fluid and gas level and conservative treatment was continued and patient responded. But after 1 month the patient developed same symptoms and attended emergency and was advised for admission. The parent refused admission and was lost to follow-up. Second patient was a girl aged 3 years presented with features of intestinal obstruction after 3 months of colostomy closure and treated conservatively. No cause was found after investigations.

Late: No late complications such as hernia, chronic sepsis due to non-absorbable suture or stitch sinus were noted in the study group.

Post colostomy closure bowel habit

Functional result assessment: Patient older than 3 years having their definitive repair done and colostomy closed were assessed functionally.

In ARM, a total 18 patients could be assessed for functional results. In Hirschsprung's disease, a total 9 patients were assessed for functional results (Table 7).

Table 7: Post colostomy closure bowel habitus.

Disease type	Good continence (%)	Constipation (%)
Anorectal malformations	n=15	n=3
	83.3	18.8
Hirschsprung's disease	n=8	n=1
	88.8	11.1

DISCUSSION

As a method of treating intestinal obstruction, colostomies date back to the latter part of the 18th century, and some of the first survivors of this procedure were children with imperforate anus.[8] Despite sporadic

early successes, the use of stomas in the large intestine in children evolved slowly. Enterostomal construction techniques developed around the turn of the century for adult, were modified and adapted for use in children particularly new borns with congenital intestinal obstruction.[9,10]

A colostomy in a child is a major disruption of normality and frequently leads to substantial psychological trauma for the child and parents. However, most intestinal stomas in the paediatric age group are temporary. Correction of the under lying problem and subsequent closure of the diverting stoma is the usual mode of management. Although surgeons are continuously in search for alternatives to intestinal exteriorization, an appropriately indicated, properly constructed temporary stoma is frequently unavoidable and lifesaving.[2] In the past couple of decades, enterostomal therapy has evolved in a specialty in its own right and occupies a substantial portion of modern paediatric surgical practice.[11]

In 1961, Bishop from Philadelphia indicated temporary abdominal colostomy in infant born with imperforate anus and Hirschsprung's disease.[3]

According to Gauderer, the indications of colostomy in children are high forms of imperforate anus and complex pelvic malformation; Hirschsprung's disease; colonic atresia, colonic or anorectal trauma and malignant conditions involving large gut and rectum.[2]

The world authority in anorectal malformatioms, Prof. Alberto Pena advised emergency or elective colostomy before 2 weeks of definitive surgery in male child having recto urethral bulbar fistula, recto urethral prostatic fistula, rectovesical fistula (bladder neck), imperforate anus without fistula and rectal atresia and stenosis. In female child, the indications are vestibular fistula, vaginal fistula, imperforate anus without fistula, rectal atresia and stenosis, persistent cloaca. He described that rectourethral in male child and anovestibular fistula is the most common in female child.[7]

In Hirschsprung's disease, a diverting Loop colostomy is made in the ganglionated segment immediately above the transition zone, except in ultra-short Hirschsprung's disease (or Anorectal achalasia). The preferred treatment for a patient with definitive ultra-short Hirschsprung's disease is anorectal myectomy. Previously diverting loop colostomy was placed proximally in the right transverse colon so that the protecting stoma could be left in place after the pull through procedure. It was then closed in the third stage of a three stage procedure. But now the preferred approach is two staged procedure.[12]

In our series of 33 patients of colostomy, the most common indication for colostomy was anorectal anomalies (22 patients- 66.7%) and Hirschsprung's disease (11 patients- 33.3%). Among anorectal anomaly in male child most common indication was rectourethral fistula (5 patients- 15.1%) followed by vesical fistula (3 patients- 9%) and in female child most common indication was anovestibular fistula (7 patients- 21.1%) followed by cloacal anomaly (4 patients- 12.1%) and in both of them suffering from Hirschsprung's disease (patient 11- 33.3%). The findings are more or less similar to Pena et al and Teitelbaum et al.[7,12]

In our series, ARM requiring colostomy presented earlier with a mean age of 2.8 days most of them presented within the first week of birth. The anovestibular fistula presented later at around 2.1 months of age which is the usual presentation.

Hirschsprung's disease is a usually an isolated disorder of full term, otherwise healthy infants. The median age at which children are diagnosed with Hirschsprung's disease has progressively decreased over the past several decades, from 2-3 years of age during the first few decades of this century to a mean age of 3-6 months of age during 1950s to 1960.[12] In our series of 11 patients, the mean age of presentation was 6 months.

When we analyzed the pattern of presentation in our hospital it was seen that only 18.0% of patients presented in early neonatal period despite of diagnosis of almost 42% of cases within this period. On the contrary, nearly half (48.4%) of the patient presented after infancy, so they presented later after being diagnosed at an early age. This shows that the awareness of the parents about implication of the disease is poor, or there might be some lapses in the referral services.

In 1996, Pena recommended dividing loop colostomy with mucous fistula and he showed the advantages of this type of colostomy-defunctionalizes only a small portion of distal intestine allowing better water absorption; is complete by diverting; allows decompression of urine that may pass from the urinary tract back into rectum; simplifies preparation of the distal intestine prior to the main repair; makes the distal colostograms easier than when dealing with a more proximal colostomy; and incidence of prolapse is initially zero.[7]

He specifically condemned the loop colostomies, because of the possibilities of allowing faeces to pass into the distal stoma, provoking faecal impaction, mega rectum and urinary tract infection. Also there is a risk of contamination and infection after the main repair.

In 1998, Gauderer categorizes most colostomies into right transverse, left transverse and sigmoid.[2] He suggested a high sigmoid loop colostomy in children with imperforate anus. Recently, however separating the ends of the colon particularly in boys has become viable option. Advantages of separation are less contamination of urinary tract and lower rate of prolapse, most notably in the distal limb. Disadvantages include a longer incision, greater potential to the wound problems and greater difficulty applying a stoma device in small neonates.

According to Gauderer and Teitelbaum et al, in children with Hirschsprung's disease the best site for a colostomy is the dilated segment that contains normal ganglion cells found immediately proximal to the transition zone.[2,12] A loop colostomy is usually chosen because its simplicity in construction and take down. Because most transition zones are in the sigmoid colon, this left quadrant stoma is taken down at the time of the definitive corrective operation. If separation of the stomas is chosen, the distal intestine should not be overseen, particularly in long segment Hirschsprung's disease because mucous can't be appropriately evacuated or washed out.

In our series, we have performed 22 colostomies (66.6%) at our centre and received 11 (33.3%) patients with colostomy done outside and subsequently referred for definitive surgery. Out of 33 patients, 24 patients having sigmoid loop colostomy (72.7%) and left transverse loop colostomy in 9 patients (27.3%). We performed left transverse loop colostomy in 4 female patients (12.1%) having cloacal anomaly and 1 male patient having anorectal agenesis without fistula hoping adequate bowel length for the definitive repair.

In 1980, Mollitt et al reviewed the incidence of colostomy complications in 146 children.[4] Colostomy was performed predominantly for Hirschsprung's, disease (70) and imperforate anus (46). A transverse loop colostomy was done in 120 patients (82%) and a sigmoid loop colostomy in remaining patients. Sepsis which occurred in 24 patients (18%) was major early complication. Late stomal complications were recorded in 48%, with skin excoriation being the most common. Prolapse occurred in 12% and stenosis 6%. Colostomy revision was required in 24 cases (18%) being principally related to appliance problems and prolapse. Sigmoid colostomy had significantly lower complications. Major complications occurred in 16 cases (15%). There were no deaths related to colostomy closure. The incidence of complications was similar to the findings reported by Mac Mohan et al and Grant et al.[13,14] Factors which seemed to be related to an increased risk of complications were use of transverse compared to sigmoid colon and the policy of using loop as compared with divided stomas. Age and underlying diagnosis were not found to be important factors.

In our series, of 33 colostomy the most common early complication was postoperative sepsis occurred in 3 patients (9.9%) and would infection 7 patients (23.1%), followed by ischaemia in 1 patient (3.3%) for which refashioning of colostomy done. Skin excoriation was seen in 14 patients (46.2%), was most common late complications followed by prolapse in 7 patients (23.1%) and most commonly seen in transverse loop colostomy. The other late complications were stenosis 2 patients (6.6%), retraction in one patient (3.3%), wound hernia in one patient (3.3%) and suture sinus 2 (6.6%). The result is lower than Mottill et al, Mohan et al and may be due to better patient management, good antibiotic, good understanding of colostomy care.[4,13]

Till to date, 27 colostomy closures was done after definitive repair and other 6 patients waiting for definitive repair of colostomy closure. Immediate postoperative complications following colostomy closure was sepsis in 2 patients (9%) and acute intestinal obstruction in 1 patient (3.3%). The result is consistent with Mottill et al.[4]

Analysis of functional results showed good continence in approximately 83.3% cases and 18.8% constipation in ARM. In Hirschsprung's disease, good continence was in 88.8% and constipation in 11.1%. These results are consistent with results reported by Pena, Rintala and Lindhal et al, Teitelbaum et al and Puri.[12,15-17]

CONCLUSION

The most common indication of colostomies in male child is rectourethral fistula and anovestibular fistula in female child. Sigmoid colostomy most commonly used for easy construction, firmer stools, less tendency to prolapse and normal growth and development. Transverse loop colostomy gives an adequate length of bowel for definitive repair but having a high rate of prolapse. Most common complication was skin excoriation. Functional results after colostomy closure is good. Careful examination is the key to diagnosis and initial management. An appropriately indicated, properly constructed temporary stoma is frequently unavoidable and life saving.

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