

Where and Why do we Select the Type and Site of Colostomy in Children below Two Years

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Abstract

Background	Alexis Litter (1710) may be called the father of colostomy, when he made an incision in the belly and opened the ends of closed bowel to the belly surface where it never closed and preformed the function of anus for an infant suffered from intestinal obstruction due to congenital malformation of the return, probably an imperforate anus. This operation was known as Litter's operation.
Objective	To decrease the incidence of colostomy complications through selection of proper site and type of colostomy.
Methods	Two hundred temporary colostomies made for 200 neonates, infants and children below 2 years old in Al-Kadhemiya Pediatric Hospital and Al-Imamain Al-Kadhemain Medical City over a period from September 2008 to September 2013.
Results	Imperforate anus was the most common indication for colostomy in 59% of cases and Hirschsprung's disease in 33.5%, which were done mainly in neonatal period (57%) especially for male imperforate anus without fistula. Prolapse was the most common and challenging complication following colostomy creation in 25% followed by severe skin excoriation 24% which mainly happened with loop transverse, while declining incidence in divided sigmoid and descending colostomies.
Conclusions	Divided and separated descending and sigmoid colostomies were the stoma of choice for most clinical situations requiring colostomy because of complete fecal diversion with the least complications prolapse and skin excoriation.
Keywords	Colostomy complications, prolapse, skin excoriation

List of abbreviation: HD = Hirschsprung's disease, IA = imperforate anus, PSARP = posterior sagittal ano-rectoplasty.

Introduction

Colostomy as a diverting procedure has its origins in antiquity. The first successful colostomy was performed in 1798 by Durret for a four day old neonate with anorectalagenesis⁽¹⁾. A colostomy is an artificial opening made in the large bowel to the exterior in order to divert its contents, where it can be collected in an artificial appliance.

Most of the colostomies in pediatrics are temporary and indicated for decompressing obstructed large bowel with fecal diversion to protect a distal anastomosis following resection

of a ganglionic segment, tumors, injured or perforated colonic lesions and conditions that require definitive pelvic operations. The most common indications for temporary colostomies in children below 2 years old are imperforate anus (IA) and Hirschsprung's disease (HD)⁽²⁾. Right loop transverse and loop sigmoid colostomies were routinely performed for most cases of IA and HD. In HD, the colostomy must be created in the ganglionic part of large bowel defined by frozen section at time of operation at centers where it is available⁽³⁾. Sometimes colostomy is created above the transitional zone depending upon barium enema and macroscopic findings. In IA, the colostomy is usually

performed in sigmoid or descending colon (loops or divided).

In divided colostomies, mucus fistula is usually irrigated to release the impacted meconium to avoid mega sigmoid and at the same time prepare it for further definitive pelvic operation (pull through or posterior sagittal anorectoplasty) (PSARP) ⁽⁴⁾. Distal colostogram was done to identify the fistula and the extent of distal colon. PSARP definitive surgery in imperforate anus is performed between 4-8 weeks and pull through for HD can be done even in neonatal period ⁽⁵⁾.

The objectives of this study were to make an early diagnosis, management and prevention of colostomy complications through performing proper site and type of colostomy.

Methods

A total number of 200 temporary colostomies were done for 200 neonates, infants, and children below 2 years old age in Al-Kadhemiya Pediatric Hospital and Al-Imamain Al-Kadhemain Medical City from September 2008 to September 2013 .

A standardized data was prepared for collection of information; included, age, sex, body weight, natal history, family history, age of presentation, associated lesions, type of lesion, history of

abdominal trauma, age at which colostomy was performed and site or type of colostomy performance.

Patients were fully examined clinically and investigated according to their diseases. These investigations included erect plain abdomen, invertogram, abdominal ultrasonic exam, computerized tomography scan, magnetic resonance image, echocardiogram, cystoscopy, cystourethrography, intravenous pyelography, barium enema, rectal biopsy and multiple colonic biopsies.

Most of our patients presented with intestinal obstruction and they were prepared prior to surgical intervention, through fluid and electrolytes replacement. Also they were covered by broad spectrum antibiotics.

Results

The commonest indications for temporary colostomy in our study were IA in 118 patients (59%) and HD in 67 patients (33.5%), while the other least indications were necrotizing enterocolitis in 8 patients (4%), rectal atresia in 4 patients (2%), pseudo intestinal obstruction in 2 patients (1%) and one patient (0.5%) had colonic perforation by bullet injury (Table 1).

Table 1. Colostomy indications with sex distribution

Disease	Colostomies		
	Male	Female	Total
Imperforate anus	85	33	118
Hirschsprung's disease	39	28	67
Necrotizing Enterocolitis	5	3	8
Colonic Atresia	2	2	4
Pseudo intestinal obstruction	2	0	2
Colonic Injury	1	0	1
Total	134	66	200

Most of the colostomies were performed in the neonatal period (114) patients (57%) with ratio of male to female 3:1 (Table 2). Seventy (70) patients (61%) of them had IA while 31 patients

(27%) had HD. Eight patients (7%) had necrotizing enter colitis, 4 patients (3.5%) had colonic atresia and one patient (1%) had colonic perforation.

Table 2. Age at colostomy creation with sex distribution

Age at stoma	Imperforate anus		Hirschsprang's disease		Others		Total
	M	F	M	F	M	F	
Neonatal Period 1 day – 1 month Infancy	65	5	19	12	9	4	114
Period 1-12 month	0	18	34	20	2	2	76
Childhood Period 1 month-2 year	0	2	4	2	2	0	10
Male to Female ratio	2.6: 1		2.6:1		2:1		200

The most common type and site of colostomy performance was right loop transverse in 58 patients (29%) and 55 of them (96.5%) had HD. Therefore, the most common colostomy in HD was right loop transverse colostomy, while most common colostomy in IA was loop sigmoid.

The second most common type was loop sigmoid which was done for (55) patients (27.5%), while divided sigmoid was performed for 48 patients (24%) and 24 patients (12%) had divided descending colostomy while 15 patients (7.5%) had divided transverse colostomy. Most of patients with divided sigmoid and descending colostomies had IA.

The complications of colostomy were:

1. Colostomy prolapsed which is noticed in 50 patients (25%). Twenty five patients (50%) of them had right loop transverse colostomy. Ten patients (20%) with divided transverse developed prolapse while 10 patients (20%) with loop sigmoid had colostomy prolapse. Only four patients (8%) with divided sigmoid and one patient (2%) with descending colostomies developed prolapse. The prolapse occurred most commonly in the distal limb of colostomy. Forty patients (80%) who developed prolapse had HD and the distal prolapsed more frequently due to redundancy of distal limb, while it declined in divided colostomies and least in divided descending due to fixed distal limb.
2. Severe skin excoriation was the second most common complication. It happened in 48 patients (24%) and from these 24 patients (50%) had right loop transverse colostomy, while 15 patients (31%) had divided transverse. Only 2 patients (4%) of them with divided sigmoid colostomy developed severe skin excoriation. Most of the patients with

this complication had HD. They were mainly from rural areas of low educational state and less nursing care in addition to deficiency of appliance and stomal bag in addition to high output fluid leading to severe skin excoriation.

3. Wound sepsis was the third common complication; it included local infection, abscess, fistula and dehiscence. Twenty four patients (12%) development wound sepsis. Eighteen patients (75%) of them had HD because of their low immunity and failure to thrive in comparison to other patients. Only 6 patients (3%) with IA developed wound sepsis due to bad technique and wound contamination during separation and fixation of colostomy limbs. Two patients (1%) had wound dehiscence and needed secondary suturing (Table 3).
4. Intestinal obstruction developed in 12 patients (6%). Eight 8 patients of them had loop transverse colostomy, while only 2 patients with divided transverse and 2 patients with loop sigmoid colostomy developed intestinal obstruction. Ten patients (83%) of them had HD because during colostomy creation we need some times taking multiple colonic biopsies to identify the extent of the aganglionic segment.
5. Stomal retraction developed in 7 patients (3.5%). It occurs due to small size incision in the abdominal wall creation in comparison to colonic diameter leading to ischemia and necrosis of the colostomy endings, in addition to recurrent trauma of the appliance to the colostomy. Three patients with divided transverse, two patients with divided sigmoid and one with divided descending colostomy developed stomal retraction.

6. Stomal stenosis happened in 5 patients (2.5%). It developed in divided transverse, sigmoid and descending colostomies due to ischemia to colonic vessels and improper using of colostomy appliance.
7. Stomal dysfunction developed in 4 patients (2%), three of them had HD and the other one with IA had sepsis and died.
8. Parastomal hernia. It developed in 2 patients (1%), one with loop transverse and the other one with divided transverse colostomy.
9. Bleeding happened in 2 patients (1%) one with divided transverse and the other with divided sigmoid colostomy (Table 4).

Table 3. Complications following colostomy creation

Type and Site of Colostomy	Colostomy Prolapse	Sever skin exponent	Wound sepsis	Intestinal obstruction	Colostomy retraction	Colostomy stenosis	Colostomy dysfunction	Parastomal hernia	Bleeding
Right loop transverse	25	24	5	8	0	0	3	1	0
Divided transverse	10	12	10	2	3	2	0	1	1
Loop sigmoid	10	8	6	2	1	1	1	0	0
Divided sigmoid	4	3	2	0	2	1	0	0	1
Divided Descending	1	1	1	0	1	1	0	0	0
Total	50	48	24	12	7	5	4	2	2

Table 4. Comparison our results with collected studies about morbidity rate and colostomy complications

Complication	Mollitt et al ⁽⁸⁾ N=146 1980	Lister et al ⁽⁹⁾ N=156 1983	Al-Salem et al ⁽¹⁰⁾ N=77 1992	Nour et al ⁽¹¹⁾ N=108 1994	Sheikh et al ⁽¹³⁾ N=16 2006	Our study 2013
Prolapse	11.6%	12%	18.9%	5%	20%	25%
Severe skin excoriation	-	21.6%	-	2%	25%	24%
Wound sepsis	-	17%	-	1%	-	12%
Intestine obstruction	-	4%	-	3%	12%	6%
Stomal retraction	3.4%	1.9%	2.7%	-	-	3.5%
Stomal stenosis	6.2%	6.4%	2.7%	-	3%	2.5%
Stomal dysfunction	-	-	-	-	2%	2%
Parastomal hernia	-	-	-	-	5%	1%
Bleeding	-	5%	-	-	1.5%	1%

Discussion

The basic principles of constructing a good temporary colostomy as an initial management for a variety of diseases in pediatric age group including appropriate positioning, a viable bowel segment without tension and a tunnel in the abdominal wall to ensure complete diversion of bowel contents. Although great advances have

been made with regard to stoma formation and management, both early and late complications are common ⁽⁶⁾. The overall morbidity from colostomy has been reported to be as high as 50% ^(7,8) and a retrospective study was (42-75%) ^(2,8).

In our study, the morbidity rate was higher than other studies Lister et al ⁽⁹⁾ and Nour et al ⁽¹⁰⁾.

The reasons of our high percentage of complications in comparison to other studies are due to more frequent occurrence of prolapse and severe skin excoriation in our study in addition to the fact that some studies did not record or underestimate bleeding, severe skin excoriation^(8,11).

The most common complication of colostomy in our study was prolapse. Our results were in harmony with those of Sheikh et al (20%) but they were more than other studies^(8,9,10,11,13).

The second most common complication was severe skin excoriation. It was more frequent with right loop transverse colostomy, because bowel motion is more frequent and the fluid and minerals are not fully absorbed yet as in sigmoid and descending colostomies. Our results reported a percentage less than Soomro et al⁽¹²⁾ and in close proximity to Sheikh et al⁽¹³⁾; yet, more than others. The reasons of high percentage in our study were due to the shortage in supplying colostomy appliances; the colostomies, being most of loop type which were associated with more soiling than divided ones on which appliances fit better, in addition to not recording this complication by many studies or underestimating it by others^(10,13).

The third common complication was wound sepsis (infection, stich abscess, fistula and dehiscence). It was higher than other studies due to imperfect nursing care. Lister et al⁽⁹⁾ had also high incidence of wound sepsis (17%). This complication was more frequent with divided type due to the technical error by doing big abdominal wall incision and contamination of the wound by immediate opening of the bowel before fixing it to abdominal wall and not well forming bridge in between the colostomy limbs.

The fourth complication was intestinal obstruction which was lower than that reported by Nour et al⁽¹⁰⁾, but higher than that of Lister et al (4%)⁽⁹⁾. It occurred more in loop transverse colostomy and more in cases of HD because during laparotomy we need to take multiple colonic biopsies and creation of colostomy leading to extensive bowel manipulation and

sometimes contamination of the peritoneum during biopsies taking.

Considering the less frequent complications of stomal retraction and stenosis; they were noticed more with divided colostomies due to technical errors through creating small abdominal wall incision in the presence of dilated and hypertrophied bowel that leads to ischemia and necrosis of colostomy endings and later stenosis and retraction. Additionally, frequent trauma to the colostomy endings by improper appliances could be another cause. Our results were in accordance to those reported by Al-Salem et al⁽¹⁴⁾ but lower than other studies.

On the other hand, stomal dysfunction and parastomal hernia reported in this study were in agreement to that recorded by Nour et al⁽¹²⁾. Bleeding was the least frequently reported complication noticed in our patients, yet, it is less than that shown by Lister et al⁽⁹⁾ and Nour et al⁽¹⁰⁾.

In conclusion, divided stomas must be the stoma of choice for most of clinical situations requiring colostomy creation, because of complete fecal diversion and least complications especially prolapse and skin excoriation. It is advisable to reduce the length of time the child having colostomy, by doing the definitive operation as early as possible particularly to those having prolapse and severe skin excoriation.

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Author contribution

Dr. Mohammed did and writes the paper; Dr. Abolhab and Dr. Mohamed collect the data and share in writing parts of the research.

Conflict of interest

We declare no conflict of interest.

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