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# **Complication of colostomy in pediatric group**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا تَوْفِيقِي إِلَّا بِاللَّهِ عَلَيْهِ

تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ

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# DEDICATION

*To My...*

*Father & Mother,*

*For their ever support...*

# ACKNOWLEDGEMENT

*I would like to express my sincere attitude to my supervisor DR. Ahmed Zubar Zain for his great help, kind and support throughout the period of this study...*

# ABSTRACT

## **BACKGROUND:**

Colostomy is an artificial opening made in the large bowel to divert faeces and flatus to exterior, where it can be collected in an external appliance. As a method of treating intestinal obstruction, colostomies date back to the later part of the eighteenth century, and some of the first survivors of this procedure were children with imperforate anus.

## **OBJECTIVE:**

To identify the common indications and complications of stoma formation in pediatric age group below 12 years.

## **PATIENTS AND METHODS:**

A total number of (10) temporary colostomies were performed for (6) neonates < month , (2) > month & < 2 years, (2) > 2 years , in the pediatric surgical department of Child's Central Teaching Hospital in Baghdad in the period from 1 August 2018 to 1 March 2019.

## **RESULTS:**

Most of the colostomies (60%) were done in the neonatal period and mainly for imperforate anus (66%) , meconium ileus (17%) and bowel atresia (17%) . skin excoriation and wound dehiscence were the commonest complication (50%) then the bleeding and prolapse take place .the double barreled colostomy was the commonest stoma used in our patients and had the lower rate of complications.

## **CONCLUSION:**

Hirschsprung's disease and imperforate anus were the most common indications of stoma formation in pediatric age group. Prolapse, skin excoriation and wound sepsis were the most common complications after creation of stoma.

# INTRODUCTION

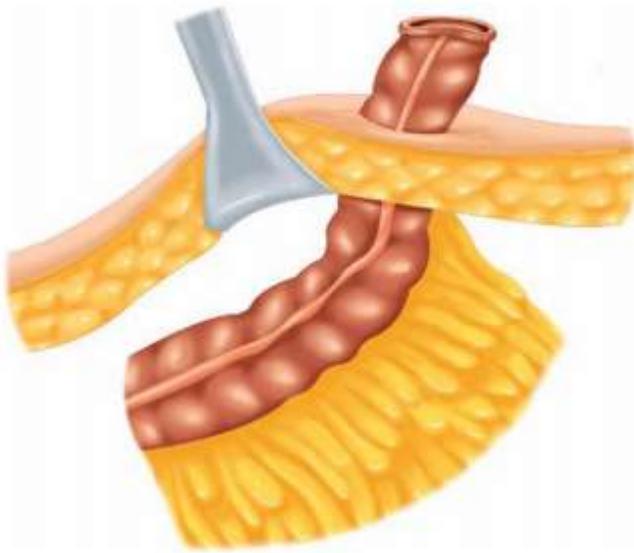
A colostomy (stoma) is a planned opening made in the colon (or small intestine) to divert feces and flatus to the abdominal wall where they can be collected in an external appliance. Depending on the purpose for which the diversion has been necessary, a stoma may be temporary or permanent. (1)

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 anorectal agenesis (2). 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) (3).

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 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)(6).

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) .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).

Most colostomies are created on the left side of the colon. An abdominal wall defect is created and the end of the colon mobilized through it. Because a protruding stoma is considerably easier to pouch, colostomies should also be matured in a Brooke fashion. The distal bowel may be brought through the abdominal wall as a mucus fistula or left intra-abdominally as a Hartmann's pouch. Tacking the distal end of the colon to the abdominal wall or tagging it with permanent suture can make identification of the stump easier if the colostomy is closed at a later date. Closure of an end colostomy has traditionally required a laparotomy, but increasingly minimally invasive techniques have been adopted. The stoma is dissected free of the abdominal wall and the distal bowel identified. An end-to-end anastomosis is then created.<sup>(6)</sup>



**Figure 1 :** Intraperitoneal end colostomy <sup>(1)</sup>.

**The most common indications of colostomies in the pediatric age group are:**

- Imperforate anus.
- Hirschsprung's disease.
- Distal colonic atresia.
- Necrotizing enterocolitis.
- Colonic and anorectal injuries (trauma).
- High fistula in ano <sup>(3)</sup>.

## the anatomy of the large intestine

The large intestine begins at the ileocaecal valve and extends to the anus. It is divided into the caecum, ascending colon, hepatic flexure, transverse colon with attached greater omentum, splenic flexure, descending colon, sigmoid and rectum. The large intestine is approximately 1.5 m long, but can be straightened at endoscopy so the caecum can be reached with 70 cm of colonoscope. The colon is distinguished from the small bowel by having fat-filled peritoneal tags known as appendices epiploicae and the taenia coli.<sup>(1)</sup>

These are three flat bands of longitudinal muscle that run from the appendix base to the rectosigmoid junction. They act to pull the colon into its sacculated state, producing a series of haustrations. Distended small and large intestine can be distinguished on an abdominal radiograph as the small bowel has complete transverse markings caused by the valvulae conniventes, while the colon has incomplete lines from the sacculations caused by the taeniae. The important posterior relations of the caecum and ascending colon are the right ureter, right gonadal vessels and duodenum and these must be protected at surgery.

The left ureter, left gonadal vessels and tail of the pancreas must be protected when operating on the left colon.<sup>(1)</sup>

**The blood supply** of the large intestine is derived from branches of the superior mesenteric artery from the caecum to the distal transverse colon and the inferior mesenteric artery and its branches more distally. Sudden occlusion of the inferior mesenteric artery may leave the area of the splenic flexure poorly perfused, leading to an ischaemic colitis. <sup>(1)</sup>

**Venous and lymphatic drainage** of the colon follows the arterial supply and venous drainage is into the portal system. The nerve supply to the large intestine is derived from the splanchnic nerves via a dense sympathetic plexus surrounding the superior and inferior mesenteric arteries. Visceral pain from the part of the colon supplied by the superior mesenteric artery is felt in the periumbilical region, while pain from the colon distal to that point is felt suprapubically. <sup>(1)</sup>

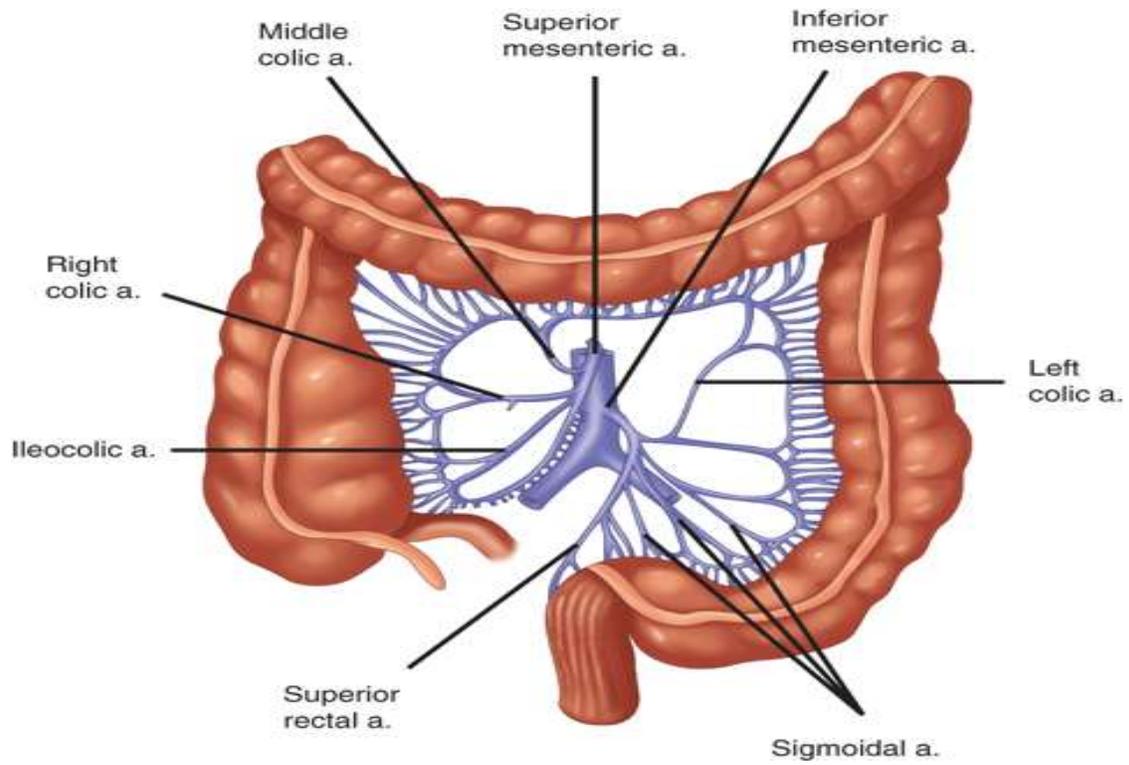


Figure2 : arterial blood supply of the colon. (6)

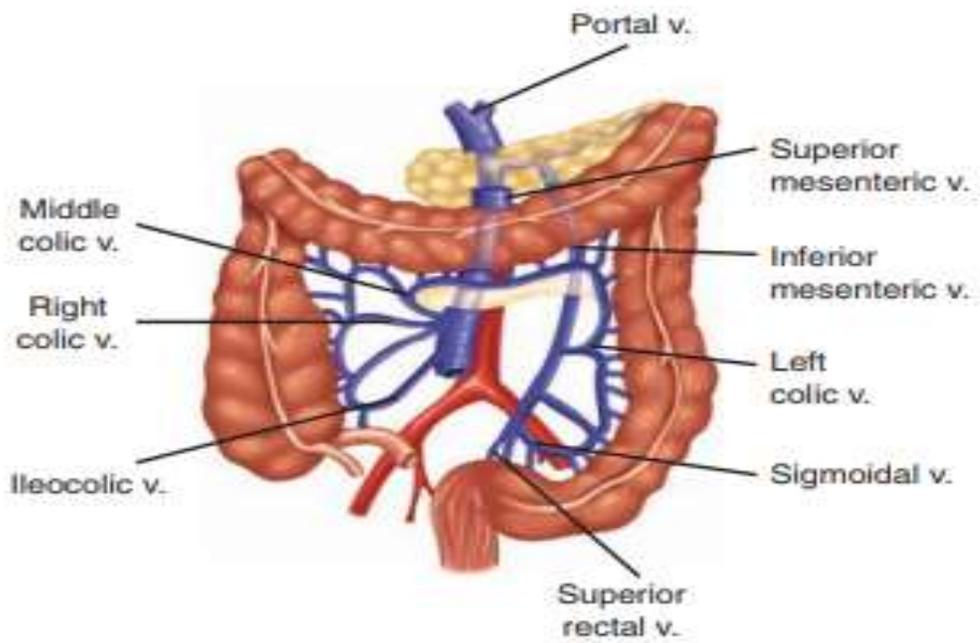


Figure 3: venous drainage of the colon. (8)

## Types of colostomy :

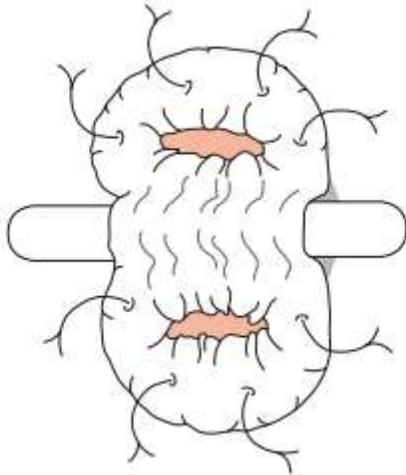
### Loop colostomy

A transverse loop colostomy has in the past been used to defunction an anastomosis after an anterior resection. It is now less commonly employed, as it is difficult to manage and potentially disrupts the marginal arterial supply to the anastomosis. Loop transverse colostomies are also particularly prone to prolapse. A loop ileostomy is now more commonly used<sup>(1)</sup>.

A loop left iliac fossa colostomy is still sometimes used to prevent fecal peritonitis developing following traumatic injury to the rectum, to facilitate the operative treatment of a high anal fistula, for incontinence and to defunction an obstructing low rectal cancer prior to long course chemoradiotherapy.<sup>(1)</sup>

A temporary loop colostomy is made by bringing a mobilized loop of colon to the surface, where it is held in place by plastic bridge passed through a mesenteric window. Once the abdomen has been closed, the colostomy is opened, and the edges of the colonic incision are sutured to the adjacent skin margin. When firm adhesion of the colostomy to the abdominal wall has taken place, the bridge can be removed. Following healing of the distal lesion for which the temporary stoma was constructed, the colostomy can be closed. It is usual to perform a contrast examination (proctogram) to check that there is no distal obstruction or continuing problem at the site of previous surgery.<sup>(1)</sup>

Colostomy closure is most easily and safely accomplished if the stoma is mature, typically after the colostomy has been established for at least 2 months. Closure is usually possible with a circumstomal incision, which avoids a full laparotomy, but it is important for patient and surgeon to consider the risks of closure carefully as it does involve a bowel anastomosis. In some cases, a full laparotomy may be required for safe closure of the stoma.<sup>(1)</sup>



**Figure 4:** Temporary (loop) colostomy opened over a rod, and immediate suture of the colon wall to surrounding skin (alternatively, a skin bridge is used).

### End colostomy

This is formed after an abdominoperineal excision of the rectum or as part of a Hartmann's procedure, bringing the divided colon through a left iliac fossa trephine in rectus Abdominis and skin<sup>(1)</sup>

The colonic margin is then sutured to the Adjoining skin. The point at which the colon is brought to the surface must be carefully selected to allow a colostomy bag to be applied without impinging on the anterior-superior iliac spine. The best site is usually through the lateral edge of the rectus sheath <sup>(1)</sup>.



**Figure 5 :** A colostomy in the left iliac fossa .

## Stoma appliance:

Stoma bags and appliances Stoma output is collected in disposable adhesive bags. colostomy appliances are simply changed two or three times each day. A wide range of such bags is currently available. Many now incorporate an adhesive backing, which can be left in place for several days. In most hospitals, a stoma care service is available to offer advice to patients, to acquaint them with the latest appliances and to provide the appropriate psychological and practical help .(1)

## Ostomies and Preoperative Stoma Planning

Depending on the clinical situation, a stoma may be temporary or permanent. It may be end-on or a loop. However, regardless the indication for a stoma, placement and construction are crucial for function. The preoperative preparation of a patient who is expected to require a stoma should include a consultation with an *enterostomal therapy (ET) nurse*. Preoperative planning includes counseling, education, and stoma siting. Postoperatively, the ET nurse assists with local skin care and pouching. Other considerations in stoma planning include evaluation of other medical conditions that may impact on a patient's ability to manage a stoma (e.g., eyesight, manual dexterity).(6)

A poorly placed stoma can result in leakage and skin breakdown. Ideally, a stoma should be placed in a location that the patient can easily see and manipulate, within the rectus muscle, and below the belt line. Because the abdominal landmarks in a supine, anesthetized patient may be dramatically different from those in an awake, standing, or sitting patient, the stoma site should always be marked with a tattoo, skin scratch, or permanent marker preoperatively, if possible(6).

For all stomas, a circular skin incision is created and the subcutaneous tissue dissected to the level of the anterior rectus sheath. The anterior rectus sheath is incised in a cruciate fashion, the muscle fibers separated bluntly, and the posterior sheath identified and incised. Care should be taken to avoid injuring and causing bleeding from the inferior epigastric artery and vein. The size of the defect depends on the size of the bowel used to create the stoma, but should be as small as possible without compromising the intestinal blood supply (usually the width of two to three fingers).(6)

The bowel is then brought through the defect and secured with sutures. Three or four interrupted absorbable sutures are placed through the edge of the bowel, then through the serosa, approximately 2 cm proximal to the edge, and then through the dermis (Brooke technique). After the stoma is everted, the mucocutaneous junction is sutured circumferentially with interrupted absorbable suture (6).

## Complications of stomas

Stoma complications are underestimated and common, On occasion these complications may require surgical treatment. Sometimes, this can be achieved with an incision immediately around the stoma but on occasion reopening the abdomen and freeing up the stoma may be necessary(1).

Repair of parastomal hernias is particularly technically challenging and the recurrence rate is high. Simple suture is associated with an almost 100% risk of recurrence and transfer to the opposite side of the abdomen, or insertion of a piece of prosthetic material within the abdominal wall around the stoma may be necessary. There is some evidence that stoma trephine reinforcement with mesh at the time of initial stoma formation may reduce the incidence of prostomal herniation, which may be as high as 50% over the long term(1)

*Colostomy necrosis* may occur in the early postoperative period and results from an impaired vascular supply (skeletonization of the distal colon or a tight fascial defect). Like ileostomy necrosis, limited suprafascial necrosis may be followed expectantly, but necrosis below the fascia requires surgery. *Retraction* may also occur but is less problematic with a colostomy than with an ileostomy because the stool is less irritating to the skin than *succus entericus*. *Obstruction* is unusual, but may also occur. *Parastomal hernia* is the most common late complication of a colostomy and requires repair if it is symptomatic. *Prolapse* occurs rarely, but is more common with a loop colostomy. Interestingly, it is almost always the efferent limb of the loop that prolapses. Dehydration is rare after colostomy, and skin irritation is less common than with ileostomy (6).

## Stoma complications

- Skin irritation
- Ischaemia
- Bleeding
- Prolapse
- Stenosis
- wound dehiscence (2)
- Retraction
- Parastomal hernia

## **PATIENTS AND METHODS**

This is prospective study with analytic elements conducted on patients in surgical wards in Child's Central Teaching Hospital , to be included in study the patients should performed colostomy and less than 12 years of age of either gender. The interviewing and collecting data performed in period from 1/October to 1/ March .

### ***Data collection***

Face-to-face interviews using paper-based questionnaire were conducted. Interviews were done at inpatient departments. regular visits were made for data collection in a system of nearly one hour a day, and 1-2 days per week. Taking into consideration criteria listed above.

### **Exclusion criteria**

Patients above 12 years of age .

### ***Study Instrument***

A semi-structure questionnaire used for evaluating complication of colostomy . The questionnaire included the following information:

- i) Socio–demographic such as current age, sex, age at time of colostomy and the date of colostomy creation.
- ii) Indication of colostomy .
- iii) Type of colostomy was done according to indication .
- iv) Complication of colostomy .

### **Statistical analysis:**

Data in the records was entered and analyzed using the statistical package for statistical sciences program, descriptive statistics was used, presented as frequencies and proportions, the results are presented in tables and figures, using Microsoft word software version 2013 .

## RESULTS

10 patients were included in the study , 7 of them were male and 3 were female ,

The commonest indication for stoma formation in our study was imperforated anus and Hirsch spring disease which each of them account for 40 % of all stomas that was performed in this series, while 10% for large bowel injury , and 10 % for other indication like large bowel atresia .

Age at stoma formation : It ranged from (1) day to (12) years.

6 cases (60%) of our patients had stoma in the neonatal period < 1 month , 4 patients ( 66%) of them had imperforate anus while 1 of them ( 17%) had Hieschspring disease and other (17%) of them had meconium ileus .

2 cases (20%) of our patients had stoma between 1month and 2 years ,100% of them had Hirschspring disease , while the other 2 cases (20%) of them had colostomy >2 years , 50% of them had large bowel trauma and 50 % of them had Hirschspring disease .

Double barreled colostomy was the commonest type of stoma in our study which was done for (50%) of the patients, (80%) of them had imperforated anus , while 1 of them ( 20%) had large bowel atresia.

Right Loop transverse colostomy was the second most common stoma and done in (40%) all of them had Hirsch spring disease .

Ascending colostomy was done in patient with large bowel injury.

Table1: Sociodemographic Characteristics of Sample :

variable	Groups	number	%
sex	Male	7	70%
	female	3	30%
Age at colostomy creation	< 1 mon	6	60%
	1 mon – 2yrs	2	20%
	>2yrs	2	20%
<b>Total</b>		<b>10</b>	<b>100%</b>

Table 2: types of colostomy :

Type	Number	%
Right Loop transverse colostomy	4	40%
Double barreled colostomy	5	50%
Cecostomy	0	0%
Ascending colostomy	1	10%
Sigmoid ostomy	0	0%
total	10	100%

Table 3: indication of colostomy

indication	Number	%
Imperforated anus	4	40%
Meconium ilius	0	0%
Hirsch spring disease	4	40%
Trauma	1	10%
Others	1	10%

### **The results of complication of colostomy:**

- Colostomy prolapse: occurred in 30% of cases all of them had right loop transverse colostomy. Prolapse most commonly occurred in distal limb and this happened because of the free mobility and redundancy of distal limb , all who developed prolapse of stoma had Hirschsprung's disease , while it decline in divided colostomies due to fixed distal limbs.
- Skin excoriation : occurred in (50%)of the patients, (60%) had right loop transverse colostomy,and (40%) of them had double barreled colostomy . severe skin excoriation mostly occur in loop ileostomy in which skin expsed to proteolytic enzymes present in thin stool . in our study. Most of the patients who developed skin excoriation from rural areas because of bad stomal care and because those was not using stomal appliance.
- Stomal stenosis: occurred in (10%), four of them had divided stoma while the other patient had loop stoma.
- Parastomal hernia: developed in (30%) of patients, 70% had right loop transverse colostomy ,and 30 % had double barreled colostomy.
- Bleeding: occurred in (50%) of the patients , 50 % had divided descending colostomy, 40% had right loop transverse colostomy and 10% had loop ascending colostomy after trauma.
- Stomal retraction: occurred in (30 %) of patients all of them had divided descending colostomy.
- Wound dehiscence: (40%) of patients developed this complication, 80% had right loop transverse colostomy and 20% had divided colostomy.

Figure 6 : frequency of complication

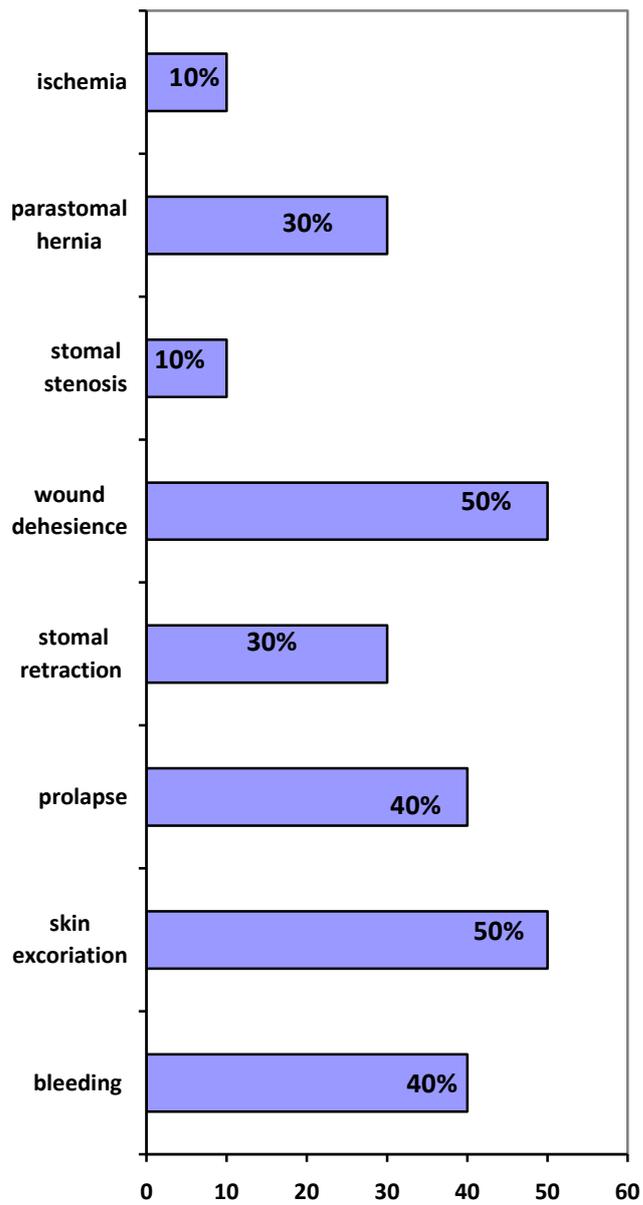
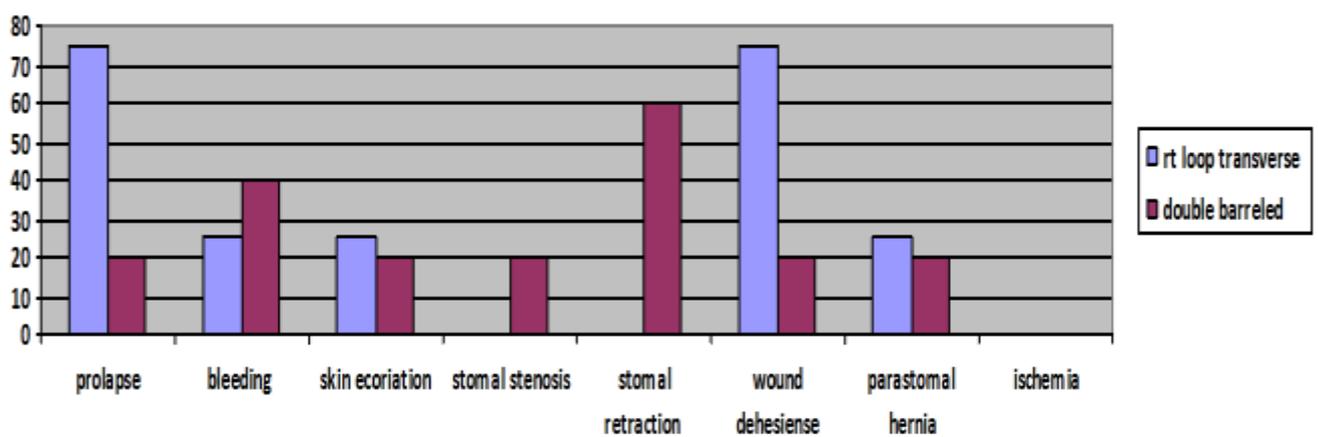


Table 4: relationship between the type of colostomy and indication

Indication type	Imperforated anus	Meconium ileus	Hirsch spring disease	Large bowel injury	others
Rt Loop transverse			■■■■		
Double barreled	■■■■■	■			■
Ascending colostomy				■	
sigmoidostomy					
cecostomy					

Figure 7: relationship between commonest types of colostomy and complication



## DISCUSSION

Temporary colostomies are necessary operations for the initial management of a variety of diseases in neonates, infants and children. The most common indications in our study were Hirschsprung's disease and imperforate anus. Most of stoma formation were performed in the neonatal period (60%) especially for imperforate anus which account for 66% of all stomas that were done at this age, while in Hirschsprung's disease account for 25 for same age, 50% for the age > month and > 2years and 25 above 2 years because the patients with imperforate anus presented as emergency with intestinal obstruction immediately after birth, while in Hirschsprung's disease, some patients responding to conservative with rectal stimulation and irrigation.

Colostomy formation declined with increase patient age, and most common indication was Hirschsprung's disease which account for 75 % while 0 % for imperforate anus, And 25 % for large bowel trauma.

The most common complication in our study is skin excoriation which was occurred in 50%, it was high in comparison to Beck et al(2%)(7) and lister et al study (21.6%)(8).

The high incidence of skin excoriation in our study was due to poor compliance of our patients with colostomy appliance especially those from rural areas and there is shortage in the supply of colostomy.

Wound dehescence which include local wound infection was( 50%) incidence which are high in comparison with Beck et al study (3%)(7) and lister et al study (17%) (8) and this complication most likely occurring due to imperfect nursing care only.

The second Most common complication in was colostomy prolapse which developed in 40% and it was all occurring in right loop transverse colostomy and account for 80% of prolapse that happened during our study, it was less frequent in divided colostomy as compared to loop colostomy. Prolapse most commonly affect distal limb more than proximal one because distal limb is dilated and hypertrophy especially in Hirschsprung's and with time decrease in size and return to the normal caliber that facilitate prolapse, also in transverse colostomy the distal limb represent transverse colon which is redundant and liable for prolapse. Our result is higher than Beck et al (18.9%)(7) and lister et al study (12%)(8) and Mollitt et al (11.6%)(9).

Stomal stenosis occurred in 10 % of patients all of them had divided stoma. The reasons of stenosis were due to small opening that was created for colostomy and ischemia of margins of stoma which end with stenosis.

Stomal stenosis was high in comparison to Beck et al study (1.4%)<sup>(7)</sup> and in comparison to Lister et al study (6.4%)<sup>(8)</sup> and Mollitt et al study (6.2%)<sup>(9)</sup>. Parastomal hernia developed in 30 % of our patients and usually occurred in that patient with poor abdominal wall muscle and with local infection . so it is high in those with Hirschsprung disease because of low immunity . Its incidence was high in comparison to Beck et al study (0.7%)<sup>(7)</sup>. Bleeding occurred in 40% of our patient and was usually technical and it was high in comparison to Beck et al (0.7%)<sup>(7)</sup> and Lister et al study (5%)<sup>(8)</sup>. In general 100% patients developed different complications directly related to stoma formation that was high in comparison to Nour et al study in which complication occurred in 6.5% only (12). Lister et al had 32% while Beck et al reported 27.5% <sup>(7)</sup>.

# CONCLUSIONS

Hirschsprung's disease and imperforate anus were the most common indications for temporary colostomy in pediatric age group.

- Construction of colostomy in pediatric patient carries a high risk of complications and requires careful technique.
  - Right loop transverse colostomy had the highest rate of complications.
  - Prolapse, skin excoriation, bleeding and wound sepsis were the most common complications after creation of stoma.
- divided stomas must be the stoma of choice for most of clinical situations requiring colostomy creation.

## RECOMMENDATIONS

### Caring for a Colostomy

The skin around your stoma should always look the same as skin anywhere else on your abdomen. But ostomy output can make this skin tender or sore. Here are some ways to help keep your skin healthy:

**1-Use the right size pouch and skin barrier opening. 2-Change the pouching system regularly Do not rip the pouching system away from the skin or remove it more than once a day unless there's a problem . 3-Clean the skin around the stoma with water..4- Watch for sensitivities and allergies to the adhesive, skin barrier, paste, tape, or pouch material.**

### Colostomy irrigation (for descending and sigmoid colostomies only)

.Irrigation is simply putting water into the colon through the stoma to help regulate bowel movements.

The equipment (Figures 17 to 20) you'll use includes:

- A **plastic irrigating container with a long tube and a cone or tip..**
- An **irrigation sleeve.**
- A **tail closure clip** .(10)

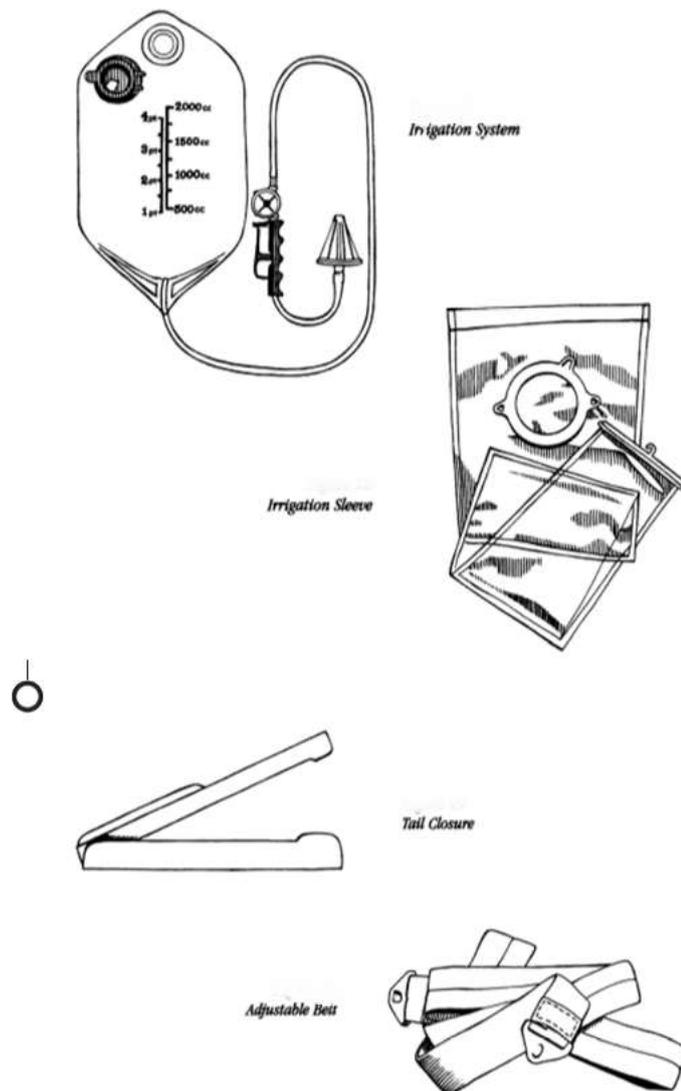


Figure 8 : irrigation system

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