ORIGINAL ARTICLE

Diverting Loop Colostomy in Children with Skin and Muscle Bridge - Our technique

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ABSTRACT

Aim: To identify the results of diverting loop colostomy with skin and Muscle Bridge technique in pediatric surgical patients.
Setting: Department of Pediatric Surgery, Sheikh Zayed Medical College, Rahim Yar Khan
Duration with dates: Ten (10) months (March -2014 to December -2014)
Sample size: A total of 60 neonates, infants and children underwent creation of loop colostomy during this period for various congenital and acquired disorders of colon, rectum and anus.
Study design: Quantitative method
Study type: Analytical study
Methods: All patients admitted in the pediatric surgery department who required diverting colostomy creations as a part of their management were included in the study. These patients were randomly admitted through OPD and emergency for diverting loop colostomy with skin and muscle bridge technique where indicated. Apart from ascending and transverse colostomies, sigmoid loop colostomy with skin and muscle bridge was the commonly performed procedure in our department. The patients who were operated upon previously or operated elsewhere and referred due to stoma complication were excluded from the study..
Results: Out of sixty patients, 37(61.67%) were male and 23(38.37%) were females. 33(55%) cases were neonates and 11(33.34%) were infants. Common indications for colostomy were, imperforate anus high variety 34(56.67%), Hirschsprung's disease 19(31.67%), Rectovaginal fistula 4(6.67%), cloacal exestrophy 2(3.34%) and ascending colon perforation 1(1.67%). Sigmoid loop colostomy with skin and muscle bridge was the preferred procedure for anorectal malformation and hirschsprung's disease. Parastomal excoriation was the commonest complication and colostomy prolapse was observed in only two patients.
Conclusion: Based on the results of this study we recommend that diverting loop colostomy using a skin and muscle bridge is a safe, rapid and easy to manage colostomy technique which gives complete diversion similar to double barrel colostomy. Apart from that morbidity after loop colostomy with skin and muscle bridge is quite less for example colostomy prolapse in loop colostomy without bridge and difficulty in application of colostomy bags due to glass or plastic rod was overcome with skin and muscle bridge technique. So considering the benefits of this technique, skin and muscle bridge method can be confidently used for congenital and acquired conditions in pediatric age groups.
Key words: Loop colostomy, Hirschsprung's disease, anorectal malformation,

INTRODUCTION

Colostomy is an operation that creates an opening for the colon, or large intestine, through the abdomen. The edges of the colon are then stitched to the skin of the abdominal wall to form an opening called a *stoma*. A stoma is a Greek word meaning "mouth" Colostomy is the most common stoma used in children[1]. First diverting stoma was performed in 1783 for the treatment of anorectal malformation[2].

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Indications for creation of colostomy may be congenital or acquired. Congenital causes are more common and include high anorectal anomalies and Hirschsprung's disease. Acquired indications include bowel perforation, high fissure in ano and severe perineal trauma. Although In developed countries, primary pull through operations are increasingly performed to treat Hirschsprung's disease and Anorectal malformation[3] but this is not true in Pakistan where colostomy is the life saving procedure for these children.

Constructional classification of colostomy is based on how the stoma is constructed and is of two major types, loop colostomy and divided colostomy. In loop colostomy an opening is made on the anti-

mesenteric border of the colon without dividing it. As the loop colostomy does not interrupt the continuity of the colon and allows some fecal matter to pass beyond the stoma, so it is in essence a non-defunctioning stoma[4]. While in divided colostomy, bowel continuity is interrupted and intestinal contents does not enter into the distal bowel, it is called defunctioning stoma.

Although the type of a diverting colostomy chosen depends on healthcare resources, surgeons' training, personal experience and preference, [5] however some surgeons at our institution and many pediatric surgeons in the world recommend loop colostomy for anorectal malformation and hirschsprung's disease. Proponents of loop colostomy claim that a well-fashioned loop colostomy is easier to create and close, moreover it also has the advantage of having better cosmetic results.

The only disadvantage with loop colostomy is its high rate of complication principally related to prolapse[6] and its lack of ability to properly dysfunction fecal matter till the definitive procedure is performed. The current technique using a glass rod over the skin surface and underneath the large bowel prevents the retraction of the large bowel into the peritoneal cavity but doesn't prevent further protrusion of the large bowel through the created abdominal wall defect[7]. It also hinders proper application of a colostomy bag over the stoma. However we overcome these two complications by introducing a skin and muscle bridge below the loop of sigmoid colon which obviates not only the above mentioned problems of using a glass rod, but also gives a much better complete diversion similar to a double barrel colostomy without creating a double barrel colostomy. So I planned to conduct this study on loop colostomy with skin and muscle bridge technique.

PATIENTS AND METHODS

This quantitative type analytic study was carried out in pediatric surgery department Sheikh Zayed Medical College/ Hospital Rahim Yar Khan, which is a tertiary care hospital during 10 months from March 2014 to December 2014. A total of 60 neonate, infants and children underwent creation of loop colostomy during this period for various congenital and acquired disorders of colon, rectum and anus. Non probability, convenience sampling technique was used. All neonates, infants and children up to 12 years of age who need large intestinal stoma as a part of their management were included in the study.

Exclusion criteria:

1. Children more than 12 years.
2. The patients who were operated upon previously or operated elsewhere and referred due to stoma complication were excluded from study.
3. Children operated with other types of colostomy like divided or end colostomy were excluded from the study.

Sixty patients fulfilling the inclusion criteria were included in the study. A standardized data sheet was prepared for collection of information including age, sex, body weight, natal history, family history, associated anomalies, types of lesion, indication of stoma, type of stoma, site of stoma and its complications. All data was collected in proforma and then analyzed by SPSS version 16.

Different techniques are used for creation of skin bridge below the loop of the colon. In a study published by Iran, an omega incision was given at the site of colostomy and tongue shaped skin bridge was created below the colostomy loop[8]**.** In our technique we created an angled incision (almost 30-45 degree) with convexity laterally for sigmoid colostomy as shown in figure 1.

Fig. 1

Fig. 2: Incision was deepened with cautery and flap of skin was elevated with the help of stay sutures.

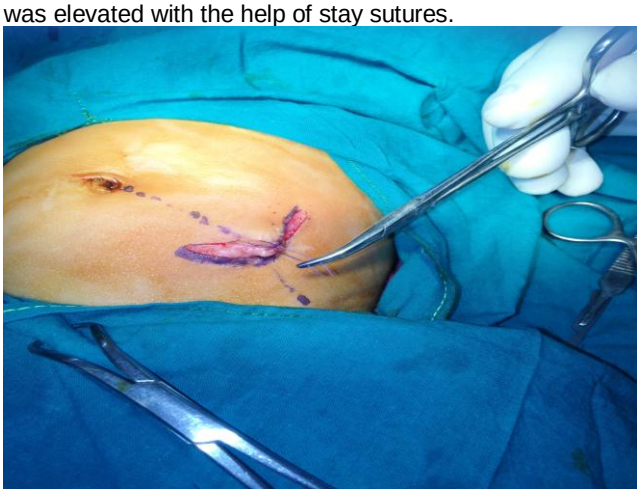

Fig. 3: Muscle flap was also elevated and held with stay sutures.

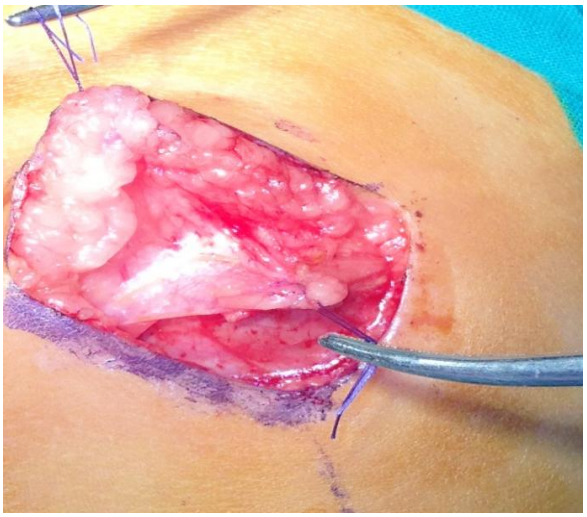

Fig. 4: Peritoneum was opened, colon was exteriorized and tunnel created in the mesentery.

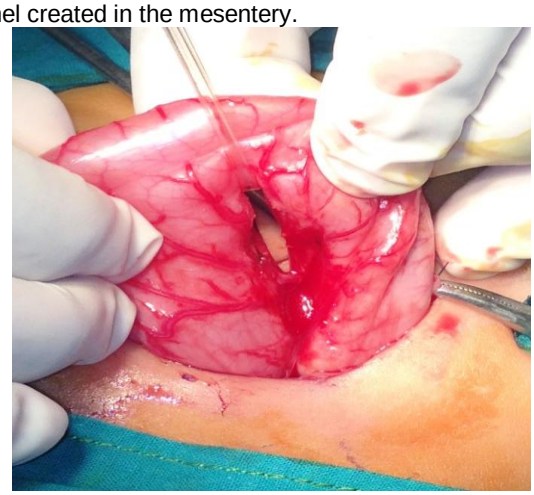

Fig. 5: Muscle flap was passed through the tunnel and stitched with opposite side muscle.

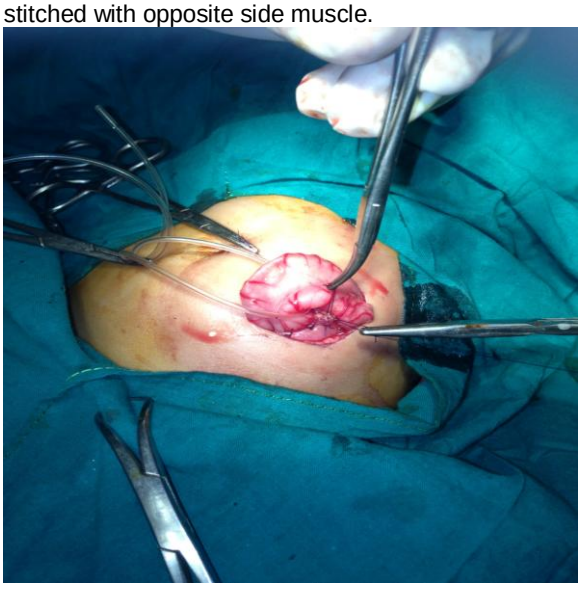

Fig. 6: Similarly skin flap was passed through the tunnel and stitched with opposite side skin as in figure.

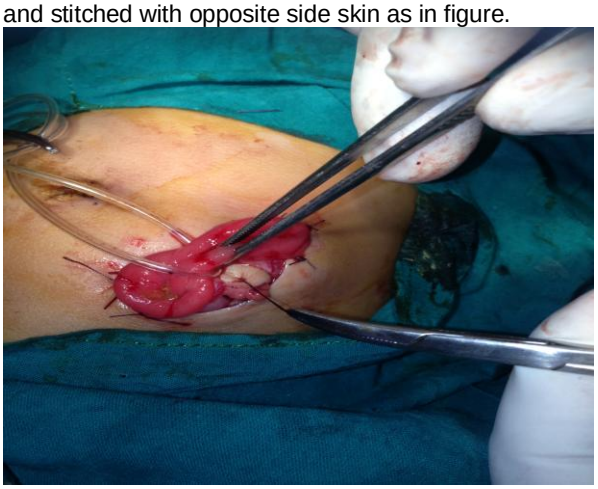

Fig. 7: Colostomy with skin and muscle bridge before removal of rubber stent.

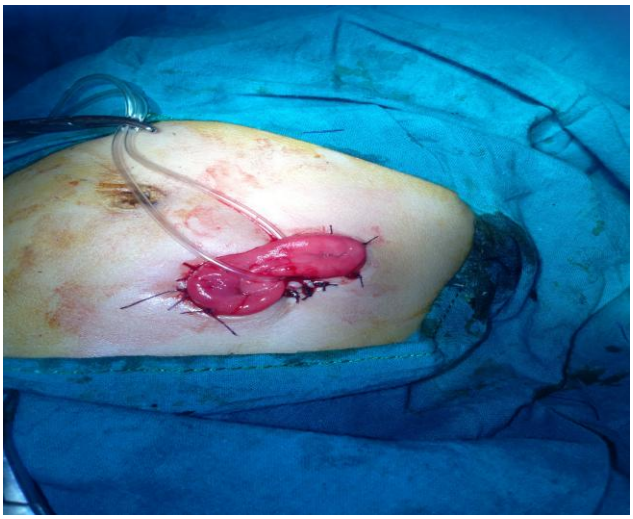

Fig. 8: Patency of the stoma was checked with Hagar dilator.

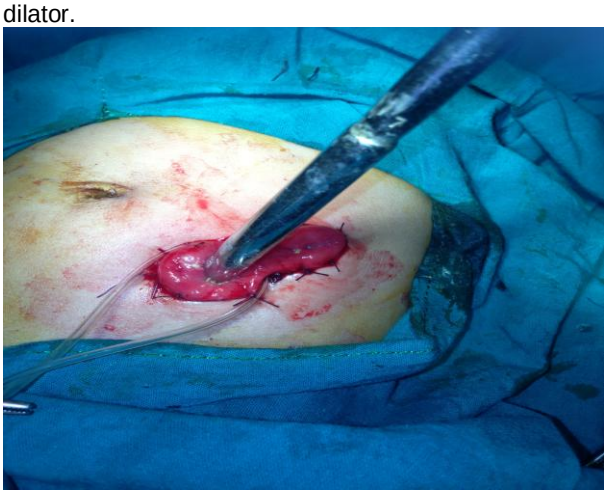

Fig. 9: Final shape of colostomy when tube stent was removed

Fig. 9: Other types of loop colostomies (ascending, transverse, descending) were also created according to this technique of angled incision and skin/ muscle bridge.

Follow-up: All patients were followed for next three months. Complications like bleeding from stoma, stoma necrosis, stoma retraction, infection, prolapse, need for revision, obstruction, stoma stenosis, parastomal excoriation, dehydration, electrolyte imbalance, parastomal evisceration and dehydration were recorded and managed accordingly. Re operation due to major complication or any mortality was also noted.

RESULTS

All patients were followed for different stoma related complications. Out of sixty patients, 37(61.67%) were male and 23(38.33%) were females (Table 1).

Table1: Gender distribution

Gender	n	%age
Male	37	61.67
Female	23	38.33

Thirty three (55%) patients were neonate, 11(18.33%) children were infants. Seven (11.67%) patients were 1-5 years old and 9 (15%) children were between 5 to 12 years of age (Table 2).

Table 2: Age distribution

Patient age	n	%age
Neonates	33	55
1 month to 1 year	11	18.33
1 year to 5 year	7	11.67
5 to 12 year	9	15

The most common indication for sigmoid loop colostomy was imperforate anus of high variety 34(56.67%).The second commonest reason for stoma formation was Hirschsprung's disease 19(31.67%). Other indications for loop colostomy were rectovaginal fistula, four cases (6.67%), cloacal exestrophy two cases (3.34%) and perforation in ascending colon one case (Table 3).

Table 3: Indications of colostomy

Patient age	n	%age
Imperforate anus (high variety)	34	56.67
Hirschsprung's disease	19	31.67
Rectovaginal fistula	04	6.67
Cloacal exestrophy	02	3.34%
Perforation in ascending colon(NEC)	01	1.67

Sigmoid loop colostomy with skin and muscle bridge was the commonest procedure performed 56(93.33%). Transverse colostomy with skin and muscle bridge was performed in only three cases (3.33%), two cases were of common cloaca and one hirschsprung's disease. Ascending colostomy with skin and muscle bridge was performed in only one case due to perforation (Table 4).

Table 4: Types of loop colostomy

Patient age	n	%age
Sigmoid loop colostomy with skin & muscle bridge	56	93.33
Transverse loop colostomy skin & muscle bridge	3	5.00
Ascending loop colostomy with skin and muscle bridge	1	1.67

All operated patients were followed for complications of colostomy. Parastomal excoriation was the most common complication (Table 6)

Table 6: Colostomy complications

Complications	Loop colostomy with skin and muscle bridge	% age
Bleeding from stoma	11	18.33
Dehydration	05	8.33
Infection	07	11.67
Para stomal evisceration	02	3.33
Burst abdomen	01	1.67
Stoma retraction	02	3.33
Stoma necrosis	02	3.33
Parastomal skin excoriation	17	28.33
Stoma prolapsed	03	5
Electrolyte imbalance	09	15
Adhesion obstruction	03	5
Stoma stenosis	05	8.33
Fecal impaction	04	6.67
Polyp formation	03	5
Metabolic acidosis	01	1.57
Death	03	5
Re-exploration	02	3.33

Table 7: Indications of loop colostomy

Indications	Imp. Anus (high variety)	H.D.
Our study	34 (56.67%)	19(31.67%)
Saleem M et al[12]	130(48.68 %)	120(44.94%)
Sheikh MA et al[13]	71 (58.68%)	41 (33.88 %)
Ekenze SO et al[10]	76 (41.76%)	10 (58.24%)
Ameh EA et al[14]	28 (49.12%)	29 (50.88 %)
Iqbal MZ et al[15]	34(41.46%)	22(26.83%)

DISCUSSION

Colostomy formation and subsequent closure are important surgical procedures in the management of Hirschsprung's disease, high anorectal malformations and neonatal necrotizing enterocolitis.[9] Defunctioning colostomy is the most frequently employed stoma technique in this study because it minimizes faecal overflow into the distal segment. In anorectal malformation this prevents contamination of the urinary tract through the recto-urinary fistula while in hirschsprung's disease faeces will not accumulate in the distal segment to form troublesome concretions. Considering the benefits of defunctioning colostomy, we used skin and muscle bridge in all types of loop colostomies as described earlier.

Total sixty patients were operated for colostomy, 37(61.67%) were male and 23(38.37%) were females. In another study conducted by Ekneze, in university of Nigeria in 2007, out of 182 children for colostomy for large bowel anomalies, 133(73.1%) were male and 49 (26.9%) were females.[10] This increased number of colostomy formation in males is due to the increased incidence of Hirschsprung's disease, which is almost four times more common in males as compared to females[11].

In this study thirty three children (55%) were neonates and most of them were operated due to anorectal malformation i.e. imperforate anus high variety. Eleven (33.34%) children were infants and commonest reason for colostomy in this age group was Hirschsprung's disease. Only seven cases (11.67%) were 1 to 5 years of age and remaining 9 cases were 5 to 12 year of age. This is similar to the study conducted in Nigeria[10] where mean age for colostomy formation was 15.5 days (range 3-75 days) and mean age for Hirschsprung's was 4.6 year (range 8 days to 15 year).

The most common indication for colostomy in this study was imperforate anus high variety where 34(56.67%) children under went stoma formation. Hirschsprung's disease was the second commonest cause where 19 (31.67%) children were operated for large bowel stoma. Similarly in many other studies anorectal malformation was the commonest cause for loop colostomy formation in pediatric age group.[12, 13.] However in some other studies hirschsprung's disease was more common as compared to anorectal malformation for stoma formation.[10, 14] In a study conducted by Iqbal MZ et al, anorectal malformation was the commonest cause for colostomy formation as shown in table below[15].

The most common indication for colostomy in our series was anorectal malformation (Imperforate anus high variety) and Hirschsprung's disease. It is very important to select appropriate site for stoma formation. As in case of imperforate anus sufficient length of colon must be left distal to stoma so that subsequent definitive procedure (PSARP) can be performed without tension[15]. Choosing the level of colostomy in Hirschsprung's Disease need special attention it should be 3 to 4cm proximal to the transitional zone[16].

Sigmoid loop colostomy with skin and muscle bridge was the commonest procedure performed in our study, 56 (94.66%) patients. Although in literature loop colostomies without bridge were found to be associated with more complications as compared to divided colostomy[17, 20] however results were significantly improved with skin and muscle bridge. Only three cases were operated with transverse colostomy; because this was not the preferred procedure due to more complications in different studies[18, 19].

The most common complications in our study were para stomal excoriation 17(28.33%) and bleeding from stoma 11(18.33%). This was due to lack of cleanliness and using rough homemade clothes for wiping fecal matter which leads to ulceration and bleeding from colonic mucosa. Colostomy bags are really used in our hospital due to poor socio economic status. Complications of loop colostomy with skin and muscle bridge were compared with many other studies and major difference was seen in colostomy prolapse. The reported incidence of stomal prolapse in other studies was 6.8%[16], 20.32%[10], 17.98%[12], 33%[21], 13(17.8%)[17] and only 3(5%) in our study. In another study conducted by Askarpour et al in 2012, complications especially prolapse after skin bridge was less 1(4.7%) as compared to rod colostomy 2((9.5%).[22] No significant difference was found regarding other complications.

CONCLUSION

Based on the results of this study, we recommend diverting loop colostomy with skin and muscle bridge a safe, rapid and easy to manage colostomy technique which gives complete diversion similar to double barrel colostomy. Apart from that morbidity after loop colostomy with skin and muscle bridge is quite less and results are comparable with divided

colostomies. Colostomy prolapse in loop colostomy without bridge and difficulty in application of colostomy bags due to glass rod is overcome with skin and muscle bridge technique. So considering the benefits of skin and muscle bridge technique, this method of loop colostomy can be confidently used for the treatment of congenital and acquired conditions in pediatric age groups.

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