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Effect of surgical techniques on long-term outcome in congenital pouch colon: A tertiary care centre experience

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ABSTRACT

Background: The objective of the following study is to assess effect of a novel surgical technique on long-term outcome in operated cases of congenital pouch colon (CPC). **Patients and Methods:** We retrospectively analysed our surgical neonatal records from June 2002 to May 2012. Out of 477 cases of anorectal malformations, CPC was found in 73 (15%) cases. Out of 73 cases of CPC, 39 (53.4%) were complete pouch and 34 (46.6%) were incomplete. In addition to invertogram, an erect skiagram was done in all cases to confirm diagnosis. Patients were operated either by single stage pull-through or by staged procedure using conventional abdominoperineal (AP) pull-through or by our new hanging bowel technique. All patients were put on bowel management programme starting 1 month post-surgery until 5 years of life. **Results:** Children presented to us at median age of 2.1 days. Mean weight at time of presentation was 2.74 kg. In our study, group median age at time of initial procedure was 2.7 days. In staged procedures definitive surgery was done after 6 months. Hospital stay in single stage procedure using the hanging bowel technique was 9.7 days while 17.4 days in conventional AP pull-through. Complication rate were high in conventional pull-through when compared to hanging bowel technique as shown by the significant $P < 0.05$. **Conclusion:** Our novel surgical technique for pull-through is suitable for both single stage as well as staged pull-through. Bowel enema programme should be an integral part of management of CPC.

Key words: Bowel training programme, congenital pouch colon, hanging bowel technique, pull-through

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INTRODUCTION

Congenital pouch colon (CPC) is a rare complex condition usually associated with high anorectal malformation (ARM).[1-4] The aetiology, embryology and pathogenesis of CPC are poorly understood but environmental, dietary and familial inheritance may be the contributory factors. Various classifications have been described for CPC. The management strategy depends on the type of the pouch and condition of the child at time of surgery. We are describing a novel surgical technique which can be used in both single stage or staged procedures with excellent results.

The goal of this study was to describe a novel surgical technique, assess of effect of bowel enema programme and to discuss the long-term outcome in operated cases of CPC.

PATIENTS AND METHODS

We retrospectively analysed our surgical neonatal records from June 2002 to May 2012. Institute's ethical committee approval was taken for the study. In addition to invertogram, an erect skiagram was done in all cases to confirm the diagnosis of pouch colon. Patients were operated either by single stage pull-through or by staged procedure using conventional abdominoperineal (AP) pull-through or by our new hanging bowel technique. In conventional AP pull-through, after pull-through of bowel through abdominal route, excess bowel from the anal verge was excised and neoanus was created by doing anoplasty i.e., interrupted absorbable sutures between skin and bowel edges. In hanging bowel technique, bowel was pulled-through as per conventional AP pull-through and hanged out of neoanus for about 5 cm without conventional anoplasty [Figure 1] with subsequent trimming of the excess bowel after 7 days. Staged procedure comprised of division of fistula with coloplasty and end stoma with second stage of stoma pull-through done after 6 months.

Rectal washes with saline enema was started 1 month following surgery initially twice a day for 6 months and once a day thereafter until 5 years of age. Then the enema programme was gradually tapered by assessing the response during follow-up.

After obtaining proper informed and written consent children were taken up for surgery. Pre-operatively 3rd generation cephalosporin, aminoglycoside and metronidazole injections were given. Abdomen was opened by Gibson incision. Pouch was identified and depending on the type of pouch either excision of pouch or coloplasty was performed. Decision to do either a single stage pull-through or a staged procedure depends on the condition of the child. For single stage procedure after excising the pouch the bowel is pulled-through presacral space inside the vertical muscle complex and hanged outside the neoanus for about 5 cm without doing conventional anopalsty (Figure 1). Muscle complex was identified by using muscle stimulator. Trimming of excess hanging bowel was done after 7 days when the auto anastomosis had taken place. For staged procedure excision of pouch or coloplasty with end stoma, followed by stoma pull-through after 6 months by similar technique without covering stoma was done. Post-operatively children were allowed orally as soon as the bowel function resumed. Children were discharged 24 h after trimming. Follow-up period ranged from 1 to 10 years. Complication rate between conventional AP pull-through were compared to hanging bowel technique and $P < 0.05$ was considered to be significant.

RESULTS

A total of 1437 surgical neonatal cases were admitted from June 2002 to May 2012. Out of these 1437 cases, 477 (33%) cases were of ARMs. CPC was found in 73 (15%) cases. Complete pouch colon was seen in 39 (53.4%) cases whereas incomplete pouch colon in 34 (46.5%) cases. In our study, group pouch colon accounted for 15% of total ARM with a male preponderance 7.1:1. Children presented to us at median age of 2.1 days. Mean weight at time of presentation was 2.74 kg. Clinically and radiologically CPC was confirmed in 89% of cases while in rest diagnosis was done intra-operatively. Out of 39 cases of complete pouch colon excision of pouch with ileal pull-through in single stage was done in 8 (20.5%) cases. Out of eight cases of ileal pull-through, six underwent pull-through by hanging bowel technique. In the other two cases conventional AP pull-through was done. Out of 31 (79.4%) cases who were staged 26 (83.8%) cases underwent pull-through by new hanging bowel technique while 5 (16.2%) by conventional technique [Table 1]. In 34 cases of incomplete pouch colon, excision of pouch with division of colovesical fistula with colon pull-through was done in 18 (52.9%) cases. Single stage pull-through by new technique was done in 10 (30%) cases while conventional AP pull-through was done in 8 (23.5%) cases. Staged procedures were done in 16 (47%) cases, in 9 (26%) using new technique and in 7 (21%) using conventional technique [Table 1].

In our study group median age at time of initial procedure was 2.7 days. In staged procedures definitive surgery was done after 6 months. Hospital stay in single stage procedure using hanging bowel technique was 9.7 days while 17.4 days in conventional AP pull-through. Post-operative complication rate were high in conventional AP pull-through as compared to hanging bowel technique as shown in Table 2. Wound dehiscence was seen in 3/51 (6%) of cases in



Figure 1: Intra-operative photograph showing nearly 5 cm colon (arrow) after coloplasty hanging from anal verge in a case of complete pouch colon

Table 1: Various types of procedures done for pouch colon

Procedure	Number
Complete pouch colon (*n*=39)	
Single stage	8
New technique	6
Conventional	2
Staged procedure	31
New technique	26
Conventional	5
Incomplete pouch colon (*n*=34)	
Single stage	18
New technique	10
Conventional	8
Staged procedure	16
New technique	9
Conventional	7

new technique in comparison to 5/22 (22%) of cases in conventional technique ($P = 0.03$). Constipation was seen in 2/51 (4%) of cases in new technique in comparison to 4/22 (18%) of cases in conventional technique ($P = 0.04$). Diarrhoea was seen in 3/51 (6%) of cases in our new technique in comparison to 6/22 (27%) of cases in conventional technique ($P = 0.01$). Faecal soiling was seen in 5/51 (10%) of cases in new technique in comparison to 8/22 (36%) of cases in conventional technique ($P = 0.006$). None of the patients operated by our new technique had complications such as suture line leak, colonic dilatation and recurrent urinary tract infection in post-operative period [Table 2].

Table 2: Comparison of complications

Complication	New technique ($n = 51$) (%)	Conventional technique ($n = 22$) (%)	*P* value
Wound dehiscence	3 (6)	5 (22)	0.03
Suture line leak	–	1 (4.5)	–
Colonic dilatation	–	2 (9)	–
Recurrent UTI	–	1 (4.5)	–
Constipation	2 (4)	4 (18)	0.04
Diarrhoea	3 (6)	6 (27)	0.01
Faecal soiling	5 (10)	8 (36)	0.006

UTI: Urinary tract infection

Table 3: Classification of pouch colon

Type of pouch colon	Description
Incomplete	Length of the normal colon is adequate enough for performing the pull-through, without the need for doing a coloplasty
Complete	There is either no or little normal colon left that is not enough for performing the pull-through

DISCUSSION

CPC is a condition in which the colon is replaced, wholly or partially, by a dilated pouch together with ARM and a genitourinary fistula. Most of the reported series have been from south Asian subcontinent especially from Northern India and Pakistan where this malformation is frequent.[5-11] Spriggs in 1912 described a CPC like condition with absence of left half of colon and rectum.[12] The term short colon was coined by Singh and Pathak in 1972.[13] In 1976 Wakhlu *et al*. classified CPC into five types.[5] Narsimha Rao *et al*. suggested the name "Pouch Colon Syndrome" and also proposed an anatomical classification of this condition, which has been widely accepted.[5,6,14] They had given the classification based on the length of the normal colon present proximal to the dilated pouch and classified CPC into four types. Wakhlu and Pandey in 1996 simplified the classification as "partial short colon" (Type A) with the presence of >8 cm of normal colon proximal to the pouch and "complete short colon" (Type B) with the absence of normal colon or <8 cm of colon proximal to the pouch.[5] Gupta and Sharma in 2005 classified CPC into two types: "Complete CPC" and "incomplete CPC" depending upon the presence or absence of the adequate normal colon for performing the pull-through operation [Table 3].[6] Saxena and Mathur in 2008 classified CPC cases into five types based on the anatomic morphology.[11] CPC which was not mentioned in the Wingspread classification of ARM in 1984, has now been accepted and included in the new International Classification (Krickenbeck) of ARM in 2005, as rare anomalies (being only regional).[15,16] We have classified our cases of CPC according to Gupta and Sharma classification and details are provided in Table 3.[6]

A large loop of bowel with a single air fluid level occupying more than half of the total width of the abdomen on the plain abdominal X-ray, either erect or inverted, is almost diagnostic of CPC. The pouch is proximal to the pubococcygeal line in the invertogram and it is possible to diagnose pouch colon in about 75-90% of the cases. Management of pouch colon is controversial with very poor long-term result and outcome. Various procedures have been described for management of CPC and most are staged. The various procedures which can be done in a case of CPC include (a) proximal colostomy, window colostomy or ileostomy with or without fistula division (b) division of fistula, excision of pouch and end colostomy (c) division of fistula, coloplasty and end colostomy followed by one of the following definite procedure (1) pouch excision and AP pull-through of colon (2) pouch excision with abdominoperineal posterior sagittal anorectoplasty (3) division of fistula, coloplasty and AP pull-through of coloplasty colon with proximal ileostomy and (4) pouch excision and AP pull-through of ileum followed by ileostomy closure. The choice of procedure depends upon the choice of the surgeon, condition of the baby at presentation, technical skill of the surgeon and the available facilities. The aim of the surgery in CPC is to utilize the available length of colon for absorption and storage capacity as well as capability for propelling faecal matter onwards with a continent anal opening. We have performed either single stage or two staged procedures depending upon the condition of the child. We compared our new technique with conventional pull-through technique. Advantages of new technique includes ease of performance, no suture line in perineum, no chances of retraction, no chances of anal stenosis, short hospital stay and early recovery. As per our protocol we started bowel enema programme with saline 1-month after the definitive surgery in all cases except those with

an ileal pull-through. In our series, we found there is improvement in continence with daily use of enema. The continence results were comparable with other series.[17-20] There was significant improvement in stool frequency in both the cases of complete and incomplete CPC, though response was more in incomplete CPC.

In our present series, we have not encountered any mortality and long-term outcome was good to satisfactory, with less morbidity when compared to conventional surgical techniques. As rightly described by Pena and supported by Moore *et al*. that we should all move in the direction of repairing anorectal anomalies earlier and in a single operation.[21,22] We believe in single stage procedure using the hanging bowel technique in early neonatal period.

CONCLUSION

We recommend use of our novel hanging bowel technique for all cases of CPC and bowel enema programme should be an integral part of management.

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