

Congenital Pouch Colon: Case Series and Review of Evidences for Resection

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ABSTRACT

Background: Congenital pouch colon (CPC) is a rare variant of anorectal malformations (ARM) with its highest reported incidence in India. We aimed to describe five patients affected by CPC, in which the tissue from the terminal dilated colon has been successfully used and to discuss our results on the light of an extended revision of the literature.

Materials and Methods: The clinical details of five cases treated for CPC in two Italian Centers were retrospectively reviewed assessing the fate of the terminal dilated colon.

Results: In all cases, the tissue from dilated colon has been used. The double vascular system of the dilated pouch allowed increasing bladder capacity (case 4), reconstruction of the vagina (case 3, 5), and lengthening of the colon (case 1, 2, 5). In our series, 3/5 have a good bowel control with daily bowel management after ARM correction. In literature, there are not differences in terms of dependence from bowel management in patients with pouch resected and in patients with pouch saved ($P = 0.16$).

Conclusions: We acknowledge that the analysis of the available literature is limited by the absence of studies with high level of evidence and the removal or the preservation of the abnormal colon tissue seems to follow the surgeon preferences.

KEYWORDS: Anorectal malformation, augmentation bladder capacity, congenital pouch colon, vaginal reconstruction

INTRODUCTION

Congenital pouch colon (CPC) is a rare variant of anorectal malformations (ARM) with its highest reported incidence in India.^[1] It may present therapeutic challenge for surgeons who are not familiar with the malformations' peculiar anatomy. In CPC, the distal part of the colon, shorter than normal, forms a dilated pouch that is frequently connected to the urinary tract. Male are preponderant, with the male-to-female ratio between 3 to 1 and 7 to 1.^[2] Different classifications have been proposed: Narasimharao *et al.* classified CPC into four subtypes based on the length of normal colon proximal to the pouch.^[3] More recently, Saxena added the fifth type as a double pouch colon, whose distal part terminates in a fistula with the urinary tract, with short normal interposed colon segment.^[4] Other classifications

divided patients with CPC in two groups: Complete CPC which include type 1, 2 and 5 and Incomplete CPC which include type 3 and 4.^[5]

Almost hundred papers have been published in the past 3 decades on the CPC; however, there is not consensus about the surgical management of the dilated colon. The treatment varies accordingly to the characteristics of each single case and most authors advise not to preserve the pouch in order to reduce the risk of complications (i.e. pouch redilation, soiling, incontinence, or

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constipation) supported by the pathology findings of abnormal muscle layer.^[6-9] By contrast, some reports advise to maintain part of pouch to improve water absorption and reservoir function.^[10-12] These discrepant ideas along with the possibility of using the pouch tissue as a source for genitourinary reconstruction, prompted us to search systematically the literature and revise our experience.

MATERIALS AND METHODS

The clinical details of consecutive cases treated for CPC in the two Centers (Paediatric Surgery Unit of Padova and Paediatric Surgery Unit of Treviso, Italy) were retrospectively reviewed assessing the fate of the terminal dilated colon [Table 1].

RESULTS

Case series

A total number of 5 cases were included in this case series [Table 1]. Three were males (60%) and 2 were female (40%) with a median birth weight of 2654 g (range 1900–3200 g). The age of presentation was ranged from 1 day to 7 months; all the male cases had an absent anal opening and were presented with abdominal distension, whereas the female cases (2 cases) were presented with the passage of meconium from a single perineal opening (cloaca). In all cases there was a fistula connected to the urinary tract. The primary surgical procedure consisted of performing a divided ileostomy in 4/5 cases and a colostomy in one case. In 4/5 cases a complete pouch colon was identified, whereas in 1 case incomplete pouch was noticed. The reconstructive surgery was performed after a median of 12.2 months (range 4–26 months). During the second surgery, the ligation of fistula with the bladder was performed. In Table 1, the use of pouch tissue is summarized. In particular, in case 2, the two hemi-pouches were tubularised and anastomosed [Figure 1a and b] obtaining a 28 cm long colonic segment. In 3/5 cases the pouch

colon was pulled through via the posterior sagittal approach while 2 patients are still awaiting for definitive correction. The postoperative recovery was uneventful for all cases. Following our center policy, all patients underwent spinal magnetic resonance imaging at 1 year of life to detect spinal cord anomalies. In 3/5 tethered cord was revealed without related symptoms. However, the patients with spinal cord anomalies were followed up with periodical clinical evaluations of lower urinary tract symptoms and renal bladder ultrasound to detect urinary tract dysfunction. The median of long-term follow-up was 86 months (range 12–180 months) during which 3 out of 5 patients had a good bowel control with daily bowel management after ARM correction.

DISCUSSION

CPC was first described by Trusler *et al.* in 1959.^[14] In India, it affects 7-9% of children with ARM, while in Western Countries, a pediatric surgeon can hardly encounter more than a single case during his/her career.^[15,16] In 2005, CPC had been accepted and introduced in the International Classification of ARM (Krickenbeck) as a regional variant of ARM.^[17]

The association of CPC and ARM may be initially suspected from the plain abdominal X-ray even if the definitive type of malformation and the corrections' plan can only be determined at surgical exploration.^[18,19]

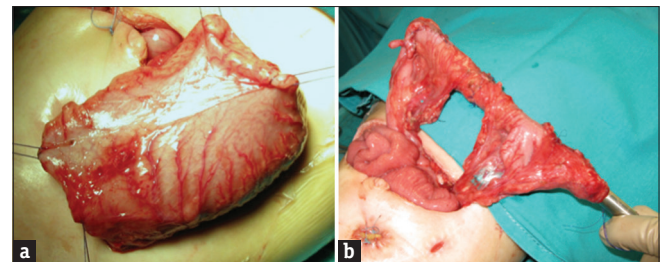


Figure 1: Complete congenital pouch colon with recto-bladder fistula. The congenital pouch colon which was fed by two vascular pedicles (a) was split medially. The two Emi-pouches were then tabularised over a Hegar dilator size 11 and anastomosed (b)

Table 1: Case series from two Italian centres

Authors	Year	Complete pouch	Incomplete pouch	Use of pouch	Complications	Quality of life	Follow-up (months)	Rif. Biblio
Luzzato ^[13]	1990	1		Tapering	Uneventful	Daily bowel management	180	Pediatric Surgery International 2010
Case 2		1		Tubularizing and colon elongation	Uneventful	Daily bowel Management	96	
Case 3			1	Vaginal reconstruction	Uneventful	Daily bowel management	84	
Case 4		1		Tubularizing/augmented bladder	Uneventful	Awaiting for corrective surgery	48	
Case 5		1		Vaginal reconstruction and colon elongation	Uneventful	Awaiting for corrective surgery	12	

The left-side “hockey stick” incision has been considered as the optimal route to define the anatomy and correctly classify the malformation.^[19] We approached one patient with this incision at the time of definitive correction. This allowed optimal view and space for good mobilization of the pelvic structures.

The main debate in the treatment of CPC is the fate of the pouch itself.

There is not yet a clear agreement about the surgical management of the dilated colon also on the basis of the contractile and histopathologic patterns. The pouch colon is thought to be an abnormal developed tissue suggesting its resection, to reduce the risk of complications (i.e. pouch redilation, soiling, incontinence, or constipation).^[6,7,20,21] Gangopadhyay *et al.* recently described, in a large series, various histologic abnormalities, in the muscle layer of the pouch, strongly suggesting to remove the abnormal colon.^[8] Similarly, Tyagi *et al.*^[9] advised to remove the pouch based on lacking of natural spontaneous contractions and histologic anomalies such as muscular abnormalities and decreased/absence of ganglion cells.

However, the existing literature could not identify outcomes differences related to pathology findings. Furthermore, the histological analysis of our cases did not report microscopic abnormalities and showed normal ganglion cells representation. Still, some of the abnormalities described by Gangopadhyay *et al.*^[8] can be secondary to the obstruction and no data exist on the long-term histology changes if the pouch is left in place or refashioned. Remodeling the pouch colon, with a staged or direct pull-through, have been described as technically feasible and safe from many authors.^[22,23]

The current literature did not offer comparison between cases treated maintaining the pouch tissue and those, which have the pouch resected, in terms of both short- or long-term outcome.

We searched scientific databases (PubMed, Cochrane, Embase and Web of Science MeSH) using the keywords “CPC” until December 2017. Search criteria were english language, cases description sufficient for malformation’s type definition (according to Saxena Classification), description of the surgical treatment and outcome measure.^[4] We founded 56 studies describing 619 cases [Table 2].

In 326/619 cases pouch was spared whereas in 293/619 pouch was resected [Tables 3 and 4 respectively]. Only 19 paper for a total of 93 patients (63 saved pouch, 30 resected) reported follow-up details [Table 2]. Median length follow-up, when reported, was 18 months

Table 2: All studies included in the review

Authors	Year	Country	Number of patients	Sex (male/female)
J. D. Rawat*	2017	India	1	1/0
Nand Kishor Shinde	2017	India	31	20/11
Pavai Arunachalam	2017	India	4	0/4
Praveen Mathur	2017	India	2	2/0
Raj P	2017	Pakistan	1	1/0
Praveen Jhanwar	2016	India	2	0/2
Bilal Mirza*	2016	Pakistan	1	1/0
Binod Kumar Rai	2016	Pakistan	1	1/0
Nand Kishor Shinde	2015	India	1	0/1
Jujju Jacob Kurian*	2015	India	1	1/0
Vaibhav Pandey*	2015	India	1	0/1
Bilal Mirza	2015	Pakistan	1	1/0
Shilpa Sharma*	2015	India	68	45/23
Shasanka Shekhar Panda	2014	Pakistan	73	/
Praveen Mathur	2013	India	1	1/0
Rajiv Chadha*	2013	India	1	0/1
Venkatesh M Annigeri	2013	India	1	1/0
Rajendra K Ghritlaharey	2013	India	11	11/0
Archana Puri	2012	India	1	1/0
Sangkhatat S*	2012	Thailandia	1	1/0
Bilal Mirza	2012	Pakistan	21	16/5
Bilal Mirza	2011	Pakistan	1	0/1
Yilmaz Ol*	2011	Turchia	1	0/1
Archana Puri	2011	India	2	2/0
Sunita Singh*	2011	India	1	1/0
Bilal Mirza	2011	Pakistan	1	1/0
Lopater*	2010	Francia	1	0/1
Subhramoy Chaudhury	2010	India	1	1/0
Parekar S*	2010	India	1	0/1
Aejaz A. Baba*	2010	India	1	1/0
Arunachalam Pavai*	2009	India	3	2/1
Ajay Narayan	2009	India	24	/
Gangopadhyay Mathur P	2009	India	77	50/27
Uttara Chatterjee*	2009	India	5	1/4
Al-Salem AH*	2008	India	2	0/2
Rajiv Chadha	2008	India	25	/
Praveen Mathur	2008	India	1	1/0
Ragab H. Donkol	2008	Arabia Saudita	1	1/0
Saxena AK	2008	Austria	64	/
Cüneyt Atabek	2007	Turchia	2	1/1
Billur Demirogullari*	2007	Turchia	2	0/2
Bhat NA	2007	Arabia Saudita	17	11/6
Wester*	2006	Svezia	2	0/2
Archana P	2006	India	22	14/8
A. K. Singal	2006	India	3	3/0
N. J. Arestis	2005	Scozia	1	1/0
A. K. Bangroo	2005	India	1	1/0
K. Agarwal	2005	India	17	11/6
Simmi K. Ratan*	2004	India	1	1/0
By Rajiv Chadha*	2002	India	3	3/0
By P. Mathur	2002	India	2	2/0
By Rajiv Chadha	2001	India	1	1/0
By Rajiv Chadha	1998	India	1	1/0
By Rajiv Chadha	1998	India	39	27/12
S Budhiraja MS MCh	1997	India	27	21/6
By Rajiv Chadha	1994	India	41	32/9

*Papers with follow-up data

Table 3: Follow-up in patients where pouch colon was spared

Authors	Year	Country	Study's type	Patients complete pouch (n)	Patients incomplete pouch (n)	Use pouch	Complications	Follow-Up (months)	References
J. D. Rawat	2017	India	Case Report	1		Tapering + pulled trough	Incontinence and perineal excoriations (for 6 months)	22	J Indian Assoc Pediatr Surg. 2017 Apr-Jun; 22(2): 122-123.
Nand Kishor Shinde	2017	India	Study Population	12	2	13/14 tubularization + pulled trough; 1/14 colostomy after tubularization	Fecal incontinence (64%)	90*	J Indian Assoc Pediatr Surg. 2017 Jan-Mar; 22(1): 13-18.
Praveen Jhanwar	2016	India	Case Report	2		Unspecified	Uneventful	Waiting definitive surgery	APSP J Case Rep 2016; 7(1):9
Shilpa Sharma	2015	India	Retrospective Study	16	31	Coloplasty or nothing; 35 pull trough	5 died; 5 dilatation (2 excision + 3 re-dilatation)****	60 (for 38 patients)	Pediatr Surg Int (2015) 31:753-758
Nand Kishor Shinde	2015	India	Letter to Editor	1		Unspecified	Unspecified	Waiting definitive surgery	Journal of Neonatal Surgery 2015; 4(1):10
Juju Jacob Kurian	2015	India	Case Report		1	Neurogenic Bladder augmentation	Uneventful	156	BMJ Case Rep 2015.
Shasanka Shekhar Panda	2014	Pakistan	Retrospective Study	31	16	Unspecified	2 dilatations***	66*	African Journal of Paediatric Surgery July-September 2014 / Vol 11 / Issue 3 251
Praveen Mathur	2013	India	Letter to Editor	1		Unspecified	Unspecified	0	Journal of Neonatal Surgery 2013;2(4):48
Rajiv Chadha	2013	India	Case Report		1	Tubularizing	Urinary and fecal incontinence	192	J Indian Assoc Pediatr Surg. 2013 Apr-Jun; 18(2): 81-83.
Bilal Mirza	2012	Pakistan	Retrospective Study	10	4	Nothing	2 died; 4 wound infection; 2 mild wound dehiscence; 3 stoma prolapse*****	/	J Neonat Surg 2012;1(3):37
Archana Puri	2012	India	Letter to Editor	1		Unspecified	Unspecified	Waiting definitive treatment	J Indian Assoc Pediatr Surg 2012;17:89-90
Sangkhat S	2012	Thailand	Case Report	1		Tubularizing	Uneventful	36	J Med Assoc Thai. 2012 Feb;95(2):270-4.
Bilal Mirza	2011	Pakistan	Case Report	1		Unspecified	1 died	/	CASE REPORT Page:167-168
Yilmaz OI	2011	Turkey	Case Report	1		Unspecified	Uneventful	48	Acta Chir Belg.2011 Sep-Oct;111(5):335-7.
Archana Puri	2011	India	Case Report	1	1	Unspecified	Group 1: died for sepsis Group 3: uneventful	Died/waiting definitive treatment	J Indian Assoc Pediatr Surg 2011;16:61-3
Sunita Singh	2011	India	Case Report	1		Coloplasty	Urinary infection	1	BMJ Case Reports 2011;

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Table 3: Contd...

Authors	Year	Country	Study's type	Patients complete pouch (n)	Patients incomplete pouch (n)	Use pouch	Complications	Follow-Up (months)	References
Mathur P	2009	India	Retrospective Study	40		Tapering + pull	22 died*	0	J Pediatr Surg. 2009 May;44(5):962-6
Uttara Chatterjee	2009	India	Case Report	4		1 pull trough	Group 1: constipation + perianal abscesses + re-dilatation → partially resected; urinary problem; constipation + re-dilatation → waiting for surgery	58.5*	Pediatr Surg Int (2009) 25:377–380
Saxena	2008	Austria	Retrospective Study	37		Tapering	Unspecified	0	Int J Colorectal Dis. 2008 Jun;23(6):635-9
Al-Salem AH	2008	India	Case Report	2		Tapering or not	Regular enemas/oral laxatives	22	Journal of Pediatric Surgery (2008) 43, 2096-2098
Cüneyt Atabek	2007	Turkey	Case Report		2	Tapering	Uneventful	0	Turk J Gastroenterol 2007; 18 (4): 261-264
Billur Demirogullari	2007	Turkey	Case Report	2		Tapering	Uneventful/perineal excoriations	168	Journal of Pediatric Surgery (2007) 42, E13–E16
Bhat NA	2007	Saudi Arabia	Retrospective Study	4		Tubularizing	Small number of wound infections	Unspecified	Ann Saudi Med. 2007 Mar-Apr;27(2):79-83.
Wester	2006	Sweden	Case Report	2		Vaginal reconstruction	1 Incontinence (enema+ catheterization)/1 uneventful	96	Journal of Pediatric Surgery (2006) 42, E25-E28
Archana Puri	2006	India	Retrospective Study	4		Tubularizing	2 re-dilatation	4.5*	Journal of Pediatric Surgery (2006) 41, 1413–1419
A. K. Singal	2006	India	Case Report	3		Tubularizing or not	Unspecified	0	Pediatr Surg Int (2006) 22: 459–461
Simmi K. Ratan	2004	India	Case Report	1		Tubularizing	Uneventful	12	Pediatr Surg Int (2004) 20: 801–803
Rajiv Chadha	2002	India	Case Report	3		Tubularizing	Anastomotic leak; adhesive bowel obstruction → re-exploration; 2 re-dilatation	42	Journal of Pediatric Surgery, Vol 37, No 9 (September), 2002: pp 1376-1379
P. Mahtur	2002	India	Case Report	2		Tubularizing or not	1 died	0	Journal of Pediatric Surgery, Vol 37, No 9 (September), 2002: pp 1351-1353
Rajiv Chadha	1998	India	Case Report		1	Tapering	Uneventful	0	Journal of Pediatric Surgery, Vol 33, No 12 (December), 1998: pp 1831-1833
Rajiv Chadha	1998	India	Retrospective Study	24	8	Tubularizing or not	4 died; 1 wound infection with retraction of the pulled-through colon/4 re-tubularized	Up to 65**	Journal of Pediatric Surgery, Vol 33, No 10 (October), 1998: pp 1510-1515

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Table 3: Contd...

Authors	Year	Country	Study's type	Patients complete pouch (n)	Patients incomplete pouch (n)	Use pouch	Complications	Follow-Up (months)	References
S Budhiraja MS MCh	1997	India	Retrospective Study	14		Tapering	6 died	0	TROPICAL DOCTOR, 1997, 27, 217-220
Rajiv Chadha	1994	India	Retrospective Study	32	5	Tubularizing	10 died; 4 dilatation → re-tubularization; 4 wound infection	0	J Pediatr Surg. 1994 Mar;29(3):439-46.

*Median follow-up (months), **Follow up reported range (0 months up to 65 months), ***Conventional technique (22): 5/22 wound dehiscence; 1/22 colonic dilatation; 4/22 constipation; 6/22 diarrhoea; 8/22 soiling; 1/22 suture line leak; 1/22 urinary tract infection. New technique (51): 3/51 wound dehiscence; 2/51 constipation; 3/51 diarrhoea; 5/51 soiling, ****Group 1 CPC (20): 5/20 urinary infection; 6/20 incomplete decompression; 4/20 colostomy prolapse; 4/20 bleeding; 11/20 enterocolitis; 1/20 septicaemia; 12/20 anaemia; 13/20 skin excoriation; 12/20 diarrhoea; 2/20 rectal prolapse; 2/20 urinary incontinence; 5/20 colonic dilatation; 12/20 failure to thrive; 6/20 mortality, Group 2 CPC (48): 3/48 urinary infection; 2/48 incomplete decompression; 1/48 colostomy prolapse; 1/48 bleeding; 3/48 stenosis; 5/48 enterocolitis; 1/48 septicaemia; 8/48 anaemia; 5/48 skin excoriation; 6/48 diarrhoea; 1/48 prolapse; 3/48 urinary incontinence; 9/48 failure to thrive, *****Complications related to the type of treatment not specified, *Rate of mortality related to the treatment not specified. CPC: Congenital pouch colon, / unknown f-u,

for resected pouch and 57 months for saved pouch group. 53/63 patients of spared pouch group (84%) and 21/30 patients of resected pouch group (70%) were dependent from bowel management (irrigation) and/or affected by soiling. This difference does not reach statistical significance. Furthermore, due to the wide discrepancy in terms of reporting complications, meaningful conclusion cannot be drafted by comparing the published series.

Our patients after the stoma reversal have a good bowel control using daily bowel management.

Several authors^[10-12] suggested a tubular reduction of the dilated pouch avoiding its complete resection in order to preserve the absorptive function. The anatomic basis of this procedure is the presence of the double vascular arcades, which allows pouches splitting and lengthening. Trusler *et al.* first described the procedure on the dilated colon, obtaining a longer, tubular structure, with normal caliber, to preserve absorption properties.^[14] Although our series is limited, the double vascular system of the dilated pouch allowed increasing of the bladder capacity (case 4), reconstruction of the vagina (cases 3 and 5), and lengthening of the colon (case 2 and 4).

Some authors showed the advantages to split the pouch to reconstruct a neo-vagina and/or to augment the bladder capacity. Peña *et al.* first described vaginal reconstruction using the rectum.^[24] Following this principle, Wester *et al.* reported two cases of vaginal reconstruction by longitudinal splitting of the CPC using the redundant part of the pouch wall to create the vagina and recently Chadha *et al.* suggested to use a segment of the CPC for bladder augmentation.^[25,26] In two cases from our case series (case 3 and case 5) a part of the pouch colon was used to reconstruct a neo vagina. No solid data are available to support these approaches but, from our experience the reconstruction of the vagina using a part of the dilated colon was effective. The case 3 of 7 years has a good bowel control with daily bowel management. Secretion of the neo-vagina is complained even tough improving. The case 5 is in a good compensation even if she is awaiting for further corrective surgery.

In the fourth case part of the pouch was used to augment the bladder capacity and part to lengthen the colon. We believe that in such a complex case, even with a short follow-up, the decision to take advantage of extra tissue to augment the bladder capacity and convert an ileostomy in permanent colostomy, turned out to be important for patient management.

Re-dilatation requiring surgical re-intervention (retubularization or resection) occurred in 24/63 (38%) patients who had pouch used.^[11,15] However, despite

Table 4: Follow-up in patients where pouch colon was resected

Authors	Year	Country	Article type	Patients complete pouch (n)	Patients incomplete pouch (n)	Complications	Follow-up (months)	References
Pavai	2017	India	Retrospective Study		4	Uneventful	72*	J Indian Assoc Pediatr Surg 2017;22:124-5
Arunachalam								
Praveen Mathur	2017	India	Case Report		2	Uneventful	/	J Indian Assoc Pediatr Surg. 2017;22:
Nand Kishor Shinde	2017	India	Study Population	9	8	Fecal incontinence (64%)	90*	J Indian Assoc Pediatr Surg 2017;22:13-8
Raj P	2017	Pakistan	Case Report	1		Uneventful	0	J Neonatal Surg 2017;6:38
Bilal Mirza	2016	Pakistan	Case Report		1	Uneventful	36	J Neonatal Surg 2016;5:66
Rai BK	2016	Pakistan	Case Report	1		Uneventful	Waiting definitive surgery	J Neonatal Surg 2016;5:55
Vaibhav Pandey	2015	India	Case Report		1	Uneventful	12	J Indian Assoc Pediatr Surg 2015;20:148-9
Bilal Mirza	2015	Pakistan	Case Report	1		Uneventful	0	J Neonatal Surg 2015;4:6
Shilpa Sharma	2015	India	Retrospective Study	4	17	1 died****	60 (for 38 patient)	Pediatr Surg Int 2015;31:753-8
Shasanka Shekhar Panda	2014	Pakistan	Retrospective Study	8	18	The rate of complication are selected in based on conventional/new technique***	66*	Afr J Paediat Surg 2014;11:251
Venkatesh M Annigeri	2013	India	Case Report		1	Uneventful	/	J Indian Assoc Pediatr Surg 2013;18:79-80
Rajendra K Ghritlaharey	2013	India	Retrospective Study	3	8	9 SKIN escoriation 6 stenosis stoma *****	26 *	Afr J Paediat Surg 2013;10:17-23
Bilal Mirza	2012	Pakistan	Retrospective Study	4	3	2 died 4 wound infection 2 mild wound dehiscence 3 stomy prolapse*****	/	J Neonat Surg 2012;1:37
Bilal Mirza	2011	Pakistan	Case Report	1		Uneventful	/	Ann Saudi Med 2011;31:546-7.
Lopater	2010	Francia	Case Report		1	Uneventful	12	Pediatric Surg Int 2010;26:759-61
Subhramoy Chaudhury	2010	India	Case Report		1	Uneventful	Waiting definitive surgery	Iran J Pediat 2020;20:
Parelkar S	2010	India	Case Report		1	Uneventful	12	J Pediat Surg 2010;45:639-41
Aejaz A. Baba	2010	India	Case Report		1	Uneventful	2	Afr J Paediat Surg 2010;7:
Arunachalam	2009	India	Case Report		3	Uneventful	24	J Indian Assoc Pediatr Surg 2009;14:218-20.
Pavai								
Ajay Narayan Gangopadhyay	2009	India	Retrospective Study	10	14	2 died; unspecified	/	J Pediatr Surg 2009;44:600-6
Mathur P	2009	India	Retrospective Study	2	35	22 died*	0	J Pediatr Surg 2009;44:962-6
Uttara Chatterjee	2009	India	Case Report	1		Uneventful	48	Pediat Surg Int 2009;25:377-80
Rajiv Chadha	2008	India	Retrospective Study	25		Unspecified	/	J Pediat Surg 2008;43:2048-52
Praveen Mathur	2008	India	Case Report		1	Uneventful	/	J Pediat Surg 2008;43:E9-11

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Table 4: Contd...

Authors	Year	Country	Article type	Patients complete pouch (n)	Patients incomplete pouch (n)	Complications	Follow-up (months)	References
Ragab H. Donkol	2008	Arabia Saudita	Case Report		1	Uneventful	/	J Pediat Surg 2008;43:E9-11
Saxena	2008	Austria	Retrospective Study		27	Unspecified	/	Int J Colorectal Dis 2008;23:635-9
Bhat NA	2007	Arabia Saudita	Retrospective Study		13	1 died; small number of wound infections	/	Ann Saudi Med 2007;27:79-83.
Archana Puri	2006	India	Retrospective Study	13	5	Unspecified	4.5*	J Pediat Surg 2006;41:1413-9
N. J. Arestis	2005	Scozia	Case report + Review		1	Uneventful	/	Pediatr Develop Pathol 2005;8:701-5
A. K. Bangroo	2005	India	Case Report	1		Uneventful	/	Pediatr Surg Int 2005;21:474-7
K. Agarwal	2005	India	Retrospective Study	12	5	Unspecified	0	Histopathol Eur J Pediat Surg 2005;15:102-6
Rajiv Chadha	2001	India	Case Report	1		Uneventful	0	J Pediat Surg 2001;36:1593-5
Rajiv Chadha	1998	India	Retrospective Study	7		1 dead; unspecified	0	J Pediat Surg 1998;33:1510-5
S Budhiraja	1997	India	Retrospective Study	1	12	1 dead; unspecified	0	Trop Doctor 1997;27:217-20
By Rajiv Chadha	1994	India	Retrospective Study		4	1 dead	0	J Pediatr Surg 1994;29:439-46.

*Median months of follow up, ***Conventional technique (22): wound dehiscence: 5/22; colonic dilatation 1/22; constipation 4/22; diarrhoea 6/22; soiling 8/22; suture line leak 1/22; UTI 1/22. New technique (51): wound dehiscence: 3/51; constipation 2/51; diarrhoea 3/51; soiling 5/51, ****Group 1 CPC urinary infection 5/20; incomplete decompression 6/20; colostomy prolapse 4/20; bleeding 4/20; stenosis 0/20; enterocolitis 11/20; septicaemia 1/20; anemia 12/20; skin escoriation 13/20; diarrhoea 12/20; prolapse 2/20; urinary incontinence 2/20; colonic dilatation 5/20; poor weight gain 12/20; mortality 6/20, Group 2 CPC urinary infection 3/48; incomplete decompression 2/48; colostomy prolapse 1/48; bleeding 1/48; stenosis 3/48; enterocolitis 5/48; septicaemia 1/48; anemia 8/48; skin escoriation 5/48; diarrhoea 6/48; prolapse 1/48; urinary incontinence 3/48; colonic dilatation 0/48; poor weight gain 9/48; mortality 0/20, *****Skin escoriation stoma 6/11: 1 Group 1, 5 Group 2, stenosis stoma 2/11: 1 Group 1, 1 Group 2, prolapse stoma 4/11: 2 Group 1, 2 Group 2, anal stenosis 4/11: 1 Group 1, 3 Group 2, prolapse 2/11: 1 Group 1, 1 Group 2, *****It doesn't specify the complications in based on the type of treatment, *It doesn't specify the rate of mortality in based on the treatment. UTIs: Urinary tract infections, CPC: Congenital pouch colon, /: unknown f-u

re-dilatation needing re-intervention accounts as a complication, there were not significant differences between the two groups in terms of incidence of complications.

This is confirmed by our research that did not show significant differences in terms of short- and long-terms complications between the two groups of treatment. Most of the CPC cases are associated with complex ARM malformation, which quite often requires some bowel management.

Furthermore, there were no difference in the mortality between the two groups and rate of mortality in CPC is not different from mortality of severe ARM.

CONCLUSIONS

The removal or the preservation of the abnormal colon tissue seems to follow the surgeon preferences and apparently does not influence negatively the outcome. However, we encourage to tailor the corrections

technique on the basis of the anatomy and to consider the use of pouch tissue in particular to contribute to Genito-urinary reconstruction.

Informed consent

Patients' consent was obtained for the surgery. It was a retrospective study. Data were collected from the old records.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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