

# Transcolostomy-site endorectal pullthrough for Hirschsprung's disease

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**Purpose** To present our results for an endorectal pullthrough operation as the second stage for the treatment of Hirschsprung's disease through the colostomy site.

**Materials and methods** This study included 13 patients, four girls and nine boys. Their ages ranged from 9 months to 7 years. They presented with a leveling colostomy with a diagnosis of Hirschsprung's disease. The colostomy was carried out in the neonatal period because of neonatal intestinal obstruction in three patients (one female and two males), in two patients because of recurrent attacks of enterocolitis, and three patients because of the inability of the patient to withstand major surgery. Four patients presented without a clear history of the cause for the colostomy. One patient aged 7 years presented with sigmoid volvulus. All the patients were subjected to a transcolostomy endorectal pullthrough.

**Results** The operation was completed as described in all patients. The time from colostomy to pullthrough ranged from 3 to 7 months (median 4.7 months). The operation time ranged from 95 to 140 min (median 113 min). All the patients passed stool within 24–48 h. Stool output ranged from two to six stools per day. Optimal wound healing occurred in all patients without wound complications. Postoperative perineal excoriation occurred in four patients. A urinary tract infection developed in one patient.

## Introduction

The standard treatment for Hirschsprung's disease has been colostomy, followed by one of several pullthrough procedures [1].

Colostomy represents a significant source of morbidity and even mortality; these complications related to colostomy have been well documented in many series [2].

Nowadays, one-stage definitive repair has become the standard treatment. One-stage procedures are performed by laparotomy, minimal invasive techniques, and transanal pullthrough [3,4]. Despite this, the staged operation still has a place [5].

The endorectal pullthrough for Hirschsprung's disease was described by Soave in 1964 [6]. Since then, different modifications have been made to the procedure.

Here, we describe our modification of the endorectal pullthrough to perform it through the colostomy site.

## Patients and methods

This study included 13 patients, four girls and nine boys. Their age ranged from 9 months to 7 years.

They presented to us with a leveling colostomy with a diagnosis of Hirschsprung's disease. The colostomy was

A patient with a history of recurrent attacks of preoperative enterocolitis developed mild enterocolitis 2 weeks after the operation. Adhesive intestinal obstruction occurred in one patient. Recurrence of symptoms occurred in two patients because of stricture at the anastomotic site, one responded to repeated dilatation and the other required internal sphincterotomy.

**Conclusion** Transcolostomy endorectal pullthrough has the following advantages: it is associated with less pain and a shorter hospitalization than the classic endorectal pullthrough. Wound complications are rare. The cosmetic result is better than the classic Soave operation. It has no specific technique-related complications. Long-term outcome and functional results are good. To our knowledge, this approach has not been described before. *Ann Pediatr Surg* 9:11–15 © 2013 Annals of Pediatric Surgery.

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**Keywords:** Hirschsprung's disease, leveling colostomy, pullthrough

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carried out in the neonatal period because of neonatal intestinal obstruction in three patients (one female and two males), recurrent attacks of enterocolitis in two patients, and inability of the patient to withstand major surgery in three patients. Four patients presented to us without a clear history of the cause for the colostomy. One patient aged 7 years presented with intestinal obstruction with a history suggestive of Hirschsprung's disease. Plain radiograph indicated sigmoid volvulus. A trial of reduction by enema and a rectal tube failed. Exploration indicated sigmoid volvulus with the typical gross picture of Hirschsprung's disease. The volvulus was untwisted, a biopsy from the narrow segment was taken, and a leveling colostomy was constructed.

The duration from the time of the colostomy till the pullthrough ranged from 3 to 8 months.

## Operative technique

The operation was performed as a usual transabdominal pullthrough operation. The abdomen was entered through a skin incision all around and besides the mucocutaneous junction of the colostomy. The colostomy was dissected from the abdominal wall till the peritoneum was entered.

The colon was repaired temporarily and proximal to the colostomy site, the colon was mobilized by incising the peritoneum on both sides until a suitable length of the colon was mobilized. This step requires a good retraction of the abdominal wall. Distal to the colostomy site, the colon was mobilized by double ligation of its mesocolon.

The operation was completed as a modified endorectal Soave pullthrough. A circumferential seromuscular incision of the rectum was carried out and the rectal mucosa was dissected till the anorectal junction was reached. The mobilized colon was pulled through the seromuscular cuff and end-to-end rectoanal anastomosis was performed.

An intra-abdominal tube drain was placed and the defect in the abdominal wall was repaired.

In one patient, the colon proximal to the colostomy site was still considerably dilated because of its prolapse and extramobilization of the colon up to the cecum was required; this resulted in a change of the site of the cecum to the subhepatic position. Appendectomy was required in this patient (Figs 1–6).

#### Special difficulty

Mobilization of the colon proximal to the colostomy site could be difficult but with traction of the colon downward and medially and retraction of the abdominal wall upwards, the colon could be mobilized.

In two cases, endorectal dissection could not be completed abdominally as the colostomies were constructed in the lumbar region. We decided on transanal dissection of the remaining part of the rectum.

This study was approved by the ethical committee of the institution.

#### Results

This study included 13 patients. The operation was completed as described in all patients. The time from colostomy to pullthrough ranged from 3 to 7 months (median 4.7 months).

The operative time ranged from 95 to 140 min (median 113 min).

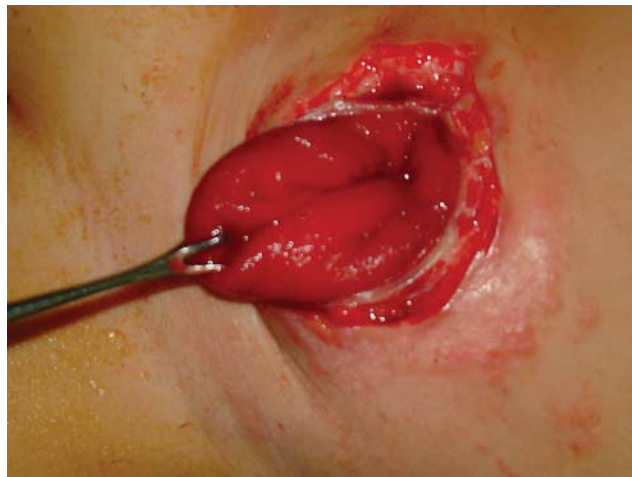
The patient was kept on intravenous fluids for 48 h, systemic antibiotics, and metronidazol for 5 days and the drain was extracted after 24 h. The wound dressing was changed after 72 h and stitches were removed after 8 days.

All the patients passed stool within 24–48 h. Stool output ranged from two to six stools per day.

Optimal wound healing occurred in all patients without wound complications.

Postoperative dilatation started 2 weeks postoperatively to prevent stricture at the anastomotic site. Follow-up ranged from 5 to 13 months (median 5.7 months) (Table 1).

Fig. 1



Incision.

Fig. 2



Mobilized colostomy.

#### Early postoperative complications

Postoperative perineal excoriation occurred in four patients and this was treated with a zinc-based cream. Postoperative high-grade fever occurred in two patients without a specific cause and responded well to cold fomentations and antipyretics.

Fig. 3



Repaired colostomy site.

Fig. 4



Mobilized colon.

Fig. 5



Endorectal dissection.

Fig. 6



Pulled colon.

A urinary tract infection occurred in one patient on the fourth postoperative day, as indicated by urine analysis and culture, and responded well to proper treatment.

A patient with a history of recurrent attacks of preoperative enterocolitis developed mild enterocolitis 2 weeks after the operation; it occurred once and responded to conservative treatment using antibiotics, intravenous fluids, and rectal irrigation. There were no early anastomosis-related complications.

#### Late postoperative complications

Adhesive intestinal obstruction occurred in one patient 3 months after the operation and was treated conservatively.

There was recurrence of symptoms in two patients because of stricture at the anastomotic site: one responded to repeated dilatation and the other required internal sphincterotomy (Table 2).

#### Discussion

Although a primary pullthrough is the preferred approach for use in children with Hirschsprung's disease, some children benefit from an initial leveling colostomy, which is indicated in infants who have severe enterocolitis or a markedly dilated proximal colon that might preclude the performance of a primary pullthrough [5]. Colostomy decompresses the bowel, and this decompression elevates the nutritional status of patients, decreases the risk of anastomotic leak and pelvic abscess, and facilitates smooth healing [7]. Results of studies comparing one-stage with two-stage pullthrough have reported higher complication rates in the two-stage operation, which may be attributable to the presence of a stoma [7,8].

Other indications for staged surgery using a colostomy include patients with long segment, total colonic aganglionosis, complicated Hirschsprung's disease with perforation, toxic megacolon, questionable pathology, or unavailability of frozen section [8,9].

In our institution, the standard treatment for Hirschsprung's disease is a one-stage pullthrough operation either

**Table 1 Results of 13 patients treated with a transcolostomy-site endorectal pullthrough procedure**

Patient number	Sex	Age at colostomy (months)	Age at pullthrough (months)	Weight (kg)	Operation time (min)	Appendectomy	Transanal mucosectomy	Op complications	Stools per day	Follow-up (month)
1	M	27	30	13	115	Yes	No	–	2–3	8
2	M	9	16	8	105	No	No	Bowel rotation	2–3	8
3	M	22	25	15.5	140	No	No	No	3–5	13
4	F	32	36	22	130	No	No	No	4–6	14
5	M	84	90	33	133	No	Yes	No	2–5	17
6	M	36	39	26	95	No	No	No	2–5	20
7	F	48	52	29.5	100	No	No	No	2–6	12
8	F	8	13	7	105	No	No	No	2–4	20
9	M	10	14	8.5	98	No	Yes	No	3–5	6
10	M	22	26	14	130	No	No	No	3–6	9
11	M	13	17	9.5	99	No	No	No	3–4	11
12	F	15	18	10	110	No	No	No	4–5	13
13	M	11	14	9	115	No	No	No	2–5	18

F, females; M, males.

**Table 2 Postoperative complications**

Complication	Number of cases	Interventions required
High-grade fever	2	Cold fomentations and antipyretics
Perineal excoriation	4	Treated with a zinc-based cream
Postoperative enterocolitis	1	Improved with medical treatment
Adhesive obstruction	1	Treated conservatively
Anastomotic stricture	2	One treated with dilatation and one treated by myotomy

through a transabdominal or a transanal approach. Colostomy is performed only in indicated cases.

Three of our patients underwent a colostomy in the neonatal period because of neonatal intestinal obstruction, two because of recurrent enterocolitis, three because of poor general condition, one because of sigmoid volvulus, and three without a definite history.

The duration from performing a colostomy till the definite transcolostomy-site pullthrough varied considerably according to the cause of the colostomy. The operation was performed when the patient was in a fair general condition and the colon was decompressed enough for a safe pullthrough. This period ranged from 3 to 8 months.

The idea to do the pullthrough transcolostomy site is that it is a less invasive technique than the usual approach of Soave pullthrough, which uses a hockey stick incision including the colostomy site. The transcolostomy-site incision is smaller, it is not muscle cutting, and leads to much lower morbidity. None of our patients had developed wound-related complications.

Lesser time was taken to reach the peritoneal cavity, but the total time of the entire procedure was comparable with the standard time of the pullthrough operation. Mobilization of the colon proximal to the colostomy site takes longer than usual with the hockey stick incision. This step must be carried out carefully and it is aided by downward traction on both the colon at the colostomy

site and the transverse colon. This facilitates rapid mobilization of the colon, even the difficult splenic flexure. In two cases with prolapsed colostomy, the mobilization of the colon proximal to the colostomy site was easy, but we found that this prolapsed part of the colon was not decompressed enough and it was resected.

Transanal mucosectomy has been used for many years in endorectal pullthrough for Hirschsprung's disease. It was used by Georgeson *et al.* [10], who described the use of laparoscopy for the abdominal stage. Saltzman *et al.* [11] used it with laparotomy for the abdominal stage.

In two of our patients, endorectal dissection was difficult abdominally; therefore, we performed it transanally. A combination of transcolostomy-site and transabdominal pullthrough is a feasible option.

Great care must be exercised to ensure that the colon is not twisted as it is pulled through the muscular cuff. Twisted pullthrough could result in intestinal obstruction or may be a cause for redo surgery [9,12]. This occurred in one of our patients; fortunately, we noted this intraoperative and untwisted. Thus, we recommend orientation of the colon after pullthrough and before the coloanal anastomosis to exclude twist.

Postoperative perineal excoriation is common and can be treated with a zinc-based cream.

Dilatation of the anastomosis is necessary for several months after the Soave operation to prevent stricture formation [13]. We start postoperative dilatation as a routine in all patients 15 days postoperatively and for variable periods. Two patients in our series developed stricture as they were lost in the follow-up period. They presented with symptoms of recurrence. Physical examination indicated stricture, and immediate dilatation was started. One patient responded well to repeated dilatation and in the other, posterior myectomy was required. We recommend routine dilatation after pullthrough operations.

Postoperative enterocolitis is a serious complication and it is a common cause of Hirschsprung's disease-related mortality. Enterocolitis occurs in 17–50% of infants with

Hirschsprung's disease and is most commonly caused by intestinal obstruction and residual aganglionic bowel [14]. Early symptoms of enterocolitis in patients with Hirschsprung's disease include abdominal distention; foul-smelling, watery diarrhea; lethargy; and poor feeding. Treatment with rectal irrigation several times per day and antibiotics is usually effective. Oral metronidazole can be used with rectal irrigation in patients with milder disease. More serious disease should be treated intravenously with broad-spectrum antibiotics and rectal irrigation [14].

One of our patients who had a preoperative history of enterocolitis developed a mild attack of postoperative enterocolitis and responded well to conservative treatment.

The overall incidence of complications in our series is comparable with other Soave pullthrough series. Larger series and long-term follow-up are required to document our procedure.

The reported mortality in the literature is variable. An unacceptably high mortality (6–35%) has been reported [15]. Sharma *et al.* [9], reported 112 cases without deaths; they attributed this to a proper preoperative preparation and the use of sound surgical principles.

There were no postoperative deaths in our series possibly because of the same reasons.

Our technique has the following advantages:

1. It is associated with less pain and a shorter hospitalization than the classic endorectal pullthrough.
2. Wound complications are rare.
3. The cosmetic result is better than that with the classic Soave operation.
4. It has no specific technique-related complications.
5. Long-term outcome and functional results are good.
6. To our knowledge, this approach has not been described before.

## Acknowledgements

### Conflicts of interest

There are no conflicts of interest.

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