

A comparative study between transanal endorectal pull-through and Swenson transanal pull-through techniques in treatment of patient with Hirschsprung disease

Original
Article

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ABSTRACT

Background: Hirschsprung (HD) disease is a relatively common neonatal developmental disorder of the enteric nervous system.

Aim & Objectives: To study and compare the Soave and Swenson transanal endorectal pull-through procedures in HD patients. Regarding the operative and postoperative complications, time to return to full oral feeding, duration of hospital stay, and outcome.

Patients and Methods: This prospective randomized study included 40 patients diagnosed with HD disease at the Pediatric Surgery unit, General Surgery department, Faculty of Medicine, at Cairo University Hospital and Benha Children Hospital from July 2014 to October 2016. Patients were randomly divided into two equal groups.

Results: There was a highly statistically significant difference between the two groups as regards mean operative time $P < 0.001$. There was no statistically significant difference between the two groups as regards blood transfusion, mean time to return to full oral feeding $P = 0.612$, and mean postoperative hospital stay $P = 0.574$ only two cases in group B suffered from anal lacerations due to excessive traction by the retractor. There was no statistically significant difference between the two groups as regards late postoperative complications $P = 0.267$.

Conclusion: The Swenson Trans-anal pull-through, is a safe and effective alternative for the treatment of HD, with comparable results to the more established Soave procedure, also with shorter operative time, without increased incidence of urological problems, or intraoperative injury of surrounding vital structures. The technique can even be easier than the Soave procedure.

Key Words: Hirschsprung disease, swenson transanal pull-through, transanal endorectal pull through.

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INTRODUCTION

Hirschsprung (HD) disease is a relatively common neonatal developmental disorder of the enteric nervous system. It is characterized by the absence of ganglion cells in the myenteric and submucosal plexuses of the distal intestine. This results in absent peristalsis in the affected bowel, and the development of a functional intestinal obstruction. The pathogenesis and genetic basis of the disease are yet unclear^[1].

The most widely accepted etiopathogenic hypothesis is based on a defect of craniocaudal migration of neuroblasts originating from the neural crest^[2].

The main diagnostic investigations are mega-colon appearance in barium enema and demonstration of the absence of ganglion cells and hypertrophied nerve terminals in rectal biopsy^[3].

The surgical management of HD disease has developed, from full-thickness rectosigmoid dissection (Swenson and Bill), an endorectal dissection (Soave), retro rectal pouch procedure (Duhamel), to more recently a primary repair that can be done transanally^[4].

Trans-anal endorectal pull-through procedure was described by De la Torre Mondragon and Ortega-Salgado in 1998, and a good functional outcome has been achieved using this technique without laparotomy or laparoscopy, also the risks of contamination and adhesion formation are eliminated, the procedure does not damage the pelvic structures, is not expensive with good cosmetic results^[5].

This study aimed to study and compare the Soave and Swenson transanal endorectal pull-through procedures in HD patients. Regarding the operative and postoperative complications, time to return to full oral feeding, duration of hospital stay, and outcome.

PATIENTS AND METHODS:

This prospective randomized study included 40 patients diagnosed with HD disease at the Pediatric Surgery unit, General Surgery Department, Faculty of Medicine, at Cairo University Hospital and Pediatric Surgery Department of Benha Children's Hospital from July 2014 to October 2016. Patients were randomly divided into two equal groups (A and B) by random serial number method. Each group included 20 patients. Patients of group A were treated by Swenson transanal pull-through and patients of group B were treated by Soave transanal pull-through.

Ethical consideration

This study was approved by the ethical committee of the Faculty of Medicine, at Cairo University. Also publishing permission and consent were taken from parents.

Inclusion criteria: patients with short segment disease (only extending to the sigmoid colon), patients without other major congenital anomalies, and patients without intestinal obstruction or enterocolitis.

Exclusion criteria: patients with long-segment disease (extending beyond the sigmoid colon), acute intestinal obstruction with failed conservative treatment necessitating diversion, enterocolitis with failed medical treatment necessitating surgical intervention, and disease associated with major congenital anomalies.

Methods

All patients were subjected to

History taking, clinical examination, laboratory investigations, contrast enema, rectal biopsy, preoperative preparation, surgical treatment, postoperative care, and follow-up.

Contrast enema

The catheter was inserted just inside the anus and the balloon was not inflated because it might obliterate a low transition zone. A slow hand injection was done to avoid distension of the colon by the rapidly injected contrast media. Anteroposterior and later views obtained. It showed megacolon, transitional zone (Fig. 1) (funnel-shaped), and narrow segment. It is useful in evaluating the level of aganglionosis. Only rectal, rectosigmoid, and sigmoid cases are included in this study.

Rectal biopsy

Full thickness rectal biopsy was taken in the operative theater, from above the dentate line. Staining of biopsy done with hematoxylin and eosin. Diagnostic features were: The absence of ganglion cells and hypertrophied nerve bundles.

Surgery

All cases were operated upon in exaggerated lithotomy position by transanal route, under general anesthesia with endotracheal intubation. Urethral catheterization was done. Rectal irrigation was performed with a dilute solution of betadine. The patients were then prepared circumferentially from the costal margin to the feet. The anus was gently dilated by a finger to facilitate dissection. In group A: we used the Swenson transanal pull-through technique. Everting sutures using 2/0 (Fig. 5) Silk or Prolene were placed between the ring retractor and the anal canal just distal to the dentate line. A circumferential row of 3–0 silk stay sutures was inserted 0.5 cm above the dentate line. Incision: Circumferential, just above the circumferential silk stay sutures by using diathermy. The incision started posteriorly and deepened to include rectal full thickness. Progressive circumferential dissection close to the rectal wall allowed the full-thickness rectum to be delivered easily. The plane is easy to identify and follow, the key tip is to strictly dissect on rectal wall. The plane is bloodless. As the dissection proceeded upwards, two small retractors on either side aided in visualization. A sudden give of the rectal tube, or appearance of the peritoneal reflection, indicates that the intraperitoneal portion of the rectum is approaching (Figs. 2 and 3). The peritoneal reflection is cut anteriorly to enter the peritoneal cavity, allowing the intraperitoneal portion of the bowel to be dissected. Further dissection proceeded cautiously identifying and coagulating mesenteric blood vessels close to the rectum/rectosigmoid. Once the dilated bowel was exposed, as we have no frozen section facilities, morphological identification of the transitional zone is relied on (Fig. 1). The distal bowel resected at least 5 cm above the level of gross dilatation. Seromuscular anchoring sutures of 3/0 vicryl were inserted between the ganglionic bowel and the outer muscle layer of the anal canal. Finally, a coat 4/0 vicryl was used to complete the anastomosis between the pulled-through colon and the anal canal (Fig. 4).

In group B: We used the Soave trans anal pull-through technique. Everting sutures using 2/0 proline or Silk were placed between the ring retractor and the anal canal just distal to the dentate line. A circumferential row of 3–0 silk stay sutures was inserted 0.5 cm above the dentate line. Incision: Circumferential, just above the circumferential silk stay sutures by using diathermy. The incision started posteriorly, and the submucosa was dissected off the underlying smooth muscle using fine scissors. Progressive circumferential incision and dissection allowed the entire submucosa to be elevated from the rectal muscle cuff. The initial dissection needed to be sharp as the plane is difficult to identify. A little proximally the plane became clear and the submucosa can be stripped from the muscular cuff using a peanut. Traversing submucosal vessels were clearly seen and were coagulated easily. As the dissection proceeded upwards, two small retractors on either side aided in visualization. A sudden give of the submucosal

tube, or the buckling of the muscular cuff indicated that the intraperitoneal portion of the rectum had been reached. The Length of the seromuscular cuff was 4 cm. The muscle cuff was divided anteriorly to enter the peritoneal cavity (Fig. 7). Then the cuff was divided circumferentially, allowing the full thickness of the bowel to be dissected. The muscular cuff was then slit posteriorly in a vertical manner extending to almost the dentate line. Further dissection proceeded cautiously identifying and coagulating mesenteric blood vessels close to the rectum/rectosigmoid. Once the dilated bowel was exposed, as we have no frozen section facilities, morphological identification of the transitional zone is relied on the distal bowel resected at least 5 cm above the level of gross dilatation. Seromuscular anchoring sutures of 4/0 vicryl were inserted between the ganglionic bowel and the muscle cuff. Finally, a coat 5/0 vicryl was used to complete the anastomosis between the pulled-through colon and the anal canal (Fig. 5).

In both groups: Rectal tube () for decompression of colon. A small povidone iodine pack was inserted, to be removed after 1 day.

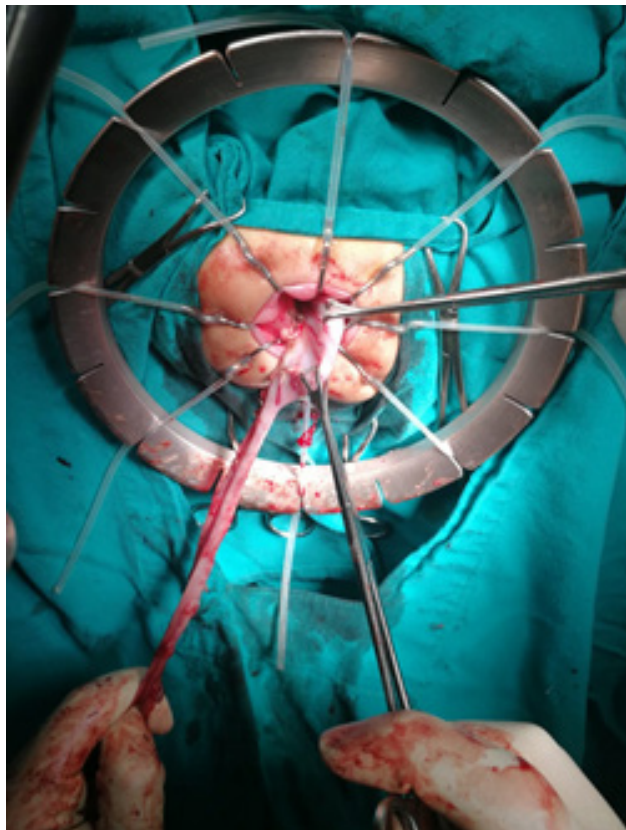


Fig. 1: Transitional zone.

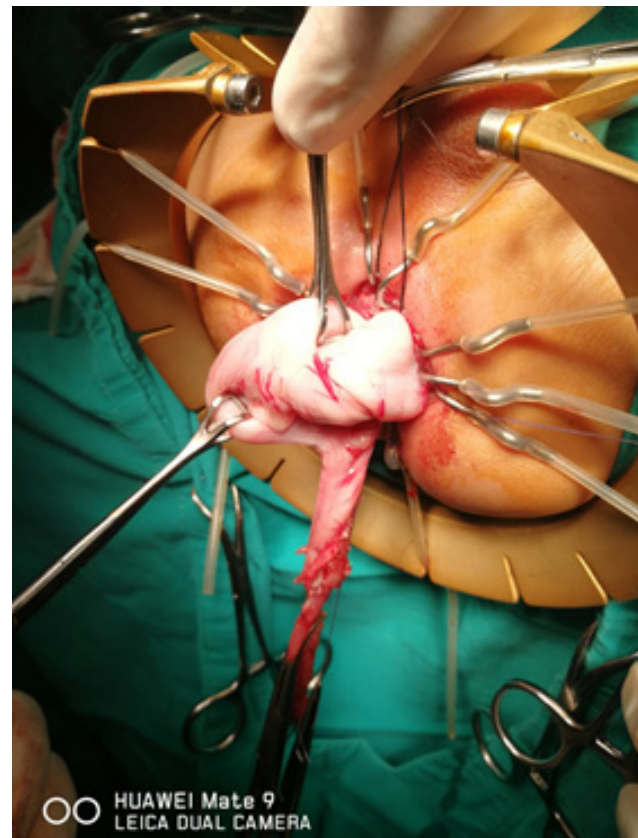


Fig. 2: Normal ganglionated colon above the transitional zone.

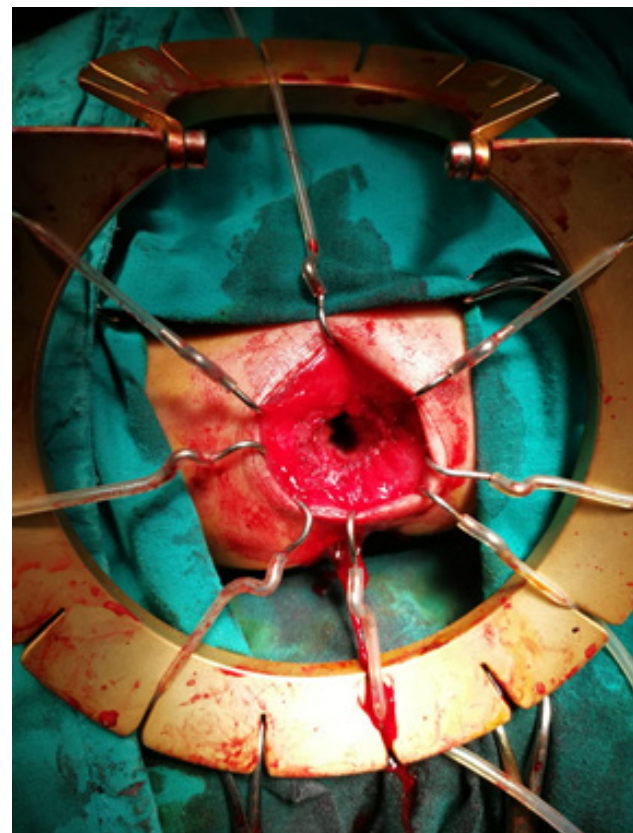


Fig. 3: Colo-Rectal anastomosis after Saove pull-through.

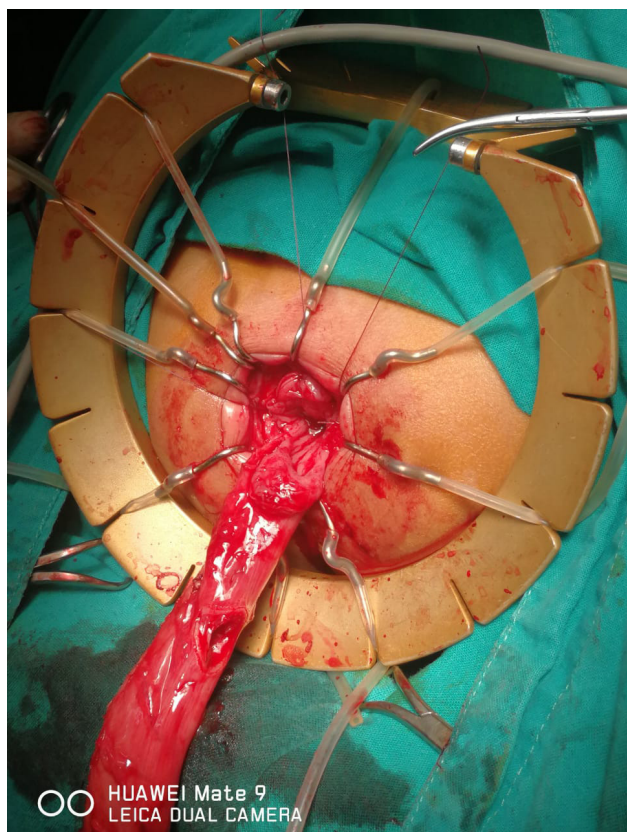


Fig. 4: Anastomosis between pulled through colon and anal canal.

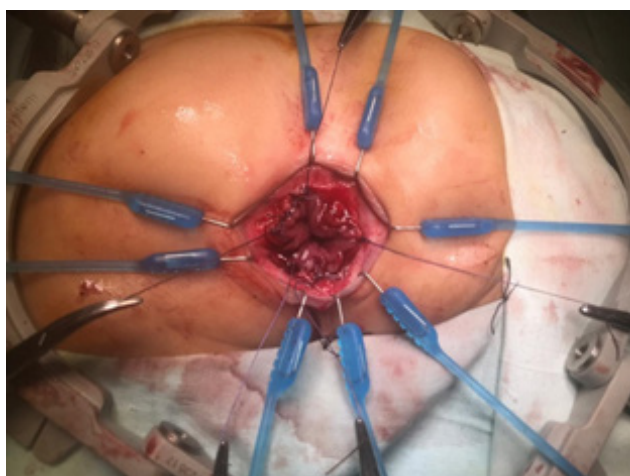


Fig. 5: Colo-rectal anastomosis after Swenson pull-through.

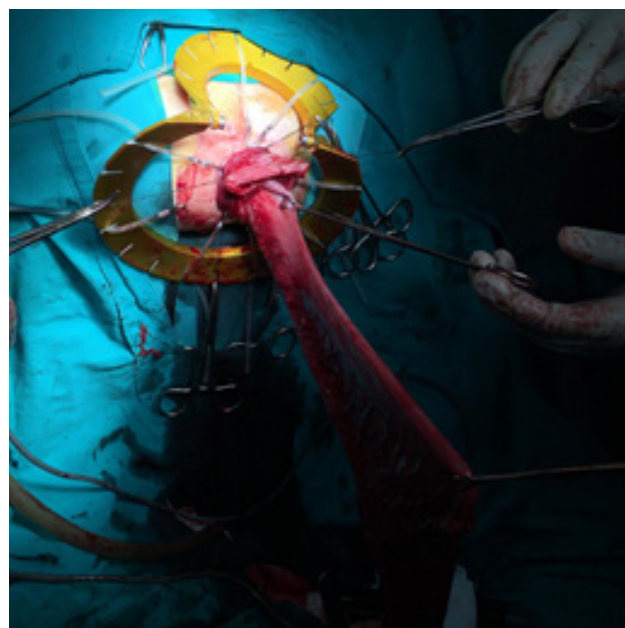


Fig. 7: Creation then a division of muscular cuff.

Postoperative care

Patients maintained on nothing by mouth, with intravenous fluid hydration until they passed flatus or had a bowel motion. Once this occurred, clear liquids were started and the diet was advanced gradually as tolerated. Adequate analgesia was given. Intravenous antibiotics were given until discharge. the transluminal rectal tube had been removed. Patients are discharged after 5 to 9 days. Zinc oxide cream was used perianally in cases with perianal dermatitis (skin excoriation).

Postoperative follow-up

Follow-up was done weekly for the first month, then every 3 months after that for 2 years. The First digital rectal examination was performed after 2 weeks. Routine anal dilatation was performed in all patients of both groups once or twice weekly for at least 1 month. Follow-up includes dietary and bowel history, examination of wound, and weight gain.

Statistical analysis

Results were expressed as the mean (SD). Statistical analysis was performed using the student t test with a *P* value less than 0.05 being considered statistically significant. We used MedCalc statistics software.

RESULTS:

There was no statistically significant difference between the two groups as regards age, sex, and weight $P=0.911, 1.000, 0.422$, respectively, (Table 1).

There was highly statistically significant difference between two groups as regards mean operative time $P<0.001$ (Table 2).

There was no statistically significant difference between two groups as regards blood transfusion $P=0.545$. Only two patients in group B required blood transfusion (Table 3).

There was no statistically significant difference between the two groups as regards Mean time to return to full oral feeding in $P= 0.612$ (Table 4).

There was no statistically significant difference between the two groups as regards mean postoperative hospital stay $P= 0.574$ (Table 5).

Only two cases in group B suffered from anal lacerations due to excessive traction by retractor (Table 6).

There was no statistically significant difference between the two groups as regards late postoperative complications $P=0.267$ (Table 7).

Table 1: Show demographic data

Group	Mean age in months (S.D)		P value
A (N=20)	9.52 (16.22)		0.911
B (N=20)	8.99 (14.66)		
Group	Sex		P value
	Number of males (%)	Number of females (%)	
Group A (N=20)	15 (75)	5 (25)	1.000
Group B (N=20)	15 (75)	5 (25)	
Group	Mean weight in kg (S.D)		P value
A (N=10)	7.55 (5.23)		0.422
B (N=10)	7.75 (5.16)		

Table 2: Show the mean operative time in the two groups

Group	Mean operative duration in min. (S.D)	P value
Group A (N=10)	124.31 (22.41)	<0.001
Group B (N=10)	159.43 (57.26)	

Table 3: Show patients require blood transfusion

Group	Patients required blood transfusion	P value
A (N=20)	0	0.545
B (N=20)	2	

Table 4: Show mean time to return to full oral feeding

Group	Mean time to return to full oral feeding in days (S.D)	P value
A (N=20)	3.15 (1.41)	0.612
B (N=20)	4.31 (1.53)	

Table 5: Shows that the mean postoperative hospital stay

Group	Mean postoperative hospital stay in days (SD)	P value
Group A (N=20)	5.33 (1.85)	0.574
Group B (N=20)	6.14 (1.72)	

Table 6: Show intraoperative complications

Group	Urethral injury	Vaginal injury	Anal lacerations	Twist of the pulled-through bowel
Group A (N=20)	0	0	0	0
Group B (N=20)	0	0	2	0
P values	0	0	0.331	0

Table 7: Show late postoperative complications

Group	constipation	Enterocolitis	Adhesive I.O	Soiling	Urologic problems	Stricture
Group A (N=20)	3	4	1	2	0	1
Group B (N=20)	4	5	0	5	0	3
<i>P</i> values	0.432	0.511	0.165	0.396	0	0.267

DISCUSSION

The main results of our study were as following:

Age of patients in this study ranged from 1 week to 3 years, with the mean value is 9.52 ± 16.22 months for group A and 8.99 ± 14.66 months for group B. Such a young age at presentation confirms a congenital etiology. It is observed from this study that, HD is diagnosed at an earlier age, and there is increased awareness of this disease among pediatricians, as many cases are referred from them. A high index of suspicion by pediatricians is needed for early diagnosis. This finding is in agreement with that of Leily *et al.*^[6].

Among the 40 patients in the study, there were 30 male and 10 female with a ratio 3 : 1 male to female. The disease is commoner in males, and this may indicate a genetic element of the disease. This finding is similar to that of Mahajan *et al.*^[7].

Weight among operated-upon HD patients in our study is below average for age. Weight loss and failure to thrive are common, especially in older children. This finding is the same as that of Ahmed *et al.*^[8].

Contrast enema is a good investigation that helps in the diagnosis of cases and is particularly important in leveling the disease. To increase diagnostic accuracy, contrast enema should be done without preparation, without insufflation of the rectal catheter balloon, and by slowly injecting the contrast. This finding is in agreement with that of Ahmed^[8].

We found in our study that operative time is statistically significant in favor of group A, with the Swenson procedure taking less time than the Soave procedure. This can be explained by the easier full-thickness plane of dissection in the Swenson procedure, which is less vascular compared with the submucosal plane in the Soave procedure, which is sometimes difficult to identify and separate and is bloody. The mean operative time in group A was 124.31 min. however in group B, it was 159.43 min. faster operation means more rapid anesthesia recovery, faster onset of oral feeding, and shorter postoperative hospital stay. This finding is in agreement with that of Xiaogeng *et al.*^[9].

There was no significant difference between the two groups about blood loss and blood transfusion.

Only two patients in group B needed a blood transfusion. Regarding the first patient, he was 3 years old. The second patient was 1 year old with a history of repeated attacks of enterocolitis. Both factors (Age, and recurrent enterocolitis history) resulted in difficult submucosal dissection due to less clear surgical planes, the presence of adhesions in the submucosal plane, more thickness of the mesentery, and long-standing dilated and hypertrophied colon making mobilization difficult. This finding is in agreement with that of Elhalaby *et al.*^[10].

In our study, there was no significant difference between the two groups about the onset and tolerance of postoperative oral feeding, the mean time in Group A was 2.15 days however in Group B was 3.31 days. Most of the patients in the two groups started oral feeding on the second postoperative day. Two patients of the group and three patients of group B have ileus, with delayed feeding, but responded to the nasogastric tube and GIT rest. Our study agrees with the findings of Leily *et al.*^[6].

We found in our study that there was no significant difference between the two groups about postoperative hospital stay. The mean postoperative hospital stay in group A was 5.33 days and it was 6.14 days in group B. This finding is the same as that of Ahmed *et al.*^[8].

As regards the intraoperative complications, we found in our study that there was no significant difference between the two groups. Only 2 cases in group B suffered from anal lacerations due to excessive traction by the retractor. This may be explained by the excessive traction needed for Soave submucosal dissection. It did not occur in all cases. But overstretching of the internal anal sphincter remains a critical issue, which may impact the long-term continence outcome. This finding is in agreement with that of Ahmed *et al.*^[8].

In our study, the first digital rectal examination is performed after 2 weeks. Anal dilatation was performed in all patients of both groups once or twice weekly for at least one month. Anal stricture affected one patient in group A and three patients in group B. It is manifested by palpable anastomosis. All strictures responded to dilatation, and most patients had 2 to 3 bowel motions per day. This finding is similar to that of Al-Baghdady *et al.*^[11].

As regards the postoperative complications, we found in our study that there was not any significant difference between the two groups. Constipation complicated three cases in group A and 4 cases in group B, most improved by transient use of laxatives, only one patient in group B required myectomy of the internal sphincter to relieve constipation. Adhesive intestinal obstruction (IO) complicated one case in group A, and it responded to conservative measures. These findings are similar to that of Mahajan *et al.*^[7].

Soiling complicated two patients in group A and five patients in group B. Soiling is defined as stool staining of underwear in between motions, It improved with time with a gradual increase of rectal sensation and sampling. This finding is in agreement with that of Al-Baghdady *et al.*^[11].

In our study, there was neither retraction nor prolapse of the pull-through segment. Also no urologic problems occurred. No mortality was encountered among all patients. These findings are similar to that of Marc *et al.*^[12].

CONCLUSION

The Swenson trans-anal pull-through, is a safe and effective alternative for the treatment of HD, with comparable results to the more established Soave procedure, also with shorter operative time, without increased incidence of urological problems, or intraoperative injury of surrounding vital structures. The technique can even be easier than the Soave procedure (Fig. 6).

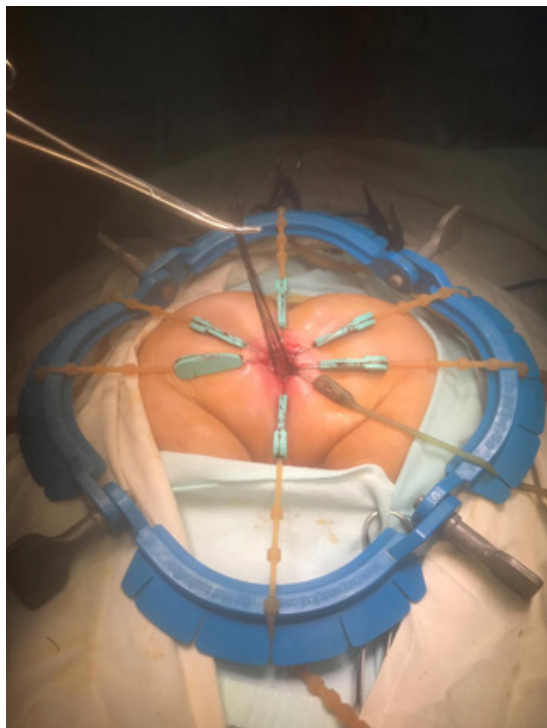


Fig. 6: Start of dissection above dentate line by 1.5:2 cm.

CONFLICT OF INTEREST

There are no conflicts of interest.

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