

## Transanal Swenson Procedure for Pediatric H.D., Advantages and Disadvantages

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### Abstract

**Background:** In infants, intestinal obstruction is most commonly caused by Hirschsprung's disease (HD). An aganglionic segment at the level of the rectosigmoid colon is present in 70% to 80% of individuals.

**Aim of Study:** This study evaluates operative details, post-operative outcome and complications of transanal Swenson for pediatric H.D.

**Patients and Methods:** 56 patients were included in this study in the period from (June 2018-July 2021) at Mansoura University Children Hospital. All cases were diagnosed by history, barium enema and rectal biopsy. They underwent transanal Swenson with full thickness incision 1cm above the dentate line and the aganglionic segment was resected, with evaluation of operative details, post-operative outcome and complications (6 months-12 months).

**Results:** This study was including 56 cases (35 male, 21 female), with age ranged from 4 months to 5 years. The operative time ranged from (80 minutes-140 minutes). The length of the resected aganglionic segment ranged from (15cm - 43cm). There was no significant blood loss except in one case that needed blood transfusion. Post-operative hospital stay ranged from (3-7 days). 2 cases suffered from anastomotic leak that required exploration and colostomy. 5 cases presented by post-operative constipation which were managed conservatively, except one case that required internal sphincter myectomy. 6 cases suffered from post-operative soiling with perianal excoriation and managed by medical treatment and biofeedback. 3 cases suffered from enterocolitis with conservative management. There were no urinary problems or dripping.

**Conclusion:** The transanal Swenson procedure for H.D. is a good technique with short operative time, insignificant blood loss and accepted post-operative outcomes and bowel habits. This technique avoids the problems associated with long mus-

cular cuff of transanal Soave procedure, but it carries the risk of anastomotic leak and soiling.

**Key Words:** Transanal Swenson Procedure for Pediatric H.D.

### Introduction

**IN** infants, intestinal obstruction is most commonly caused by Hirschsprung's disease (HD). An aganglionic segment at the level of the rectosigmoid colon is present in 70% to 80% of individuals [1].

The last thirty years have seen significant advancements in the surgical management of Hirschsprung disease (HD). Georgeson et al., reported on the laparoscopic surgery in 1990 [2].

De la Torre-Mondragon and Ortega-Salgado outlined the transanal method [3]. The transanal pull through technique is linked to a shorter hospital stay and fewer problems when compared to transabdominal procedures [4,5]. It reduces the common post-operative problems after a laparotomy, including wound infections, adhesion bowel blockage, and unintentional damage to the pelvic nerves [6]. The transanal pull through techniques have been refined throughout time. Endorectal dissection is the method most frequently used for the transanal pull-through surgery. This treatment leaves a lengthy muscular cuff that is either divided posteriorly or excised. It is commonly recognized that blockage may result from the lengthy muscle cuff left behind [6].

Xu et al. (2008) initially described and updated the modified Swenson technique in China [7]. Both the Swenson and the pullthrough Soave procedures, with or without laparoscopic assistance, are now well accepted worldwide and have garnered a large following [8-10].

Few investigations have directly compared the transanal Swenson and transanal Soave procedures

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[11,12]. This retrospective research assesses the transanal Swenson's operational details, postoperative result, and complications.

### Patients and Methods

This study involved fifty-six patients from Mansoura University Children Hospital between June 2018 and July 2021. Rectal punch biopsy and barium enema were used to confirm the diagnosis. A frozen section analysis of an intraoperative biopsy verified the transitional zone between the normal and aganglionic colon. Participants in this research were those who had a one-stage transanal Swenson surgery after receiving a tissue diagnosis of rectosigmoid or short segment HD. This research excluded patients with lengthy aganglionic segments (proximal to sigmoid colon), patients with ignored intestinal obstruction not responding to bowel decompression, and patients referred to us after completing an initial colostomy.

The main transanal Swenson pull-through technique was performed on all children. The following factors were assessed: The patient's age, weight at the time of surgery, transitional zone level, surgical time, duration of hospital stay, follow-up period, problems following the procedure, and functional results.

#### *Preoperative preparation:*

Saline enemas were used to begin the colonic preparation one day before to surgery, and all fluids were stopped aside from clear ones. The patient fasted for six to eight hours before to the procedure. Metronidazole and intravenous antibiotics were started and maintained for the first 72 hours following the surgery. Every parent provided written approval after being told.

#### *Surgical technique:*

A diluted betadine solution was used for rectal irrigation following the onset of general endotracheal anesthesia. Next, the patient was prepped from the foot to the costal margin. There was a Foley's

urinary catheter inserted. Hegar dilators were used to slightly dilate the anus in order to make the perirectal dissection easier. Sometimes a borrowed star retractor was used to evert the anus by placing traction sutures circumferentially, just proximal to the anoderm but distal to the dentate line. One centimeter above the dentate line, a circumferential row of 4-0 vicryl stay sutures was placed. Using a tiny diathermy needle, a full thickness circular incision was created right below the circumferential silk stay sutures (Fig. 1), and the dissection was carried out proximally. Either monopolar or bipolar electrocautery was used to regulate the vessels (Fig. 2). The peritoneal reflection, which was approximately 5cm above the transitional zone, was reached by continuing the dissection. This phase involved using a frozen section examination of a full thickness biopsy to confirm the normoganglionic level. After that, the colon was released tension-free up to the suggested anastomotic line; a colectomy of the thickened and dilated ganglionic section was subsequently carried out (Fig. 3). 4-0 interrupted, absorbable sutures were used to produce a single-layered, full thickness anastomosis [13].

Oral feeding was resumed 24 to 48 hours after the restoration of gastrointestinal function following surgery. When the patient could tolerate a regular, age-appropriate diet, discharge took place. Two weeks later, the patient was evaluated in the clinic, and Hegar dilators were used to enlarge the anus [14].

Patients were checked on every two weeks for the first two months, then every month for the next three, and finally every fifteen days. Diarrhea was defined as more than eight stool motions per day in a patient. Constipation was defined as the inability to have regular bowel motions without the use of an enema, medication, or both. If home dilations were insufficient, anastomotic stricture was detected. The clinical syndrome of enterocolitis was described as having diarrhea, temperature over 38°C, and distension of the abdomen [15].

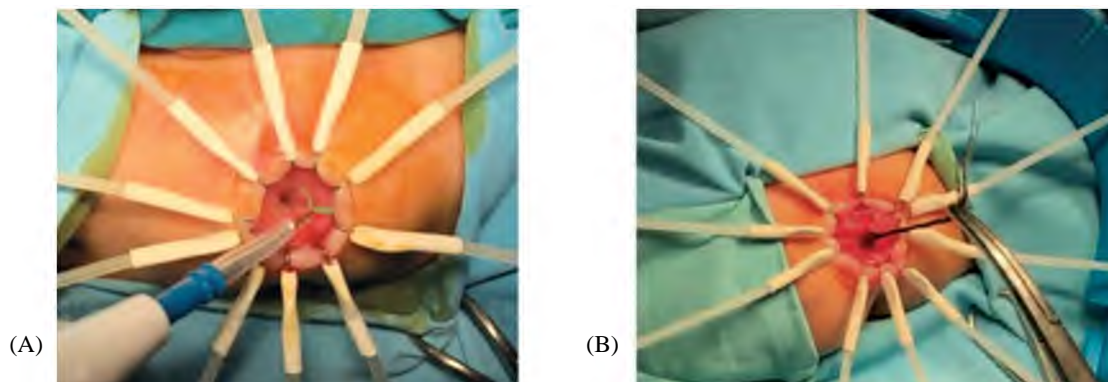


Fig. (1): A full thickness circumferential incision was made just below the circumferential silk stay sutures by using a fine diathermy needle.

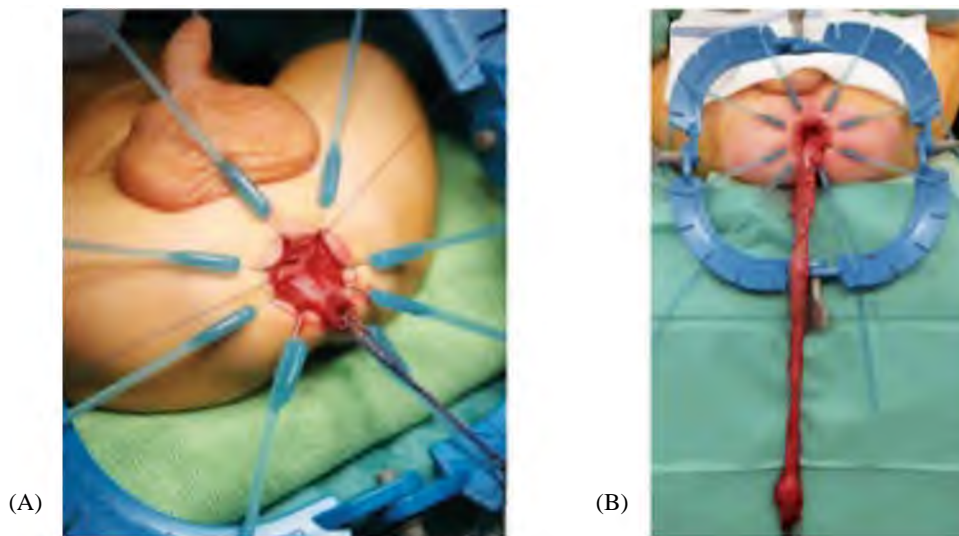


Fig. (2): Dissection was carried proximally. Vessels were controlled either with the monopolar or bipolar electrocautery.



Fig. (3): Anastomitic line.

### Results

Surgery was performed on fifty-six HD patients using a one-stage transanal pull-through Swenson technique. In this series, there were 21 girls (37.5%) and 35 boys (62.5%) ranging in age from 4 months to 5 years. The weight of the body varied from 5.5 to 18kg. The transanally resected aganglionic section was between 15 and 43 centimeters in length. Table (1).

The surgical duration varied from 85 to 180 minutes, with an average of 132.5 minutes. It was not necessary to convert any patient to an abdominal operation. Apart from one patient (1.8%) with substantial bleeding that required blood transfusion, there were no further intraoperative problems. The length of a post-operative hospital stay varied from three to seven days, with a mean stay of five days.

There were two cases (3.6%) with anastomotic leaks, both cases presented by high grade fever, bilious vomiting and abdominal distension, one case diagnosed at 2<sup>nd</sup> day and the the other case was at 3<sup>rd</sup> postoperative day. Plain abdominal X-ray and US were done, and management was exploration, abdominal toilet and colostomy then colostomy closure 3 months later. there was no bowel obstruction.

All patients' bowel motions returned to normal within 24 hours following surgery. With two exceptions-cases with anastomotic leaks-full oral intake was attained between the third and fifth postoperative days. Three to seven days were spent in the hospital following surgery. The duration of the follow-up was six to forty-two months. The first post-operative anal dilatations were performed on each patient.

Postoperative enterocolitis attacks affected three individuals (5.6%); these patients were effectively treated with intravenous metronidazole, cephalosporin, and rectal irrigations.

With the exception of one instance (1.8%), which needed an internal sphincter myectomy due to inadequate emptying due to the existence of an anastomotic stricture and rectal stenosis despite dilatations, five cases (8.9%) had post-operative constipation that was treated conservatively. Six instances (10.7%) had perianal excoriation following surgery, which was treated with medication and biofeedback. There were no leaks or issues with the urine. Table (2).

At digital examination of 51 patients (91.1%) at 3 months after surgery, the anastomotic circumference could not be felt.

Table (1): Patients data.

No. of patients	56 patients with HD
Age	4 months to 5 years
Sex	35 boys (62.5%) and 21 girls (37.5%)
Body weight	5.5 to 18 kg
The length of aganglionic segment	from 15 to 43 cm

Table (2): Operative and postoperative complications.

No. of patients	56 patients with HD
Operative time	(85 min - 180 min) with mean 132.5 min
Hospital stay	(3-7 days) with mean stay 5 days
Intra-Operative complication	One case (1.8%) with significant bleeding
Anastomotic leaks	2 cases (3.6%)
Attacks of postoperative enterocolitis	3 cases (5.4%)
Post-operative constipation	5 cases (8.9%)
Soiling with perianal excoriation	6 cases (10.7%)
Urinary problems or dripping	0%

### Discussion

Using the Soave, Duhamel, or Swenson methods, surgeons have begun to conduct the final one-stage operation for HD even in the newborn period in recent decades [9-13].

Several basic laparoscopic pull-through techniques for HD in babies and children were reported by Georgeson et al. [16]. Although there are numerous benefits to this minimally invasive laparoscopic method, there are also some drawbacks, such as harmonic damage to the pelvic organs [17].

In addition to the benefits of laparoscopic surgery, such as less or no postoperative ileus, less pain after surgery, and early hospital discharge, the completely transanal approach offers additional benefits such as the avoidance of risks related to intra-abdominopelvic dissection, such as bleeding, harm to other organs, adhesion formation, less pain after surgery due to the lack of multiple abdominal port sites, better cosmetic results, and lower costs [18, 19].

By performing the one-stage Swenson pull-through operation entirely transanally, a deep intrapelvic dissection was avoided. Male ejaculatory duct and sacral nerve damage risk is reduced by inserting a urethral catheter and performing the dis-

section directly on the colon wall. Furthermore, because the distal aganglionic segment's muscle cuff is present, this surgery reduces the risk of bleeding, cuff abscess, and postoperative constipation in patients who have had transanalendorectal pull-through [20,21].

The current investigation removed all of the aganglionic bowel by starting the dissection 0.5-1cm above the dentate line. We were concerned that the infant's aganglionic segment would expand with time and that constipation might become more common. Second, the choice was made to dissect above the transitional zone to a level where the gut seemed normal. In a few of youngsters, the ganglionated bowel was so dilated that it was necessary to remove the dilated segment in order to improve the coloanal anastomosis and prevent any potential motility issues.

In this series, the average operating duration was 132.5 minutes. The Swenson procedure's shorter completion time-less than that of studies by George et al. [22,23] and Mahajan et al. [24,25], which reported operative times of 150 and 141.7min, respectively-may be explained by skipping the submucosal dissection. However, this study's average operative time of 70min was recorded by Zhi-lin et al. [26].

Anastomotic leaks occurred in two (3.6%) of the patients in our investigation. Sherman et al. [22] evaluated 880 Swenson operations (a mix of two- and three-stage procedures) and found that the anastomotic leak rate was 5.6%. A 3% anastomotic leak rate was observed in another group by Hadidi [27] and might be related to either ischemia or the coloanal anastomosis being fashioned under considerable strain. According to studies by Dela-Torre-Mondragon and Ortega-Salgado [18], George et al. [23], and Orkan et al. [28], there was no anastomotic leak in other series.

There was no postoperative adhesive intestinal blockage seen in this investigation. The incidence of intra-abdominal adhesions is decreased by minimally invasive surgery [20]. This presumably applies more to the patients who receive care via a transanal technique alone. Conversely, following an open pull-through operation for HD, the incidence of adhesion small intestinal obstruction has been reported to range from 2 to 20% [22,29,30].

Three patients (5.6%) experienced postoperative enterocolitis attacks in our investigation; this is less than the 10-33% reported incidence of postoperative enterocolitis in previous series [29,31-34]. So et al. [21] treated 84 HD patients. The authors noted that no surgical stricture nor enterocolitis occurred in these patients, and they partially ascribed this to timely and sufficient dilations. The development of postoperative intestinal obstruction due to



adhesions and the presence of anastomotic leak or stricture both increased the relative risk and subsequent enterocolitis by approximately three times, according to research by Hackman et al. [35] on the risk factors for postoperative enterocolitis. The loop (stasis–bacterial overgrowth–mucosal invasion) that results in the following local and systemic inflammatory response is triggered by these risk factors, which also promote intestinal stasis [36]. Due in part to the lack of a seromuscular cuff, low coloanal anastomosis, and normal postoperative anal dilatation, the current series' relatively low incidence of enterocolitis following a one-stage transanal Swenson technique seems plausible.

Although there was no anastomotic stricture or rectal stenosis in the current investigation, these complications have been reported to occur at rates of 15.72-22% Minford GL et al. [32], 11.7% Mahajan et al. [25], and 4% Umar et al. [34].

Six instances (10.7%) in this research experienced post-operative soiling with perianal excoriation, which was treated with medication and biofeedback. Several writers observed reduced continence ability with the introduction of the transanal endorectal pull-through in comparison to the traditional transabdominal techniques [36]. The first theory put forward was that one major problem impacting continence may be the anal sphincter's overstretching during the transanal surgery. Numerous studies have been published to address this issue. Kim et al. [37], in particular, looked at the long-term stooling results in a large, multicenter cohort of patients receiving either the transabdominal or transanal endorectal pull-through techniques. The transanal endorectal pull-through operation did not result in an increased incidence of incontinence and was linked to fewer complications and enterocolitis episodes [18,38,39]. The shorter operation duration in the current investigation, which applied the ideal amount of dilatation without overstretching the anal sphincter, can be used to explain why there was no disruption in stooling at the conclusion of the follow-up period.

In this study, the Post-operative hospital stay ranged from (3-7 days) with mean stay 5 days, Which is significant shorter than Xubing et al. [26], the mean length of hospital stay (Soave group:  $7.91 \pm 3.13$  days; Swenson group:  $7.84 \pm 4.03$  days) [40].

#### Conclusion:

The transanal Swenson procedure for H.D. is a good technique with short operative time, insignificant blood loss and accepted post-operative outcomes and bowel habits. This technique avoids the problems associated with long muscular cuff of transanal Soave procedure (obstructed symptoms and enterocolitis), but it carries the risk of anastomotic leak and soiling.

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## الاستئصال الجزئى للقولون من خلال فتحة الشرح بطريقة سوينسون لعلاج مرض هيرشسبرينج فى الاطفال. المميزات والعيوب

مقدمة: يعد مرض هيرشسبرونج هو السبب الأكثر شيوعاً لانسداد الأمعاء عند الأطفال حديثى الولادة. سبعون إلى ٨٠٪ من المرضى لديهم قطعة عقدية على مستوى القولون المستقيم السينى.

شهد العلاج الجراحى لمرض هيرشسبرينج تغيرات كبيرة فى الثلاثين عاماً الماضية. فى عام ١٩٩٠، تم الإبلاغ عن الإجراء بالمنظار من قبل جورج سون وآخرين.

تم وصف النهج عبرالشرح لأول مرة من قبل ديلا توريو ونندراجون وأورتيج اسالجادو. بالمقارنة مع الطرق عبرالبطن، ترتبط تقنية السحب عبرالشرح بإقامة أقصر فى المستشفى ومضاعفات أقل. فهى تقلل من المضاعفات النموذجية لفتح البطن مثل انسداد الأمعاء اللاصق، ومضاعفات الجرح، والإصابة غير المقصودة لأعصاب الحوض. لقد تم تحسين إجراءات السحب عبرالشرح بشكل مستمر. الأسلوب الأكثر استخداماً لإجراء السحب عبرالشرح هو تشريح بطانة المستقيم، مما يترك كفة عضلية طويلة عادة ما يتم تقسيمها للخلف أو استئصالها. ومن المعروف أن الكفة العضلية الطويلة التى تترك خلفها قد تكون سبباً فى الانسداد.

تم الإبلاغ عن إجراء سوينسون المعدل لأول مرة وتم تعديله فى الصين فى عام ٢٠٠٨. والآن، أصبحت إجراءات مع أو بدون مساعدة بالمنظار شائعة فى جميع أنحاء العالم ولكل منهما العديد من المؤيدين .

المرضى وطرق البحث: شملت هذه الدراسة ستة وخمسين مريضاً فى الفترة من (يونيو ٢٠١٨ - يوليو ٢٠٢١) بمستشفى الأطفال الجامعى بالمنصورة، وتم تأكيد التشخيص باستخدام حقنة الباريوم الشرجية وخزعة المستقيم. تم تأكيد المنطقة الانتقالية بين القولون الطبيعى والعقدى من خلال الخزعة أثناء العملية التى تم تحليلها بواسطة القسم المجمد. تم تضمين المرضى الذين تم تشخيصهم بالأنسجة المثبتة للسينى المستقيمية أو HD المقطع القصير، والذين تم تشغيلهم كإجراء سوينسون عبرمرحلة واحدة، فى هذه الدراسة. تم استبعاد الأطفال حديثى الولادة والمرضى الذين يعانون من انسداد الأمعاء المهمل الذين لا يستجيبون لتخفيف غط الأمعاء، أو أولئك الذين تمت إحالتهم إلينا بعد إجراء فغر القولون الأولى، والمرضى الذين يعانون من شرائح عقدية طويلة (القريبة من القولون السينى) من هذه الدراسة.

خضع جميع الأطفال لإجراءات سحب سوينسون الأولية عبرالشرح. تم تقييم التركيبة السكانية للمريض، والعمر، والوزن عند الجراحة، ومستوى المنطقة الانتقالية، ووقت العملية، ومدة الإقامة فى المستشفى، وفترة المتابعة، ومضاعفات ما بعد الجراحة، والنتائج الوظيفية.

تقوم هذه الدراسة بأثر رجعى بتقييم تفاصيل العملية ونتائج ما بعد الجراحة ومضاعفات عملية سوينسون عبرفتحة الشرح لدى الأطفال.