

Comparison Between Swenson and Soave Pull-Through in Hirschsprung Disease

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Abstract

Background: Considerable controversy exists regarding the optimal surgical technique for the treatment of Hirschsprung disease. Currently, both Swenson and Soave procedures are used for its treatment.

Objectives: The purpose of this study was to compare outcomes and complications of Swenson and Soave pullthrough using a matched case control analysis.

Patients and Methods: A cross-sectional study was done on patients with Hirschsprung disease (HD) admitted in Mofid Children's hospital from 2006 to 2012. Children with HD who underwent Soave procedure and sufficient data to analyze were matched 1:1 to a Swenson study sample. Patients were matched with respect to gestational age (37 - 42 weeks), age of patient at pullthrough procedure, operation stages, level of aganglionosis (rectosigmoid, sigmoid, descending and transverse colon) and the presence of comorbidities (major cardiac, trisomy 21, and other syndromes). SPSS version 18.0 was used for statistical analysis. Descriptive statistics and the Chi-square test and Student t-test were used. $P < 0.05$ was considered as significant.

Results: Sixty patients (30 patients undergone Soave, 30 patients undergone Swenson) had adequate data for matching and analysis. Mean follow-up time was 3 years for both groups. Mean (SD) age of patients at the time of pullthrough procedure was 43.1 (35.6) months in Swenson group (range; 1 - 168) and 41.9 (49.6) months in Soave group (range; 1 - 132) (P value = 0.920). No significant differences were seen in mean (SD) operating time (Soave: 156.7 (59.0) minutes, Swenson: 134.3 (51.4) minutes) (P value=0.145). There were no significant differences between 2 groups with regard to operative time, hospital stay, early and late complications such as postoperative obstructive symptoms, enterocolitis, fecal incontinence, perianal abscess and fistula, anastomotic leakage, peritonitis, and pelvic abscess formation. Rate of complication was 47% for Soave group and 40% for Swenson group (P value = 0.795, risk ratio = 1.147).

Conclusions: There were no significant differences in the early and late complications between Soave and Swenson pullthrough procedures.

Keywords: Hirschsprung Disease, Complications, Swenson Pullthrough, Soave Pullthrough, Children

1. Background

There are various techniques for treatment of Hirschsprung disease (HD). Swenson and Bill explained this procedure in 1948 (1). In this procedure despite meticulous dissection near to the rectal wall, there is a chance of damage to the pelvic nerves which leads to bladder damage, rectal wall innervations, and sexual function. In Soave technique, distal aganglionic mucosa and submucosa are removed and ganglionated intestine pulls through in muscular cuff (2-4). On the other hand, enterocolitis the main reason of morbidity and mortality in HD. There are dissimilar results for enterocolitis in various studies with different types of pullthrough (5, 6).

2. Objectives

The purpose of this study was to compare outcomes and complications of Swenson and Soave pullthrough using a matched case control analysis.

3. Patients and Methods

A cross-sectional study was done on patients with a diagnosis of HD who were admitted in Mofid Children's Hospital from 2006 to 2012. An information sheet were prepared for data collection, including age at presentation, sex, associated anomalies, type of presentation, type of the surgical procedure performed for treatment and early and late postoperative complications.

We identified children with non-long segment disease who underwent Soave procedure and had enough data to analyze. Children with similar disease who underwent Swenson procedure and sufficient data to analyze were matched 1:1 to the Soave sample. Patients were matched with respect to their gestational age (37 - 42 weeks), age of patients at time of pullthrough procedure, operation stages, level of aganglionosis (rectosigmoid, sigmoid, descending and transverse colon) and the presence of comorbidities (major cardiac, trisomy 21, and other syndromes). If more than one match was found, the more recent operations were chosen.

3.1. Statistical Analysis

SPSS version18.0 was used for analysis. Descriptive statistics and the Chi-square test and Student t-test were used, considering $P < 0.05$ as significant.

4. Results

Out of 103 children who underwent abdominal Swenson or Soave procedure, 60 patients (30 patients undergone Soave technique and 30 patients undergone Swenson technique) matched based on gestational age, operation stages, age of patients at time of pullthrough procedure, level of aganglionosis, and the presence of comorbidity. The study population characteristics are shown in Table 1. There were no significant differences between the groups regarding these matched variables.

Table 1. Characteristics of the Study Groups

	Soave (n = 30)	Swenson (n = 30)	P Value
Gestational Age (mean), wk	38.1	38.3	0.720
Age at time of OR, mo ^a	41.9 ± 49.6	43.1 ± 35.6	0.920
Level of aganglionosis	-	-	-
Ultra short	5	2	-
Sigmoid	22	22	-
Descending colon	1	2	-
Transverse colon	2	4	-
Comorbidities	-	-	-
Major cardiac disease	1	1	-
Trisomy 21	2	2	-

^aData are presented as mean ± SD.

Mean (SD) age of the patients at the time of pullthrough was 43.1 (35.6) months in Swenson (range; 1 -

168) and 41.9 (49.6) months in Soave (range; 1 - 132) (P value = 0.920) (Table 2).

Table 2. Comparison of Patients' Results in Soave and Swenson Pullthrough Techniques^a

	Swenson	Soave	P Value
Mean age of patients, mo	43.1 ± 35.6	41.9 ± 49.6	0.920
Gender of patients (Male)	80.65	77.4	0.999
Mean operation duration, min	134.3 ± 51.4	156.7 ± 59.0	0.145
Length of hospital stay, d	16.2 ± 10.8	13.2 ± 6.0	0.202
Complications	40	47	0.795

^aData are presented as mean ± SD or percent.

In Swenson group, 80.65% were male and in Soave group 77.4% (P value > 0.999) (Table 2). Mean (SD) duration of pullthrough operation in Soave group was 156.7 (59.0) minutes (range; 75 - 360 minutes) and in Swenson 134.3 (51.4) minutes (range; 75 - 360 minutes) (P value = 0.145) (Table 2). Mean (SD) length of hospital stay of patients with Soave was 13.2 (6.0) days (range; 7-54 d) and in Swenson 16.2 (10.8) (range 6 - 39 d) (P value = 0.202) (Table 2). Both groups were followed for an average of at least 3 years. Rate of complication was 47% for Soave group and 40% in Swenson (P value = 0.795, risk ratio = 1.147) (Table 2).

About 60.7% of patients in Soave group presented chronic constipation as their first symptom and 76.7% in another group (P value = 0.258) (Figure 1).

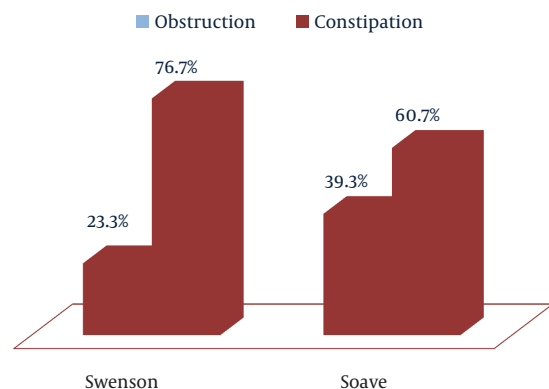


Figure 1. Comparison of Clinical Presentations in Patients With Soave and Swenson Pullthrough Techniques

There were no significant differences between 2 groups with regard to operative time, hospital stay, early and late complications such as postoperative obstructive symptoms, enterocolitis, fecal incontinence, perianal abscess

and fistula, anastomotic leakage, peritonitis, and pelvic abscess formation. The complications for each group are summarized in Table 3.

Table 3. Incidence and Type of Complications in Both Groups

Complications	Soave	Swenson
None	16 (53.3)	18 (60)
Enterocolitis	5 (16.7)	5 (16.7)
Fecal incontinence (in Patient > 5y)	4 (13.3)	0 (0)
Stricture	3 (10)	2 (6.7)
Fecal peritonitis	2 (6.7)	0 (0)
Pelvic abscess formation	2 (6.7)	1 (3.3)
Perianal fistula	1 (3.3)	1 (3.3)
Obstruction	1 (3.3)	0 (0)
Anastomosis in aganglionic part	1 (3.3)	0 (0)
Adhesion band	1 (3.3)	1 (3.3)
Perianal abscess	1 (3.3)	0 (0)
Anastomotic leak	0 (0)	1 (3.3)
Constipation	0 (0)	2 (6.7)

Figure 2 compares enterocolitis episodes in patients with Soave and Swenson pullthrough techniques (P value = 0.361). Management of enterocolitis is shown in Table 4. All patients in Swenson group are alive but one patient in Soave group expired after fourth enterocolitis (P value > 0.999).

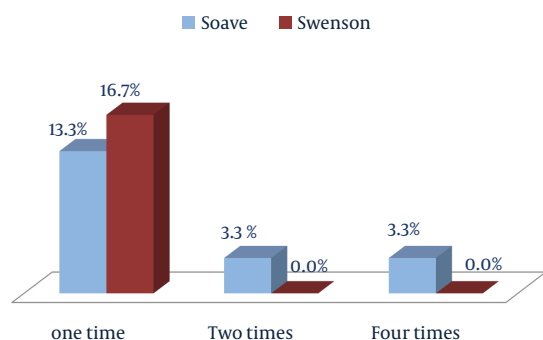


Figure 2. Comparison of Enterocolitis in Patients with Soave and Swenson Pullthrough Techniques

5. Discussion

Hirschsprung disease is defined as a developmental abnormality followed by migratory breakdown of neural

Table 4. Comparison of Management of Enterocolitis in Patients Treated with Soave and Swenson Techniques

Variables	Soave	Swenson
Conservative	5 (83.3)	4 (80)
Colostomy	0 (0)	1 (20)
Redo Pullthrough	1 (16.7)	0 (0)

crest cells. Generally, 98% of neonates pass meconium within 24 - 48 hours after delivery, but this passage fails in 90% of neonates with HD. Harold Hirschsprung, a Danish pediatrician presented the first definitive description of the disease in 1888 (7).

There are various techniques for treatment of HD. The outcome of any method for HD is calculated based on early and late complications. The aim is to achieve a regular bowel movement without incontinence or constipation.

The initial classic procedure was done by Swenson and Bill in 1948 (1). Swenson described resection of aganglionic colon bowel and anastomosis of ganglionated colon to the distal rectum.

In 1964, Soave (8) explained endorectal approach for pullthrough. In this procedure, distal rectal mucosa-submucosa removes and normal ganglionic colon pulls through the muscular cuff of aganglionic colon and coloanal anastomosis is done. This method avoids widespread dissection of rectum and preserves inner region of anal sphincter. One problem in this procedure is the presence of aganglionic muscular cuff around normal ganglionic colon and this portion of dysfunctional muscle perhaps enhances constipation cuff abscess and enterocolitis.

There are few reports about 2-stage Soave procedures. Khaleghnejad-Tabari and Moslemi-Kebria (9) reported results of two-stage Soave for surgical management of HD in a 10-year period. They used two-stage Soave procedure in 54 cases and reported normal defecation in 90.1% of the patients. Early complications were present in 9 cases (14.7%) and late complications were seen in 14 cases (22.9%). The mortality rate was 4.9% (3 patients) (9). In our study, both groups were followed for an average of at least 3 years. Rate of complication was 47% for Soave group and 40% in Swenson group. Complications are usually postoperative obstructive symptoms, enterocolitis, fecal incontinence, perianal abscess and fistula, anastomotic leakage, peritonitis, and pelvic abscess formation.

Some studies examined the variable length of cuff for Soave procedure and found that incidence of enterocolitis was lower (9% vs. 30%) in the short cuff group (10, 11). In our study in both groups, the risk of enterocolitis was the

same (16.7%). The length of the cuff in this study was approximately 7 cm.

Nasr et al. (12) studied transanal pullthrough for Hirschsprung disease by matched case-control comparison of Soave and Swenson techniques (2014). They matched patients with regard to gestational age, mean weight of patients at time of the surgery, length of aganglionosis, and comorbidities. They analyzed 54 patients (Soave 27, Swenson 27) and found no significant differences regarding mean operating time, hospital stay, complications during surgery, postoperative obstructive symptoms, number of enterocolitis, or fecal incontinence. In the present study, although numbers of enterocolitis were the same but risk of stricture, fecal peritonitis, and pelvic abscess formation were more in Soave group. On the other hand, anastomotic leak and constipation were more in Swenson group.

Zain et al. (13) studied Swenson and Soave pullthrough from June 2006 to June 2010. A total of 25 patients (62.5%) underwent Swenson pullthrough and 15 patients (37.5%) underwent Soave pullthrough. Complication rate after Swenson procedure was 24% while following Soave procedure, it was 20%. Commonest complications after Swenson pullthrough technique were wound infection and adhesive intestinal obstruction (12%) while commonest complication after Soave procedure was anastigmatic stricture (20%). In their study, the rate of complications was higher subsequent Swenson pullthrough compared to Soave procedure. In our study, the commonest complication was enterocolitis that had the same rate in both groups.

Our study has the typical limitations of retrospective studies, including selection bias due to the preference of the operating surgeon, and the relatively small study population that could decrease statistical power. We should review results in longer terms and follow up in multiple centers.

After controlling the potential confounders, no significant differences were seen in the short and late term complications between Soave and Swenson pullthrough procedures.

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Footnotes

Authors' Contribution: All authors except Ali Reza Mahdavi, and Zahra Gilaki performed the Surgery. Ali Reza Mahdavi was the anesthesiologist.

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