


Postoperative rectal irrigation after laparoscopic Swenson pull-through: is early instrumentation safe?

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ABSTRACT

Background In approaching surgical correction of Hirschsprung disease (HSCR), laparoscopic Swenson endorectal pull-through (Lap-S-ERPT) requires less transanal dissection and sphincter stretch. This may lead to more immediate postoperative obstructive symptoms. While antibiotics and rectal irrigations are mainstays of treatment, there is concern about rectal instrumentation in the setting of recent low anal anastomosis. The purpose of this study was to assess the incidence and safety of early rectal irrigations following Lap-S-ERPT.

Methods This is a single-center, retrospective review of all pediatric patients who underwent Lap-S-ERPT for HSCR from January 2018 to October 2023. Irrigations were performed if patients had obstructive symptoms including emesis, obstipation, and dilated colonic loops on radiographs. The primary outcome was need for postoperative rectal irrigation. Secondary outcomes included time from surgery to irrigation, duration of irrigation, and incidence of anastomotic leak.

Results A total of 37 patients (62% male) underwent a Lap-S-ERPT at a median age of 3 months (interquartile range (IQR): 0.5, 5.0). Rectosigmoid disease was the most common diagnosis ($n=29$, 78.4%). There were 11 patients underwent rectal irrigations with a median time to initiation of irrigation of 46 hours (IQR: 32.0, 114.0) postoperatively and a median duration of irrigations of 3 days (IQR: 2.0, 4.5). There was no difference in anastomotic leak rate between patients who received irrigations and those who did not (9.1% *v.s.* 7.7%, $p=0.887$).

Conclusion Following Lap-S-ERPT, nearly 30% of patients underwent rectal irrigation for postoperative obstructive symptoms. Despite concerns about instrumentation with a recent low anastomosis, there was no increase in leak rate in patients who received rectal irrigations.

INTRODUCTION

Hirschsprung disease (HSCR) is a rare congenital gastrointestinal disease occurring in 1 in 5000 live births encountered by pediatric colorectal surgeons.¹ Treatment is primarily surgical in nature and is aimed at removal of the aganglionic intestine and reconnecting healthy ganglionated bowel to the anus. Several surgical approaches are currently practiced, including the Yancey-Soave, Duhamel,

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ There has been a gradual shift toward performing laparoscopic Swenson endorectal pull-through (ERPT) for Hirschsprung disease (HSCR), as it allows for deep pelvic dissection and limits transanal trauma to the sphincter complex.
- ⇒ A recognized early complication of all HSCR operations is postoperative obstruction and enterocolitis, though may be theoretically higher with the Swenson ERPT due to the limited sphincter dissection.
- ⇒ Failure to expeditiously recognize and decompress these patients can lead to clinical decline.

WHAT THIS STUDY ADDS

- ⇒ This study is the first step in investigating the safety and efficacy of postoperative rectal irrigation in surgical patients with HSCR.
- ⇒ Approximately 30% of children underwent rectal irrigation for postoperative obstructive symptoms with no increase in leak rate.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ In the setting of a low anastomosis, postoperative rectal irrigations should be performed with caution though must not be delayed if there is concern for postoperative obstruction or enterocolitis.

and Swenson endorectal pull-throughs (ERPT).^{2,3} All may be performed with laparoscopic assistance; however, they vary in the extent of pelvic dissection, sphincter manipulation, and length of residual rectal muscular cuff.³ Though each has certain advantages and shortcomings, no technique has been concluded to be superior to the others.^{4,5}

Over the last 10 years in the USA, there has been a gradual shift toward performing laparoscopic Swenson ERPT due to the increasing sophistication of minimally invasive techniques, allowing for deep pelvic dissection which limits transanal trauma to the sphincter complex and facilitating complete removal of the entire aganglionic bowel.^{2,6} With increasing competency in laparoscopic surgery, this approach promotes minimally



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invasive mobilization down to the pelvic floor, further decreasing the operative time of the transanal portion.^{3,7}

A recognized early complication of all HSCR operations is postoperative obstruction and enterocolitis, though may be theoretically higher with the Swenson ERPT due to the limited sphincter dissection. Rectal irrigations and antibiotics are the standard treatment for enterocolitis; however, there is concern about doing rectal irrigations in the presence of recent and low anastomosis following Swenson ERPT.⁸ This study aims to examine the incidence of postoperative irrigation and the safety and feasibility of early rectal instrumentation following laparoscopic Swenson ERPT.

MATERIALS AND METHODS

A single-center retrospective case cohort was identified. A review of the electronic medical record was performed of all children <18 years who underwent laparoscopic Swenson pull-through for a diagnosis of HSCR from January 1, 2018 to October 31, 2023. Patients who had an open Swenson procedure or a laparoscopic procedure converted to open procedure were excluded.

Timing of surgical intervention (prior to discharge *v.s.* electively after allowing time for children to grow) depends on a combination of patient clinical factors and surgeon discretion. Children are admitted the day before surgery to complete both mechanical and oral bowel preparation. Postoperatively, patients are kept nil per os initially with initiation of Pedialyte on postoperative day 1 if the patient is clinically well. Patients are advanced to formula or breastmilk once they have evidence of return of bowel function. Following discharge, all patients are seen in the colorectal clinic at 2 weeks postoperatively at which point they are assessed for an anastomotic stricture and need for rectal dilations. Our institutional approach is to only dilate patients with an anastomotic stricture, which is defined as a narrowing or constriction of the colonic lumen. In this series, stricture is classified based on total inability to pass a 7 mm Hegar dilator or evidence of bleeding with passage of the 7 mm dilator. Should dilation be deemed necessary by the attending surgeon, family is extensively educated to begin with the 7 mm Hegar dilator and perform dilations two times per day for 30 s. They are instructed to increase by one size each weekly until the 12 mm dilator is able to be accommodated. Once the patient has tolerated the 12 mm dilator for 2 months, frequency is gradually decreased.

Early rectal irrigation was defined as any irrigations performed during the immediate postoperative admission. Indications for rectal irrigations were obstructive symptoms including vomiting, obstipation, and abdominal distention along with an abdominal radiograph demonstrating dilated colonic loops. Irrigations were also performed if there was any concern for postoperative Hirschsprung-associated enterocolitis (HAEC). Rectal irrigations with saline were performed by either a pediatric surgery fellow ($n=2$) or pediatric colorectal surgery

faculty ($n=3$) using a 12-18F red rubber catheter with size determined based on the patient's age. Frequency of irrigation ranged from two times per day to four times a day, depending on suspected completeness of decompression, quality of output, and clinical judgment of the rounding faculty.

Patient demographics including sex, age at time of surgery, and weight at time of surgery were collected. Total operative time, in minutes, and history of prior diversion were also collected. Primary outcome was need for postoperative rectal irrigation. Secondary outcomes included time from surgery to initiation of rectal irrigation (hours), duration of rectal irrigation (days), and incidence of anastomotic leaks. Clinical suspicion for an anastomotic leak was evaluated by obtaining an ultrasound looking for pelvic fluid collection(s). If positive, the surgeon either opted to perform an examination under anesthesia (EUA), or a CT scan followed by EUA. Additional hospital outcomes included time to enteral feeds (days), time to goal enteral feeds (days), and hospital length of stay (days). Categorical variables, such as patient sex and need for postoperative rectal irrigation, are reported as number of observations/percent. Numeric (continuous) variables, such as age and weight at surgery, are reported as median/interquartile range (IQR). Differences between groups were analyzed using Wilcoxon-Mann-Whitney tests or χ^2 tests based on the type of variable (continuous *v.s.* categorical).

RESULTS

A total of 37 patients underwent a successful laparoscopic Swenson pull-through for HSCR during the study period. Most patients were male ($n=23$, 62.2%) with the median age of 3 months (IQR: 0.5, 5.0) and median weight of 5.4 kg (IQR: 3.6, 6.9) at the time of surgery. Rectosigmoid HSCR was the most prevalent diagnosis ($n=29$, 78.4%), while long segment ($n=6$, 16.2%) and total colonic ($n=2$, 5.4%) were less common. Most patients underwent primary pull-through ($n=25$, 67.6%) without prior diversion. The median operative time was 268 min (IQR: 215.0, 302.0).

There were 11 children (29.7%) required postoperative rectal irrigation during their hospital stay, based on clinical examination. Median time to initiation of irrigation was 46 hours (IQR: 32.0, 114.0) after surgery, while duration of postoperative irrigation was 3 days (IQR: 2.0, 4.5). Most of these children (81.8%) received irrigation four times a day, while regimens of three times a day (9.1%) and two times per day (9.1%) were less frequently used. No differences in irrigation requirement were identified between patients with short-segment (27.6%) and long-segment disease (33.3%) ($p>0.999$). In comparing patients who were and were not diverted, there were no differences in the frequency of patients who underwent irrigation (36.3% *v.s.* 28.0%, $p=0.616$). The overall leak rate for all children who underwent laparoscopic Swenson pull-through was 8%. Of those who underwent

Table 1 Comparison of demographics and outcomes between patients who required rectal irrigation and those who did not

Characteristics	Required rectal irrigations (n=11)	No rectal irrigations (n=26)	P value
Female, n (%)	2 (18.1)	12 (46.2)	0.108
Age at time of surgery (months), median (IQR)	4.0 (0.5, 4.0)	2.5 (0.4, 7.0)	0.787
Weight at time of surgery (kg), median (IQR)	5.0 (3.5, 7.0)	5.7 (3.6, 6.9)	0.936
Time to first enteral feed (days), median (IQR)	3.0 (1.0, 3.0)	1.0 (1.0, 2.0)	0.317
Time to goal enteral feeds (days), median (IQR)	5.0 (4.0, 12.0)	3.0 (2.0, 6.0)	0.091
Anastomotic leak, n (%)	1 (9.0)	2 (7.7)	0.887
Postoperative HAEC, n (%)	2 (18.2)	4 (15.4)	0.832
Hospital LOS (days), median (IQR)	8.0 (7.0, 23.0)	6.0 (3.0, 11.0)	0.086

Postoperative HAEC is defined as the diagnosis of HAEC occurring within 30 days postoperatively. HAEC, Hirschsprung-associated enterocolitis; LOS, length of stay.

irrigation ($n=11$), one patient (9.1%) suffered an anastomotic leak diagnosed on postoperative day 7. In this child, irrigation was initiated two times per day on postoperative day 3 for concern of enterocolitis. Comparatively, incidence of anastomotic leak in patients who did not undergo irrigation (7.7%) was statistically similar ($p=0.887$). Comparisons of characteristics and outcomes between patients who did and did not receive irrigations are summarized in [table 1](#).

The time to initiation of enteral feeds was 2 days (IQR: 1.0, 3.0), while time to reach goal enteral feeds was 4 days (IQR: 2.0, 7.0). Postoperative HAEC within 30 days of surgery was diagnosed in six patients (16.2%), though there was no difference in incidence between infants who underwent irrigation (18.2%) and those who did not (15.4%) ($p=0.832$). Median hospital length of stay was 7 days (IQR: 3.0, 13.0).

DISCUSSION

In this small cohort study of patients undergoing laparoscopic Swenson ERPT for HSCR, 29.7% underwent rectal irrigation for postoperative obstructive symptoms with no increase in leak rate. These preliminary findings may help challenge existing practice dogmas regarding instrumentation in the setting of a recent low anastomosis.

Currently, rectal irrigation is used as a preoperative intervention to facilitate delayed single-stage ERPT in infants with HSCR.⁹⁻¹¹ This study is the first step in investigating the safety and efficacy of postoperative rectal irrigation in surgical patients with HSCR. Postoperative obstruction is well documented following ERPT, occurring in up to 30% of patients,¹²⁻¹⁴ which aligns with our results. Early obstruction may be due to postoperative ileus or edema at the anastomosis, while ongoing symptoms are more indicative of a mechanical cause such as a stricture, retained aganglionic spur, or adhesions.^{13,14} Additionally, postoperative HAEC should always be considered, with incidences ranging from 21% to 50%.¹⁵⁻¹⁷ Failure to expeditiously recognize and decompress these patients can lead to clinical decline. Nonetheless, discerning between

various etiologies based on physical examination and imaging can be challenging, and prompt decompression should not be delayed if there is concern for obstruction or HAEC. Thus, strategies to rapidly and safely decompress patients following ERPT are warranted.

Although there should be no hesitation to initiate rectal irrigations in the case of postoperative HAEC, there is often significant concern regarding early instrumentation of a fresh anastomosis. Older studies have previously described performing irrigations 7–10 days after surgery.^{18,19} Currently, there is no high-quality evidence in the literature to support the safety of this intervention in the immediate postoperative period. A single-center, retrospective study evaluating postoperative complications of transanal pull-through for HSCR reported two deaths due to anastomotic leaks which were thought to be related to rectal irrigations initiated on postoperative day 2.⁸ Recently, a small series by Lindert *et al.* described the use of postoperative irrigation in five patients on postoperative day 1 to facilitate passing air and relieving symptoms of bloating and distention.²⁰ Our own institutional protocol is to ideally delay rectal instrumentation until at least 2 weeks after surgery, except when there is concern for HAEC or obstruction, to allow the anastomosis time to heal. Though, with nearly a 30% of patients requiring rectal irrigation, these findings reiterate that rates of postoperative clinical obstruction are not insignificant.

Anastomotic leak only occurred in two patients overall during the study period, which is on the lower range of existing reports (1%–29%).²¹⁻²³ Though only one patient who underwent rectal irrigation developed a leak, it is unknown whether the leak was the direct result of the rectal irrigation or if the patient's obstructive symptoms were consequently related to the leak. Given that the incidence of postoperative leak in this cohort is comparable to reported leak rates in existing series of non-instrumented patients' published series, our findings suggest that rectal irrigations can be safely performed in the early postoperative period following ERPT.

This study has several limitations, primarily that it is a single-center retrospective study with a small number of patients, which may increase the risk of a type II error. Although there was no significant difference in leak rate between patients who had rectal irrigations and those who did not, this should be interpreted with caution due to the sample size. Furthermore, from retrospective chart review, it is challenging to assert definitive causation; thus, we cannot discern if the patient with an anastomotic leak in the rectal irrigation group developed obstructive symptoms as a result of an unrecognized leak or if the leak developed as a result of the rectal irrigations.

In conclusion, in this small pilot study focused on postoperative obstruction in patients undergoing laparoscopic Swenson ERPT, early rectal irrigations were safely performed with minimal morbidity. As further study is still needed, our recommendation is that rectal irrigations should be performed with caution though should not be delayed if there is concern for postoperative obstruction or enterocolitis.

Contributors NRS contributes to conceptualization, data collection, data analysis, writing original draft, and editing final draft. KMM contributes to data collection, writing original draft, and editing final draft. GK and PDR contribute to data collection and editing final draft. PE contributes to data analysis, writing original draft, and editing final draft. MDJ and MWR contribute to conceptualization, data analysis, writing original draft, and editing final draft. MWR contributes to guaranteeing.

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