Comparison between Anal Dilatation Protocols Following an Endorectal Pull-through for Hirschsprung Disease

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ABSTRACT

Objective: The purpose of this study was to compare the mechanical obstruction rate following a transanal endorectal pull-through (TERPT) in patients with Hirschsprung disease, between regular anal dilatation (AD) and selective anal dilatation (NAD) which meant that dilatation was only performed when an obstructive symptom occurred.

Materials and Methods: A retrospective chart review of patients with Hirschsprung disease who underwent TERPT/abdominal assisted TERPT at Siriraj Hospital between January 2009 and December 2021 was carried out. It was the surgeon's preference that the dilatation protocols between the 2 groups (AD or NAD) were assigned. Mechanical obstructions included evidence of stricture, a clinical symptom of constipation, presence of Hirschsprung-associated enterocolitis (HAEC), and/or requirement of re-operation.

Results: In total, 132 patients were included in this study, including 55 cases in the AD group (41.7%) and 77 cases in the NAD group (58.3%). Postoperative mechanical obstructions occurred in 84 patients (63.6%). Among the mechanical obstructions, there were 35 strictures (26.5%), 26 constipation (19.7%), 40 HAECs (30.3%), and 6 re-operation (4.5%). The mechanical obstruction rates in the AD [33/55 (60.0%)] and NAD [51/77 (66.2%)] groups were not significantly different (p = 0.582). The AD group was of a significantly younger age (p = 0.022) and lower body weight (p = 0.048) than the NAD group; however, a younger age and lower body weight were not significantly related with any of the obstructive complications. AD had a rate of anastomosis/cuff stricture [13/55 (23.6%)] similar to NAD [22/77 (28.6%)] (p = 0.665). When the statistics tests for the non-inferiority of the difference in stricture events between NAD and AD were performed, non-inferiority was demonstrated (p = 0.049). AD and NAD also had similar rates of other mechanical obstructions, including constipation (p = 0.767), HAEC (p = 0.224), and re-operation (p = 0.234), respectively.

Conclusion: Regular anal dilatation and selective anal dilatation had comparable rates of all types of mechanical obstruction.

Keywords: Hirschsprung; stricture; anal dilatation; endorectal pull-through; complication (Siriraj Med J 2024; 76: 97-105)

INTRODUCTION

Surgery is the mainstay definitive treatment for Hirschsprung disease. The effective surgical treatment includes resection of the aganglionic portion of the bowel and identification of the proximal normally ganglionic bowel, followed by a leveled coloanal anastomosis. Operative approaches to correct Hirschsprung disease are derived from the original concepts of Swenson, Duhamel, and Soave–Boley.[1-3] The standard Soave-Boley endorectal pull-through procedure used both abdominal

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and transanal approaches.[2,3] The Soave-Boley endorectal pull-through procedure was transformed into a solely transanal approach named "transanal endorectal pull-through (TERPT)" by De la Torre and Ortega in 1988.[4-6] If the transanal approach cannot be performed perfectly, a combination of abdominal and transanal approaches, named "abdominal assisted transanal endorectal pull-through" (abdo + TERPT), is used.

On a transanal endorectal pull-through, mucosal traction sutures are placed to define the submucosal plane. A circular incision is made at 0.5 cm proximal to the anal dentate line. This submucosal plane is then developed using both blunt and sharp dissection. A submucosal dissection of the rectum after a circumferential incision of the rectal mucosa is performed. Following submucosal dissection, a seromuscular layer of the rectum is incised circumferentially. Mucosectomy of the rectum, leaving a muscular cuff, is also performed. The ganglionic colon is pulled through the aganglionic rectal cuff and a coloanal anastomosis is then carried out.[4-6]

An anastomotic stricture after a pull-through procedure is an important postoperative complication. Risk factors of an anastomotic stricture include anastomotic ischemia, muscular cuff ischemia, anastomotic leak, and small circular anastomosis.[7] In the author's previously reported studies, anastomotic stricture was found to be the most common complication in this procedure.[8,9] In particular, anastomotic stricture was frequently found in those with a low transitional zone,[8] and it was found that the TERPT had a higher risk (12%) of anastomotic strictures than the abdominal assisted transanal endorectal pull-through (5%).[8] Following a TERPT, De la Torre, who has been a pioneer in this operation for more than 3 decades, still questions whether the anus should be routinely dilated or not.[10]

In the Division of Pediatric Surgery, Department of Surgery, Siriraj University Hospital, there are two strategies for anal dilatation in children: regular anal dilation (AD) and selective anal dilation (NAD). However, there is no definite criteria that determines which of the two options is appropriate for certain patients. The choice might depend on age and weight at operation, the attending surgeon's preference, the operation technique, and the difficulty of the operation.

Although the AD method is a popular option, some argue that it can have a great impact on the mental health of both the patients or parents. The patients and parents are all affected mentally while the patient must be held still in order to dilate the anus for a long period of time.[11,12]

The aim of this study was to determine which option of anal dilatation, whether AD or NAD, is the most appropriate option to prevent mechanical obstruction following a transanal endorectal pull-through or an abdominal assisted transanal endorectal pull-through. Individual mechanical obstructions were further studied and compared between these two options of anal dilatation.

MATERIALS AND METHODS

After obtaining an approval from the Siriraj Institutional Review Board (COA. no. Si 969/2021), a retrospective study was carried out in children diagnosed with Hirschsprung disease who underwent either a transanal endorectal pull-through or abdominal assisted transanal endorectal pull-through at Siriraj Hospital between January 2009 to December 2021. In this study, mechanical obstruction was defined as: severe stricture (either coloanal anastomosis or seromuscular cuff stricture), constipation with the usage of laxatives, enemas, and/or bowel irrigation for more than 3 months[13], Hirschsprung's enterocolitis with a Hirschsprung-associated enterocolitis (HAEC) score[14] greater than or equal to 10, and re-operation related to coloanal anastomosis or seromuscular cuff stricture. Patients with Hirschsprung disease who previously underwent a definitive operation at another hospital, and those with incomplete medical information were excluded from the study.

In the AD group, the size of the anastomosis was measured and calibrated at 2-3 weeks following an operation by a finger or a Hegar dilator. In some cases, the operation was done under general anesthesia. Then, the anus was dilated with a Hegar dilator 1-2 times a day at home by the parents. The duration of dilatation was at least 6 months.[15-18] The main concept of the AD was to gradually expand the anus to the size equivalent to a normal anus, to prevent stricture, severe intractable constipation, and HAEC. It was believed that if a stricture has already occurred, most patients remained asymptomatic until the stricture became too severe to be dilated with ease.[19]

In the NAD approach, the size of the anastomosis was measured and calibrated at 2-3 weeks following surgery. Anal dilatation had not been started until a patient developed symptoms of mechanical obstruction or had a stricture documented while following up at the outpatient department (OPD) then the patient would be dilated daily by their parents.[13,19,20]

Patients' demographic data, age and weight at operation, transitional zone level, types of operation, options of anal dilatation, and postoperative mechanical obstructions, such as stricture, constipation, Hirschsprung's enterocolitis, and re-operation following a TERPT were collected. The collected data were analyzed using SPSS

software version 18 (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc). Continuous data were expressed as the median and interquartile range (IQR) and categorical data were expressed as numbers and percentages. For the qualitative data, the chi-square test or Fisher's exact test was used to compare the difference in proportions between independent groups. For the quantitative data, the Mann–Whitney U test was used to compare the mean between each group. A *p*-value of <0.05 indicated statistical significance.

A statistics test for non-inferiority was also performed. Non-inferiority was demonstrated when the lower bound of the 95% one-sided confidence interval (CI) for the difference in the stricture rate between the AD and the NAD was lower than the pre-specified non-inferiority margin of 10%. The *p*-value of the non-inferiority test was considered when less than a significant level of 0.05.

RESULTS

A total of 132 Hirschsprung patients were included in this study. Postoperative mechanical obstructions occurred in 84 patients (63.6%), including 35 cases (26.5%) of stricture, 26 constipation (19.7%), 40 HAEC (30.3%), and 6 patients who required re-operation (4.5 %). Fifty-five patients (41.7%) were in the AD group, whereas the other 77 patients (58.3%) were in the NAD group. The patient's demographic data in both regular anal dilatation group and selective anal dilatation group are demonstrated in Table 1. Median ages of the patients in the AD and the NAD group were 1.4 months and 2.8 months, respectively. The difference was statistically significant ($p = 0.022$). The median weight of the patients in the AD group and the NAD group were 4.2 and 4.9 kg, respectively. Although this seemed not clinically significant difference, the difference was statistically significant ($p = 0.048$). Other factors, including gender, level of transitional zone, and whether an abdominal assisted approach was used, between these two groups were not statistically different ($p = 0.492$, $p = 0.212$, and $p = 0.084$, respectively). On comparing the incidences of postoperative mechanical obstructions between the AD group and the NAD group (Table 2), the incidences of mechanical obstruction were 60.0% and 66.2%, respectively ($p = 0.582$).

TABLE 1. Patients' demographic data: Comparison between the regular anal dilatation group and selective anal dilatation group.

	Regular anal dilatation (n = 55)	Selective anal dilatation (n = 77)	Total (n = 132)	*p*-value
Gender, n (%)				0.492
Male	39 (70.9%)	49 (63.6%)	88 (66.7%)	
Female	16 (29.1%)	28 (36.4%)	44 (33.3%)	
Age (months)				
(median (IQR))	1.4 (3.9)	2.8 (12.8)	2.3 (7.3)	0.022
Weight (kg)				
(median (IQR))	4.2 (2.8)	4.9 (4.6)	4.5 (4.2)	0.048
Transitional zone, n (%)	(n = 53)	(n = 76)	(n = 129)	0.212
Rectum	12 (22.6)	17 (22.4%)	29 (22.5%)	
Rectosigmoid colon	31 (58.5%)	40 (52.6%)	71 (55.0%)	
Descending colon	9 (17.0%)	10 (13.2%)	19 (14.7%)	
Long segment Hirschsprung	1 (1.9%)	9 (11.8%)	10 (7.8%)	
Operation, n (%)				0.084
TERPT	41 (74.5%)	45 (58.4%)	86 (65.2%)	
Abdominal/Laparoscopic-assisted TERPT	14 (25.5%)	32 (41.6%)	46 (34.8%)	

TABLE 2. Comparison of the incidences of post-operative mechanical obstructions between the regular anal dilatation group and selective anal dilatation group.

Mechanical obstruction	Regular anal dilatation (n = 55)	Selective anal dilatation (n =77)	Total (n = 132)	*p*-value
Yes; n (%)	33 (60%)	51 (66.2%)	84 (63.6%)	0.582
No; n (%)	22 (40%)	26 (33.8%)	48 (36.4%)	

Because the demographic data of the patients in the AD group and the NAD group showed differences in median age at operation and weight at operation with statistical significance, it could not be directly concluded that the AD group and the NAD group had similar incidence of mechanical obstruction without considering the effects of the difference in age, weight, and types of operation. Therefore, further analysis was performed to assess whether each type of mechanical obstruction was a result of the protocol for anal dilatation and the identified factors (age, weight, type of operation).

Factors associated with stricture:

Comparisons between those with and without stricture are presented in Table 3. Anastomosis/cuff stricture was found in 35 patients (26.5%). The AD group had 13/55 patients with stricture, whereas the NAD group had 22/77 patients with stricture ($p = 0.665$). The median age of the patients with and without stricture were 2.3 months and 2.3 months, respectively ($p = 0.472$). The median weight at operation of the stricture group (4.4 kg) wat not significantly different from those without stricture (4.6 kg) ($p = 0.560$).

The statistical analysis results for the non-inferiority test for stricture are shown in Table 4. Non-inferiority was demonstrated when the lower bound of the 95% one-sided CI for the difference in postoperative stricture rate between the selective anal dilatation group and regular anal dilatation group was lower than the pre-specified non-inferiority margin of 10%. When the statistics tests for the non-inferiority of the difference in stricture events between the selective anal dilatation group and regular anal dilatation group were performed, non-inferiority was demonstrated, as the difference in the stricture events between these two groups was 0.049. The *p*-value of the non-inferiority test was less than the level of 0.05 that would indicate significance, which indicated that selective anal dilatation was not worse than regular anal dilatation.

TABLE 3. Factors associated with stricture: Comparison between the regular anal dilatation group and selective anal dilatation group and between age, body weight, and type of operation.

Factors	Stricture (n = 35)	Non-stricture (n = 97)	p-value
Anal dilatation, n (%)			0.665
Regular anal dilatation (n = 55)	13 (37.1%)	42 (43.3%)	
Selective anal dilatation (n = 77)	22 (62.9%)	55 (56.7%)	
Age (months)			
(median (IQR))	2.3 (5.8)	2.3 (11.3)	0.472
Body weight (kg)			
(median (IQR))	4.4 (2.8)	4.6 (4.4)	0.560
Operation, n (%)			0.264
TERPT (n = 86)	26 (74.3%)	60 (61.9%)	
Abdominal/Laparoscopic-assisted TERPT (n = 46)	9 (25.7%)	37 (38.1%)	

TABLE 4. Non-inferiority test* for postoperative stricture.

Factors	Stricture (n)	Non-stricture (n)	Total count (n)	Proportion
Selective anal dilatation	22	55	77	P1 = 0.286
Regular anal dilatation	13	42	55	P2 = 0.236

One-sided 95% Confidence Interval for the difference = -0.1169 to 0.2024.
Difference P1-P2 = 0.0494**.
* Non-inferiority was demonstrated when the lower bound of the 95% one-sided CI for the difference in the postoperative stricture rate between the selective anal dilatation group and regular anal dilatation group was lower than the pre-specified non-inferiority margin of 10%.
** The *p*-value of the non-inferiority test was less than the significant level of 0.05 then non-inferiority was demonstrated.

Factors associated with constipation:

Comparisons between those with and without constipation are presented in Table 5. In our study, 26 patients (19.7%) had postoperative constipation, comprising 12 patients in the AD group and 14 patients in the NAD group. The difference was not statistically significant ($p = 0.767$). There was no significant difference in age, weight and types of operation between those with and without constipation.

Factors associated with HAEC:

Comparisons between those with and without HAEC are presented in Table 6. In the AD group, 13 patients with HAEC were recorded, whereas 27 patients in the NAD group had this condition. There was no difference in the incidence of HAEC between each protocol of anal dilatation ($p = 0.224$). Interestingly, the operative technique was the only factor associated with the incidence of HAEC, whereby 21/46 (45.7 %) of the patients in the abdominal assisted TERPT group developed HAEC, which was significantly higher than that of the TERPT group [19/86 (22.1%)] ($p= 0.009$).

Factors associated with re-operation:

In our series, re-operation for mechanical obstruction was performed in 6 cases, comprising 5 re-pull-through operations and one posterior myectomy done due to anastomotic stricture. Comparisons between those with and without re-operation are presented in Table 7 and revealed that the factors, including the protocol of anal dilatation (either regular anal dilatation or selective anal dilatation), age at operation, weight at operation, and type of operation, all showed no statistically significant differences.

DISCUSSION

Mechanical obstruction[10,21] is an important postoperative complication following a pull-through operation for Hirschsprung disease. The obstructive symptoms are often accompanied by abdominal distention, bloating, borborygmic, increased constipation, and HAEC. Mechanical obstruction has many causes[10,21], such as stricture of the anastomosis, rectal muscular cuff stricture, and twisting of the pull-through colon. An anastomotic stricture after the pull-through procedure is the most significant postoperative complication.[8,9] The risk factors include anastomotic ischemia, cuff ischemia, anastomotic leak, and small circular anastomosis.[7]

Apart from daily regular anal dilatation (AD) and selective anal dilatation (NAD) indicated by obstructive symptoms as described in our study, there are other practices. Weekly calibration and dilatation of the anus for 6 weeks by a pediatric surgeon is also recommended.[22] In this practice, the size of the anastomosis is first calibrated and dilated at 2–3 weeks after the surgery. The patient then makes an appointment every week for 6 weeks, during which the parents do not have to dilate the patient's anus at all.[22] At the follow-up appointment at the OPD, the pediatric surgeon will dilate the anus gently. If the pediatric surgeon feels that there is a stricture, whether an anastomotic stricture or cuff stricture, the pediatric surgeon will begin to regularly dilate the patient's anus and then the patient will be dilated daily by their parents.[22] Temple[22] reported that dilatation of the anastomosis every week without dilatation by the parents has a similar incidence of anastomotic strictures or leaks as cases involving daily anal dilatation by parents. In that study, only 3 of the 17 patients dilated by a doctor once a week were found to have a stricture later that caused the need

TABLE 5. Factors associated with constipation: Comparison between the regular anal dilatation group and selective anal dilatation group and between age, body weight, and type of operation.

Factors	Constipation (n = 26)	Non-constipation (n = 106)	*p*-value
Anal dilatation, n (%)			**0.767**
Regular anal dilatation (n = 55)	12 (46.2%)	43 (40.6%)	
Selective anal dilatation (n = 77)	14 (53.8%)	63 (59.4%)	
Age (months)			
(median (IQR))	2.1 (16.4)	2.3 (6.2)	0.786
Body weight (kg)			
(median (IQR))	5.2 (5.0)	4.5 (3.0)	0.238
Operation, n (%)			0.797
TERPT (n = 86)	18 (69.2%)	68 (64.2%)	
Abdominal/Laparoscopic-assisted pull-through (n = 46)	8 (30.8%)	38 (35.8%)	

TABLE 6. Factors associated with Hirschsprung-associated enterocolitis (HAEC): Comparison between the regular anal dilatation group and selective anal dilatation group and between age, body weight, and type of operation.

Factors	HAEC (n = 40)	Non-HAEC (n = 92)	p-value
Anal dilatation, n (%)			0.224
Regular anal dilatation (n = 55)	13 (32.5%)	42 (45.7%)	
Selective anal dilatation (n =77)	27 (67.5%)	50 (54.3%)	
Age (months)			
(median (IQR))	2.2 (6.9)	2.3 (8.7)	0.551
Body weight (kg)			
(median (IQR))	4.4 (3.1)	4.6 (4.4)	0.652
Operation, n (%)			0.009
TERPT (n = 86)	19 (47.5%)	67 (72.8%)	
Abdominal/Laparoscopic-assisted TERPT (n = 46)	21 (52.5%)	25 (27.2%)	

to change to a protocol with dilation of the anus every day by parents. Another practice is anal calibration under general anesthesia at the 6th week postoperatively.[23] The first calibration will be scheduled in the 6th week postoperatively, and performed using a finger or a Hegar dilator. When a stricture is detected, anal dilatation will be immediately performed. Obermayr[23] studied 20 patients with Hirschsprung disease who were scheduled to have the size of the anus calibrated under general anesthesia at the end of the 6th week following the surgery. It was found that 12 patients had no stricture but 8 patients had a stricture of the anus and serial anal dilatation was then further done on these. Two patients still required redo pull-through operation for an intractable rectal stricture.

In our study, postoperative mechanical obstructions occurred in 63.6%, comprising 26.5% patients with stricture, 19.7% with constipation, 30.3% with HAEC, and 4.5% needing a re-operation. From Table 2, the incidences of mechanical obstruction in the AD and NAD group were 60% and 66.2%, respectively. These two protocols of anal dilatation had similar results for postoperative

TABLE 7. Factors associated with re-operation: Comparison between the regular anal dilatation group and selective anal dilatation group and between age, body weight, and type of operation.

Factors	Re-operation (n = 6)	Non-reoperation (n = 126)	*p*-value
Anal dilatation, n (%)			0.234
Regular anal dilatation (n = 55)	4 (66.7%)	51 (40.5%)	
Selective anal dilatation (n = 77)	2 (33.3%)	75 (59.5%)	
Age (months)			
(median (IQR))	3.2 (30.3)	2.2 (7.2)	0.670
Body weight (kg)			
(median (IQR))	5.2 (7.0)	4.5 (4.1)	0.458
Operation, n (%)			0.420
TERPT (n = 86)	3 (50.0%)	83 (65.9%)	
Abdominal/Laparoscopic-assisted TERPT (n = 46)	3 (50.0%)	43 (34.1%)	

mechanical obstruction. Because the patients in the AD group had a younger mean age, lower body weight at the operative period and different operative approaches, compared to in the NAD group (Table 1), and so we could not conclude directly that regular anal dilatation and selective anal dilatation had similar incidence of mechanical obstruction without considering the effect of the difference in the patients' age, weight, and type of operation.

Anastomotic stricture following TERPT has been reported an incidence of between 4%-19%.[24-27] Anastomotic stricture may be caused by ischemia of the anastomosis, too much tension of the anastomosis, an incomplete suture technique at anastomosis[27], and ischemia of the rectal muscular cuff.[27] Rectal muscular cuff stricture[10,28] may be caused by too long a rectal cuff.[13] It has been reported that the rectal muscular cuff should be cut at the posterior side to ensure a minimal length of the remaining rectal muscular cuff.[13] In the author's previous reported studies, anastomotic stricture was the most common complication,[8,9] representing 32.6% of all complications.[8] A high incidence of anastomotic stricture in the author's previous study may be the results of too tight coloanal anastomosis in patients without laparotomy and a minor degree of anastomotic ischemia.[8]

In the present study, anastomosis/cuff stricture was found in 26.5% patients. The AD group had a similar rate of anastomosis/cuff stricture to the NAD group ($p = 0.665$). Although, regular anal dilation practice tended to be used in patients with a younger age in the present study (median age = 1.4 months) than selective anal dilatation (median age = 2.8 months), this confounding factor was not the factor influencing anastomosis/cuff stricture. The median age at the operation and median weight at the operation of the patients with stricture and those without stricture were the same (Table 3). It seems that surgeon tends to practice regular anal dilatation in endorectal pull-through in younger children to prevent anastomosis/cuff stricture, but actually the stricture rate here did not relate to which anal dilatation protocol was used, and selective anal dilatation had the similar stricture rate as regular anal dilatation. Among all the postoperative mechanical obstructions (stricture, constipation, Hirschsprung-associated enterocolitis, and re-operation), anastomosis/cuff stricture was the most relevant postoperative mechanical obstruction; therefore, a statistics test for non-inferiority for stricture was conducted. Non-inferiority was demonstrated when the lower bound of the 95% one-sided CI for the difference in the postoperative stricture rate between the NAD group and AD group was lower than the pre-specified non-inferiority margin of 10%. In this study, the one-sided 95% confidence interval (CI) for the difference ranged from -0.1169 to 0.2024. Non-inferiority was demonstrated as the difference in stricture events between these two groups was 0.049 and the *p*-value for the non-inferiority test was less than the significant level of 0.05, which indicated that selective anal dilatation was not worse than regular anal dilatation. Our study's results corresponded with those reported by Aworanti[29], who revealed that the rate of anastomotic strictures was not reduced when anal dilatations were prescribed routinely. However, routine

dilatations will prevent early onset strictures. The mean durations between surgery and stricture of the routine anal dilatation group and selective anal dilatation group were 348 and 74 days, respectively.[29]

In our study, constipation was defined as the usage of laxatives, enemas, and/or bowel irrigation for more than 3 months. In the regular anal dilatation group, 21.8% patients had constipation, but in the selective anal dilatation group, 18.2% patients had constipation. The difference was not statistically significant. In order to reduce the confounding factors of age and weight at operation, the median age and weight at operation of the constipated group and non-constipated group were compared and there was no difference in age or weight found between the constipated group and non-constipated group. However, constipation following TERPT occurred from many conditions, such as neuronal intestinal dysplasia, retained aganglionosis[8], and twisting of the pull-through colon[10,21], therefore, the practices of anal dilatation would be only one factor among other factors.

There was no different rate of HAEC in each protocol of anal dilatation, i.e., regardless of whether regular anal dilatation or selective anal dilatation was used. The median age and weight at operation in the regular anal dilatation group and in the selective anal dilatation group were the same. Our results were similar to the findings in Aworanti's study[29], which indicated that anal dilatation prescribed routinely could not reduce the risk of HAEC. Re-operations were performed in 6 cases in our series, comprising redo pull-through operations in 5 cases and one posterior myectomy, which was performed due to an anastomotic stricture.

Our study does have some limitations to note. First, it was a retrospective design, which meant some information may be missing. Patients with Hirschsprung disease who were referred back to other hospitals or who were lost to follow-up, and those who had incomplete medical information were excluded from the study. Only patients who still regularly followed up at Siriraj Hospital were included in the study. Second, there was no definite criteria about which patients should receive one of the two protocols: regular anal dilatation or selective anal dilatation. How to select which protocol of anal dilatation might be depended on each surgeon, the patient's age at operation, weight at operation, the operative technique, and the difficulty of the operation. This selection bias suggests that a prospective randomized controlled study should be performed in the future. Third, information about the duration of anal dilatation was lacking. Fourth, the generalizability of the results is restricted. The study was conducted in one university hospital, and thus, the method and technique of the pull-through operations as well as anal dilatations may differ from those used in other institutions.

CONCLUSION

Regular anal dilatation and selective anal dilatation had the same rates for all types of mechanical obstruction. However, in our study, selection bias in the patient selection for the protocol of anal dilatation should be further studied by performing a prospective randomized study.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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