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Research Article

Evaluation of Early Postoperative Complications with or without Trans-Anastomotic Tube Following Primary Trans-Anal Pull-Through for Hirschsprung Disease

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Abstract

Background: Complications following Trans-anal pull-through (TAPT) for Hirschsprung disease (HD) are the major cause of postoperative morbidity. The purpose of the study was to determine whether trans-anastomotic tube drainage can reduce early postoperative complications after TAPT for HD.

Methods: A total of 30 patients who underwent TAPT for HD, who were randomly divided into group A (n = 15) that is intervention group and group B (n = 15) that is the control group between January 2021 to July 2022-time frame. Group A had a trans-anastomotic tube after surgery whereas group B didn't have it. Same postoperative protocol was followed for all the patients except the trans-anastomotic tube which was kept for 3 days in group A patient after the operation. To observe the early complications a follow up plan was scheduled at 3rd POD, within 14 days and 1-month post operatively for both groups.

Results: Postoperative complications up to 3rd POD indicates significant lesser incidence of soiling (33.3% vs 86.7%, $P < 0.05$) in group A compared to group B. Development of postoperative complications within 14 days shows lower rate of complication development in group A than that of group B (33.3% vs 66.67%, $P < 0.005$). Beyond 1 month after operation, the overall incidence of soiling and perianal excoriation were not significantly different (13.3% vs 33.0%, $P = 0.195$).

Conclusion: Trans-anastomotic tube following TAPT reduces the early postoperative complications in a few cases, which doesn't give any significant benefit in the postoperative management of Hirschsprung disease.

Keywords: *Hirschsprung; Trans-Anal Pull-Through; Trans-Anastomotic Tube; TAPT; HD*

Introduction

Hirschsprung disease 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. In most cases, the aganglionosis involves the rectum or rectosigmoid [1]. Its estimated incidence is 1 in 5000 live births. Generally, the diagnosis of HD is made in the newborn period because of intestinal obstruction having the features of failure to pass meconium within the first 48 hours, abdominal distension, vomiting and neonatal enterocolitis [2]. Diagnosis is based on clinical examination, radiographic studies, and histological interpretation of biopsy specimens. The surgical treatment of HD has continued to evolve since the late 1940's when Swenson and Bill performed the first definitive procedure in 1948 and later operations by Duhamel, Soave, and others. A variety of pull- through techniques have been implemented, with some advances being shorter hospital stays and improved continence [3]. The trans-anal pull-through (TAPT) emerged in the late 1990's in the evolution of the surgical correction of HD. This operation provides the advantages of a minimal access approach with shorter hospital stay, less pain, and with excellent outcomes in preservation, restoration, or enhancement of physical appearance. Though there are several approaches like multi-stage approach the results of the one-stage (primary) approach in infants appear to be favorable. In 1996 De La Torre-Mondragon., *et al*. operated using TAPT [4]. In 2000 Langer., *et al*. compared the open and one-stage TAPT in 37 children less than 3 years of age, suggested that the one-stage trans-anal approach is associated with a significantly shorter hospital stay and lower cost without and increase risk of complications. Thus, the use of one-stage definitive procedure for small infants with HD has increased [5]. Many patients continue with postoperative complications such as soiling, perianal excoriation, anastomotic leakage, constipation, Hirschsprung associated Enterocolitis (HAEC), etc. [6]. Improvement in perioperative management of HD would maximize functional outcomes and patient's quality of life. A trans-anal tube, also called a rectal catheter, is a long slender tube which is inserted into the rectum in order to relieve passage of gas and liquid fecal matters which has not been alleviated by other methods. Some authors refer to keep a trans-anal tube proximal to the anastomosis, preventing the fecal stream from making contact with the anastomosis. It remains in situ whilst healing occurs and expelled spontaneously. It appears that surgeons who employ them in their practice do so by choice, in part reflecting personal experience. Although trans-anal tubes have been used routinely in the surgical decompression, there is little recent literature to suggest their use as an instrument of colonic decompression. This tube simplifies the postoperative management by reducing postoperative complications. Objective evidence of the return of normal peristalsis is revealed when feces is discharged from the tube. There is no doubt that the trans-anal tube prevents distension of the bowel, eliminates injurious effects such as increased intraluminal pressures upon the circulation of the intestine and interferences with healing of the anastomotic suture line [7]. A study regarding the action of trans-anal tube drainage, was performed at Kyungpook National University Medical Center. Where the trans-anal tube was gently inserted into the anus. Its tip was placed about 4 to 6 centimeters proximal to the anastomosis. The tube was fixed to the buttocks with a nylon 2-0 suture, and the extra length of the tube was cut. Drainage was maintained by gravity, and if fecal discharge or the passage of flatus was continuously observed at approximately four to six days after surgery, the trans-anal tube was removed at the surgeon's discretion. [8]. Zhang Xi., *et al*. performed a prospective, randomized controlled and multicenter based study in 2019, which infers that, in the treatment of HD keeping a trans-anal tube immediately following a pull-through can effectively assist the passage of gas by anus and avoid abdominal distension [9]. Therefore, we assumed that a postoperative trans-anastomotic tube could prevent the occurrence of early post- operative complications following TAPT. This study was designed to detect the effect of trans-anastomotic tube in reducing early post-operative complications in Hirschsprung disease.

Objectives of the Study

General objective

- To evaluate the early postoperative complications following TAPT operation with the placement of trans-anastomotic tube.

Specific objective

- To evaluate perianal soiling by clinical examination.
- To assess perianal skin excoriation by clinical examination.

Materials and Methods

This was a randomized controlled trial type of study. The patients were selected randomized sampling technique was chosen by performing lottery procedures. A total of 30 (15 in each group) patients were included in this study. The study took place in the Department of Pediatric Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. At January 2021 to July 2022.

Inclusion criteria:

- Confirmed (Clinical and histopathological) case of rectosigmoid HD who underwent primary TAPT.
- Parents with the consent to participate in this study.

Exclusion criteria:

- Patients planned for primary TAPT converted into abdomino perineal pull through due to per operative complications.
- Parents not willing to participate in the study.

Study procedure

Patients were selected randomly by using lottery procedure that fulfilled the inclusion criteria of HD. They were divided into one intervention group and one control group. Group A with a trans-anastomotic tube after surgery, and group B without any tube. It was ensured that the patients underwent primary TAPT surgery for rectosigmoid HD with the same postoperative treatment protocols, except for whether or not to keep a trans-anastomotic tube postoperatively. Proper clinical history, physical examinations, and initial investigation reports were recorded in a standard data sheet. All the patients were counseled properly about the procedure. A rubber tube made of latex material (22 fr, inner diameter 7.3 mm) was placed in the pull through colon proximal to the anastomosis in group A patients, as trans-anastomotic tube. The distal end of the tube was cut along the two side holes for better drainage. The tube was fixated with a butterfly-shaped tape instead of sutures in order to reduce postoperative discomfort. To minimize and avoid potential risk, the trans-anastomotic tube was inserted by the researcher in presence of the guide. Wise instructions of the guide prominently facilitated the procedure of inserting the trans-anastomotic tube to the patients. Tube was removed by the third postoperative day. Anal dilation was maintained for all the patients. Perianal Soiling and excoriation was observed according to grading and severity. All Patients underwent a well-planned follow up of 3 days, 2 weeks, and one month after surgery.

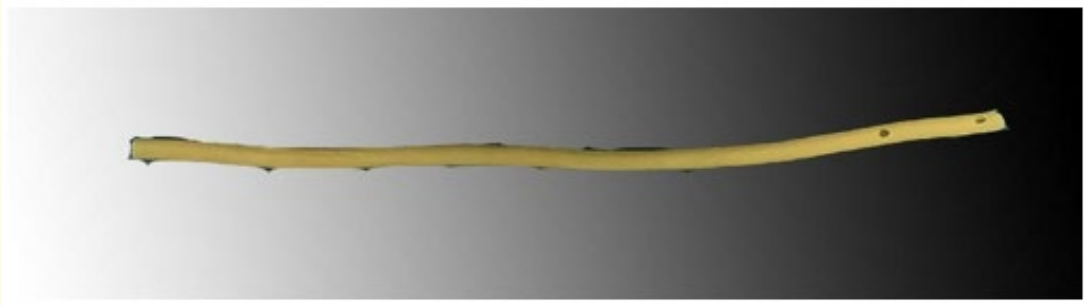

Figure 1: *Trans-anastomotic tube following TAPT for HD.*

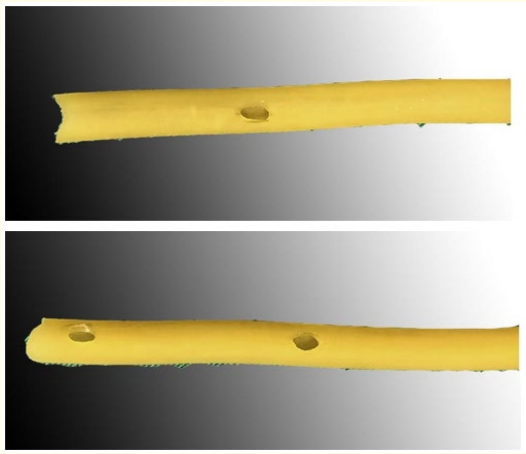

Figure 2: *Distal cut end of the trans-anastomotic tube.*

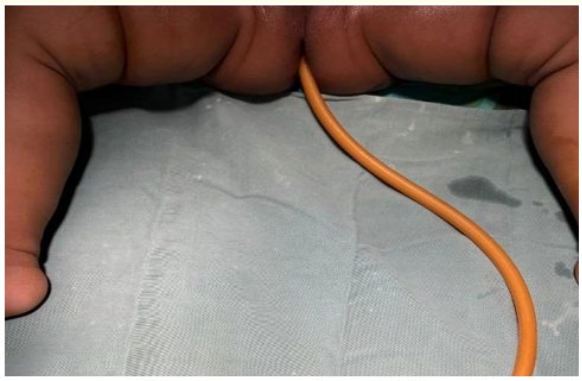

Figure 3: *Patient with trans-anastomotic tube.*

Statistical analysis

All the data were compiled and sorted properly. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. The data was presented in tabular form. Descriptive statistics, frequency and percentages were calculated to present all categorical variables including age groups, and weight was presented as mean ± SD. The post-operative complications up to 3rd POD, 5 to 14 days and 1 month were calculated for two groups with percentage and. P value was determined by Chi-square test. P-value less than 0.05 was considered as statistically significant.

Ethical considerations

Ethical clearance for the study was taken from the Institutional Review Board (IRB) of BSMMU prior to the commencement of this study. An informed written consent was taken from all the parents of the participants without exploiting any of their weakness. Privacy, anonymity and confidentiality of data information identifying any patient were maintained strictly. Each patient's guardian had the privilege to participate or refuse or even withdraw from the study at any point of time.

Results

Baseline characteristics	Group A (n = 15)		Group B (n = 15)		p value
	n	%	n	%	
Age in months					
≤ 20 months	6	40.0	5	33.3	
21 - 30 months	8	53.3	9	60.0	
> 30 months	1	6.7	1	6.7	
Mean ± SD	23 ± 6.23		24.47 ± 5.18		0.488^{ns}
Range (Min-Max)	12-32		16-34		
Weight (kg)					
Mean ± SD	9.87 ± 1.41		9.6 ± 1.3		0.589^{ns}
Range (Min-Max)	8 - 12		8 - 12		

Table 1: *Age and weight of the groups (N = 30).*

Table 1 showed baseline characteristics of the groups. It was observed that more than half (53.3%) of participants belonged to the age 21 - 30 months in group A and (60.0%) in group B. The mean weight was 9.87 ± 1.41 kg in group A and 9.6 ± 1.3 kg in group B. The differences of baseline characteristics were not statistically significant (p > 0.05) between two groups.

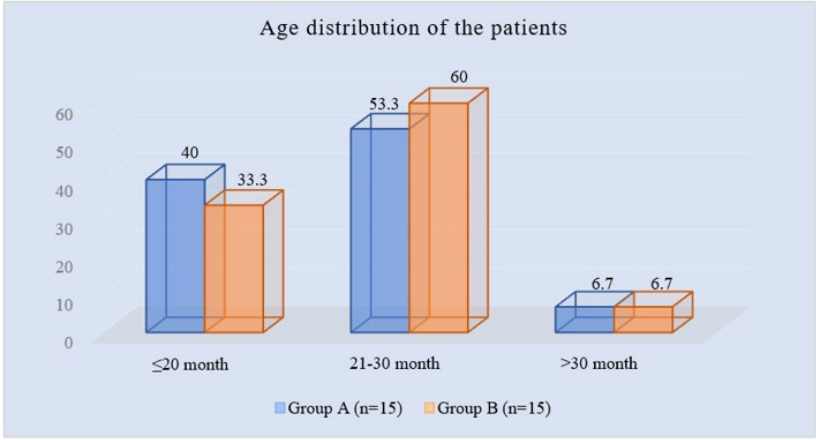

Figure 4: *Column chart showed age wise patients distribution (N = 30).*

Complications	Group A (n = 15)		Group B (n = 15)		p value
	n	%	n	%	
Soiling	5	33.3	13	86.7	0.002^{s}
Perianal Excoriation	0	0.0	0	0.0	

Table 2: *Postoperative complications up to 3rd POD (N = 30).*

Table 2 showed postoperative complications up to 3 days. It was observed that 5 (33%) patients had soiling in group A and 13 (86.7%) in group B. The differences of soiling were statistically significant ($p < 0.05$) in between group A and B.

Complications	Group A (n = 15)		Group B (n = 15)		p value
	n	%	n	%	
None	10	66.7	5	26.7	0.028[s]
Developed complications	5	33.3	10	66.67	
Soiling	5	33.3	8	53.3	
Perianal Excoriation	0	0.0	2	13.3	

Table 3: *Postoperative complications within 14 days (N = 30).*

Table 3 showed postoperative complications within 14 days. In development of postoperative complications, it was observed that one third (33.3%) of group A patients had complications. Among them 5 (33.3%) had soiling However, in group B, 10 (66.67%) patients developed complications. Eight (53.3%) had soiling, 2 (13.3%) had perianal excoriation. The differences of complications developed within 14 days was statistically significant ($p < 0.05$) in between group A and B.

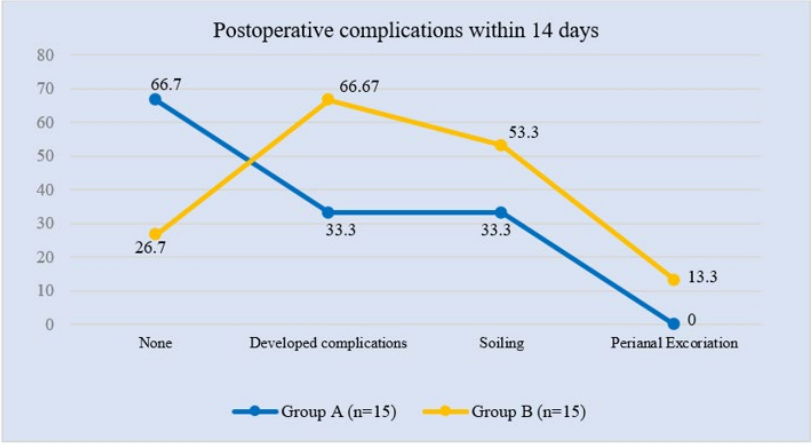

Figure 5: *Line chart showed postoperative complications within 14 days of the patients (N = 30).*

Complications	Group A (n = 15)		Group B (n = 15)		p value
	n	%	n	%	
None	13	86.7	10	66.7	0.195[ns]
Developed complications	2	13.3	5	33.3	
Soiling	2	13.3	3	20.0	
Perianal Excoriation	0	0.0	2	13.3	

Table 4: *Postoperative complications at 1 month (N = 30).*

Table 4 showed postoperative complications at 1 month. It was observed that one third (33.3%) of patients had developed complications in group B where 3 (20%) had soiling, 2 (13.3%) had perianal excoriation and 2 (13.3%) case of soiling was observed in group A. The differences of developed complications after 1 month was statistically not significant ($p < 0.05$) in between the groups.

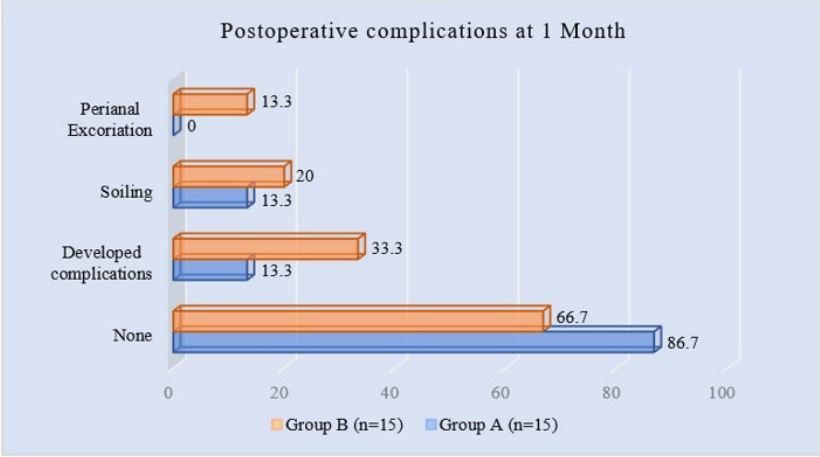

Figure 6: *Bar chart showed postoperative complications at 1 month of the patients (N = 30).*

Discussion

This randomized controlled trial type of study was carried out with an aim to assess perianal soiling and perianal excoriation following trans-anal pull through (TAPT) with or without trans-anastomotic tube. A total of 30 children age belonged 6 to 36 months having confirmed (clinical and histopathological) rectosigmoid Hirschsprung disease (HD) admitted in the department of pediatric surgery of Bangabandhu Sheikh Mujib Medical University (BSMMU) who underwent Trans-anal pull through (TAPT) surgery during January 2021 to July 2022- time frame were included in this study. The patients were divided in two groups by randomization. Fifteen patients, with a trans-anastomotic tube following the surgery, were considered as Group A and another fifteen patients without any trans-anastomotic tube were considered Group B. A rubber tube made of latex material was placed in the pull through colon proximal to the anastomosis in Group A patients, as trans- anastomotic tube The tube was fixated with a butterfly-shaped tape instead of sutures in order to reduce postoperative discomfort. The present study findings were discussed and compared with previously published relevant studies. In this present study it was observed that 53.3% of participants belonged to the age 21 - 30 months in group A and 60.0% in group B. The mean age was 23 ± 6.23 months and 24.47 ± 5.18 months in group A and B, respectively. The mean age difference was almost similar between two groups, no statistical significant ($p > 0.05$) difference was observed between group A and group B. In Zhang., *et al*. (2020) study [9], the mean age was 4.5 ± 1.7 months and 5.1 ± 1.6 months in group A and B, respectively, which are comparable with the current study. Similar observations regarding the age range also observed by Quiroz., *et al*. (2020) [10]. On the other hand, Zhang., *et al*. (2022) had done on newborns age ranging from 6 - 28 days with Hirschsprung disease (HD) underwent one- stage TAPT [11]. Beltman., *et al*. (2022) mentioned in their study that older age at time of surgery increases the risk of developing a postoperative complication [12]. Therefore, the investigators think that a higher age at surgery results in more anastomotic leakages, strictures and abdominal abscesses [13,14]. Kim., *et al*. (2021) [15], Demehri and Dickie (2021) [16], Chung., *et al*. (2015) [17] has observed older age group who underwent TAPT during the infantile period after the pathological diagnosis of HD. In this current study it was observed that the mean weight was 9.87 ± 1.41 kg in group A and 9.6 ± 1.3 kg in group B. The mean weight difference was almost alike between two groups, no statistical significant ($p > 0.05$) difference was observed between group A and group B. Beltman., *et al*. (2022) observed that the mean birth weight was 3.31

± 0.62 kg [12]. However, 19.0% and 81.0% had a low birth weight and normal birth weight respectively, which differ with the present study. The above study was explained by the enrolled newborn in their study. Similarly, Zhang., *et al*. (2022) also enrolled younger baby in their study [11]. Therefore, the median birth weight was 3.49 kg and the median weight at the time of surgery was 3.38 kg. Regarding the postoperative complications up to 3rd POD it was observed that 33.3% and 86.7% patients had developed complication in group A and group B respectively. Within 14th POD that complication developed 33.3% in group A and 66.67% in group B. At 1 month post-operative complications developed in group B were higher (33.3%) than complications developed in group A (13.3%). Postoperative complications up to 3 days, within 14 days and after 1 month were significantly ($p < 0.05$) more common in up to group B (patients without trans-anastomotic tube). Soiling was observed in 5 patients (33.3%) up to 3rd POD in group A and 86.7% in group B. Within 14 days it was also observed 33.3% and 53.3% in group A and group B respectively. Postoperative complications at 1 month were lower in group A and 33.3% found in group B. Soiling was significantly ($p < 0.05$) more common in group B up to 3rd POD and within 14th POD. However, at 1 month postoperatively it was more frequent in group B but not statistically significant ($p > 0.05$) between two groups. Perianal excoriation was not found in group A up to 3rd POD, within 14th POD and after 1-month. On the other hand, it was observed 13.3% within 14th POD and after 1 month in group B, but it was not statistically significant ($p > 0.05$) between the groups. Zhang., *et al*. (2020) study showed that perianal excoriation was noticed in 3.7% and 4.1% cases in group A and group B respectively ($p > 0.05$); no severe excoriation was found and they were cured with meticulous nursing care [9]. Meinds., *et al*. (2019) revealed that constipation and soiling persist in a substantial number of older children with surgically corrected HD [18]. The causes of soiling after repair for HD include pseudo-incontinence, abnormal sensation, and damaged sphincter. Saadai., *et al*. (2019) stated that pseudo- incontinence is the most common cause of soiling in children with HD and is defined as soiling despite intact sensation and sphincter function [19].

Limitation of the Study

- Surgeons heterogeneity.
- The sample size estimated in this study doesn't reflect the whole population.
- Short follow-up period.

Recommendation

To reduce early post-operative complications, trans-anastomotic tube following TAPT can be kept for few days which won't cause any harm to the patient.

Conclusion

Trans-anastomotic tube following trans-anal pull-through can reduce early postoperative complications in a few cases, which doesn't give any significant benefit in the postoperative management of Hirschsprung disease.

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