



# Open Journal of Surgery

## Research Article

# Impact of Additional Abdominal Approach to Transanal One Stage Endorectal Pull-Through in Treatment of Hirschsprung's Disease -

**Ho Huu Thien<sup>1</sup>, Cao Xuan Thanh<sup>1</sup>, Nguyen Thanh Xuan<sup>1</sup> and Nguyen Huu Son<sup>2\*</sup>**

<sup>1</sup>Department of Pediatric and Abdominal Emergency Surgery, Hue Central Hospital, Vietnam

<sup>2</sup>Pediatric Center, Hue Central Hospital, Vietnam

**\*Address for Correspondence:** Nguyen Huu Son, Pediatric Center, Hue Central Hospital, 16 Le Loi street, Hue city, Vietnam, Tel: +849-760-26853; ORCID ID: 0000-0002-7564-6231; E-mail: nghuuson@gmail.com

**Submitted: 13 June 2019; Approved: 27 June 2019; Published: 29 June 2019**

**Cite this article:** Thien HH, Thanh CX, Xuan NT, Son NH. Impact of Additional Abdominal Approach to Transanal One Stage Endorectal Pull-Through in Treatment of Hirschsprung's Disease. Open J Surg. 2019;3(1): 015-018.

**Copyright:** © 2019 Thien HH, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



## ABSTRACT

**Background:** The transanal one-stage endorectal pull-through (TOSEPT) procedure sometimes requires assistance by an abdominal approach to complete the operation. This study aims to rectify this by evaluating the impact of an assisted abdominal approach in the outcomes of the TOSEPT in children with HD.

**Methods:** A retrospective study was conducted at surgical pediatric department of Hue central hospital. All consecutive medical records of patients operated on for HD in our department between June 2010 and June 2018 were retrieved and analysed.

**Results:** 66/446 (14.79%) patients with HD who required TOSEPT with an additional abdominal approach to complete the operation for inclusion in this retrospective study. Length of the resected colon:  $13.30 \pm 3.45$  cm (open group) and  $19.70 \pm 4.50$  cm (laparoscopic group). Average operative time:  $156 \pm 12$  minutes (open group) and  $170 \pm 14$  minutes (laparoscopic group). No deaths or intra-operative complications were recorded in this study. No postoperative complication occurred in the laparoscopic group. Grade II complication based on Dindo-Clavien classification occurred in 14 (21.21%) of the open group and one (1.51%) grade III complication. The length of hospital stay was shorter in the laparoscopic group at  $5 \pm 1.5$  days compared to  $7 \pm 2.5$  days for the open group. All of the complications were grade I or II, mainly enterocolitis at 3-month follow-up.

**Conclusion:** Additional abdominal approach impacts on post-operative results of TOSEPT procedure for HD but not on outcome of disease. Laparoscopic surgery as the additional abdominal approach should be used to reduce the complications

**Keywords:** Hirschsprung's disease; Transanal one-stage endorectal pull-through; Additional abdominal approach

## INTRODUCTION

Since its introduction more than two decades ago the transanal one-stage endorectal pull-through (TOSEPT) procedure has gained worldwide acceptance in the treatment of children with Hirschsprung's Disease (HD) [1,2]. Laparoscopic endorectal pull-through has recently been proved a feasible and safe treatment for HD [3-7], however, TOSEPT is still the procedure of choice for patients with a mid-low rectosigmoid transition zone due to its simplicity and effectiveness coupled with a short operative time and recovery duration [8-12].

Unfortunately, not all procedures could be performed entirely by TOSEPT, some cases require an additional abdominal approach to complete the surgery. This study aims to identify the causes for this additional step and evaluate the impact of an additional abdominal approach to outcomes in children with HD.

## METHODS

A retrospective study was conducted at surgical pediatric department of Hue central hospital. This study was approved by the ethics committee of the hospital. All consecutive medical records of patients operated on for HD in our department between June 2010 and June 2018 were retrieved. We normally based on baryte enema to diagnose, in suspected cases biopsy were made. HD were finally confirmed by post-operative pathology. We indicated initially performing laparoscopy assisted pull through in the patients which the transition zones were proximal to one upper third of sigmoid colon or the extremely dilated colo-rectum. For HD with transition zone distal to upper third of sigmoid, we perform transanal one-stage endorectal pullthrough procedure or laparoscopic assisted.

**Inclusion criteria:** Patients with HD who required TOSEPT with an additional abdominal approach to complete the operation for inclusion in this retrospective study.

**Exclusion criteria:** Patients scheduled initially for a laparoscopic-assisted endorectal pull-through procedure and patients who only required TOSEPT were excluded from the study

For each patient, the following data was collected: Age at surgery; Length of resected segment; Additional abdominal

procedure required: laparoscopic or open procedure; Causes of additional abdominal approach to TOSEPT; Operative duration; Any intraoperative events; Immediate postoperative complications; Length of hospital admission; Complications at 3 months based on Clavien-Dindo classification [13].

**Statistical analysis:** Data was analysed in two groups dependent on if the patients had an open or a laparoscopic additional abdominal procedure.

Data are reported as mean and standard deviation. Chi-square or Fisher's exact test were used to compare categorical data. Independent t-tests and analysis of variance were used to compare among two groups.

**Ethical considerations:** Ethical approval was obtained from the Ethical Review Committee of Hue Central Hospital. Approval No: HCH01012010. Confidentiality was ensured by not writing the names of patients on proforma in accordance the Helsinki declaration.

**Reporting:** The STROCCS/STROBE guidelines were used in reporting this study [14,15].

## RESULTS

A total of 446 consecutive patients operated on for HD with histopathological proof were retrieved from our databases, of whom 24 patients (5.38%) scheduled initially for a laparoscopic-assisted endorectal pull-through procedure so were excluded from the study. The 422 remaining patients were operated with TOSEPT in which 356 patients who only required TOSEPT. This left 66 (14.79%) patients with HD who required TOSEPT with an additional abdominal approach to complete the operation for inclusion in this retrospective study.

52 (78.79%) of these patients required an additional open procedure via a transverse incision in the left lower quadrant. The 14 remaining patients (21.21%) required a laparoscopic procedure with 4 ports (10 mm umbilical port and three 5 mm ports in left, right lower quadrant and right flank). Patients who underwent an open procedure had a mean age of  $3 \pm 1.2$  months while patients who had a laparoscopic procedure had a mean age of  $35 \pm 6.5$  months. Age distribution and the additional abdominal procedure was detailed in table 1.

There were 4 reasons identified in this study which prevented the completion of the procedure by TOSEPT alone. These are detailed in table 2.

All of 14 patients who had a laparoscopic additional abdominal procedure required this due to a long aganglionic segment.

The mean length of resected colon was  $13.30 \pm 3.45$  cm in the open group and  $19.70 \pm 4.50$  cm in the laparoscopic group ( $p < 0.0001$ ). The average operative time was  $159 \pm 12$  minutes overall with a mean operative duration of  $156 \pm 12$  minutes for the open procedures and  $170 \pm 14$  minutes ( $p = 0.0004$ ) for the laparoscopic procedure.

There were no deaths or intra-operative events for any of the patients in this study.

No post-operative complications occurred in the patients who underwent additional laparoscopic procedure. Of these patients who underwent an additional open procedure, there were 14 (21.21%) grade II postoperative complications and 1(1.51%) grade III postoperative complication.

Duration of hospital stay was  $7 \pm 2.5$  days in the open group and  $5 \pm 1.5$  days in laparoscopic group ( $p = 0.0059$ ). Postoperative complications are detailed in table 3.

The follow-up results at 3 months are showed in table 4.

## DISCUSSION

Although the incidence of TOSEPT associated with an additional abdominal approach was low (14.79%), the impact of the additional abdominal approach on the surgical results were highlighted by the above data.

Preoperatively, the patients in this study were assessed as

**Table 1:** Age distribution and additional procedures.

Age (month)	Open, n (%)	Laparoscopic, n (%)
	52 (78.79%)	14 (21.12%)
< 1	22 (33.33%)	0 (0)
1-12	18 (27.27%)	4 (6.06%)*
> 12	12 (18.18%)	10 (15.16%)

\* > 6 months

**Table 2** Reasons for additional abdominal approach being required.

Reason	Age of patient			Total
	< 1 month	1-12 months	> 12 months	
Sigmoid colon adherent to lateral abdominal wall		8	8	16 (24.24)
Pelvic inflammation	4	0	0	4 (6.06)
Extremely dilated rectum and colon	0	0	4	4 (6.06)
Long aganglionic segment	18	14	10	42 (63.63)
Total	22	22	22	66 (100)

**Table 3:** Postoperative complications.

Clavien-Dindo classification		Complication n (%)
Grade II	Incisional infection	10 (15.15)
	Intestinal obstruction	2 (3.03)
	Anastomotic infection	2 (3.03)
Grade III	Abdominal evisceration	1 (1.51)

**Table 4:** Follow-up results at 3 months.

The follow-up results at 3 months	Open group n (%)	Lap. group n (%)	Clavien-Dindo grade	Total n (%)	P
Enterocolitis	7 (10.61)	3 (4.55)	II	10 (15.15)	0.49
Anastomotic stenosis	2 (3.03)	0 (0)	II	2(3.03)	0.51
constipation	4 (6.06)	0 (0)	I	4(6.06)	0.34
Mucosal prolapse	3 (4.55)	1 (1,52)	I	4(6.06)	0.60
Totala	16 (24.25)	4 (6.07)	I-II	20 (30.30)	

requiring TOSEPT alone however this was found not to be possible intraoperatively. The reasons for the additional abdominal approach being required in this study were found to be sigmoid colon adherent to lateral abdominal wall, pelvic inflammation, long aganglionic segment or an extremely dilated rectum and colon. In author’s opinion, pelvic inflammation was considered as a lot of fluid spilled out when abdominal cavity accessed. The colon wall was so fragile and some adhesions between colon and small intestines. The reasons were enterocolitis and malnutrition condition after a follow-up period and repeated enema.

Long aganglionic segment was the main reason for additional abdominal approach which accounted for 63.63% and appear in all of period. Except in neonates where only 75% of patients with HD will demonstrate a transition zone on barium enema [9], So, some newborn patients were so difficult to identified the transition zone while the colon was pulled out from the anus. In contrast, in older children, we didn’t know when we passed over the transition zone due to the colon was still dilated or the frozen biopsies gave the negative or degenerated ganglions. The long aganglionic segment could be identified before surgery by careful evaluation of colonography [16] and laparoscopic approach considered initially in these cases [11]. On the other hand, this situation might still be encountered because most pediatric surgeons prefer TOSEPT to laparoscopy due to its simplicity and advantages in neonates, in whom fixation of colon to retroperitoneum is looser which allows the resection of long segment of descending colon through the anus, this in reverse to the more laborious procedure in older patients [10]. So, it is the opinion of the authors that the additional abdominal approach should be used without hesitation when the TOSEPT alone is insufficient and laparoscopic approach should be the method of choice [17].

There were no intra-operative complications in this study but the rate of post-operative complication was rather high. Most of the complications related to abdominal incisions. The postoperative complication rate was 22.72%, in which 21.21% of patients were classified as grade II and 1.51% grade III following the Clavien-Dindo classification (Table 3).

In this study, no cases of anastomotic leakage or remaining aganglionic segment were reported, however these complications have been reported in other studies although the rate of these complication was low [4,8,12,18]. The 3-month follow-up complication rate was 24.25%, mainly enterocolitis which was similar to the TOSEPT alone approach [12,18]. There was no statistically significant difference between additional open and laparoscopic procedure (Table 4). Importantly however in using an additional abdominal approach, these infants were definitively treated in one-stage, rather than undergoing a three stages surgery with the associated surgical complications, anaesthetic risk and requirement of stoma care.

Additional laparoscopy was used in 14 (21.21%) cases, most of these were in patients older than 12 months old (10 cases) with only 4 additional cases in patients between 6 months-12 months old. Additional laparoscopy was not utilized due to a lack of experience in pediatric laparoscopy among the operating surgeons, especially in newborn patients where small abdominal cavity combined with serious abdominal distention made the surgeons like open approach than laparoscopic approach although Georgeson has proved that laparoscopy is feasible and safe in neonates [1].

In the cases of extremely dilated rectum-colon which mainly occurred in children older than 12 months, all patients required an open additional abdominal approach. This was because the operative time for these cases was already long and the surgeons did not want to prolong this further by using additional laparoscopy. In the authors' opinion, TOSEPT was not suitable for these cases, and laparoscopy should be initially indicated although Miyano also showed the significant longer operative time for older children [4].

A laparoscopic approach showed promise in this study with no intra-operative or post-operative complications recorded. The length of resected colon was longer ( $p < 0.0001$ ) and hospital stay was shorter ( $p = 0.0059$ ) in comparison between additional laparoscopic and open surgery. The disadvantage of laparoscopic surgery was the operative time which was significantly longer than open group ( $p = 0.0004$ ), this has also been noted previously in other studies [2,3,5].

## CONCLUSION

Additional abdominal approach impacts on post-operative results of transanal one-stage endorectal pull-through procedure for Hirschsprung's disease but not on outcome of disease. Laparoscopic surgery as the additional abdominal approach should be used to reduce the complications.

## ACKNOWLEDGEMENT

The Authors thank Claire Norman, Swansea University, UK for her assistance in editing the manuscript.

## REFERENCES

1. Georgeson KE, Cohen RD, Hebra A, Jona JZ, Powell DM, Rothenberg SS, et al. Primary laparoscopic-assisted endorectal colon pull-through for Hirschsprung's disease: a new gold standard. *Ann Surg.* 1999; 229: 678-682. <https://bit.ly/2ZS254A>.
2. Yamataka A, Miyano G, Takeda M. Minimally Invasive Neonatal Surgery: hirschsprung Disease. *Clin Perinatol.* 2017; 44: 851-864. <https://bit.ly/2RMltND>
3. Guerra J, Wayne C, Musambe T, Nasr A. Laparoscopic-assisted transanal pull-through (LATP) versus Complete Transanal Pull-through (CTP) in the surgical management of Hirschsprung's disease. *J Pediatr Surg.* 2016; 51: 770-774. <https://bit.ly/2Lmxx33>
4. Miyano G, Takeda M, Koga H, Okawada M, Nakazawa-Tanaka N, Ishii J, Doi T, et al. Hirschsprung's disease in the laparoscopic transanal pull-through era: implications of age at surgery and technical aspects. *Pediatr Surg Int.* 2018; 34: 183-188. <https://bit.ly/2X5Kowg>
5. Thanh Liem N, Duc Hau B, Anh Quynh T. To compare early outcomes of primary laparoscopic-assisted endorectal colon pull through and transanal for Hirschsprung disease. *Ho Chi Minh city Medical Journal.* 2011; 15: 33-36.
6. Thomson D, Allin B, Long AM, Bradnock T, Walker G, Knight M. Laparoscopic assistance for primary transanal pull-through in Hirschsprung's disease: a systematic review and meta-analysis. *BM J Open.* 2015; 5: e006063. <https://bit.ly/2YmEA3i>
7. Uy Linh TN, Ngoc Linh PT, Kinh Bang N, Trung Hieu D. Transanal endorectal pull through in infants less than three months of age with Hirschsprung' disease. *Ho Chi Minh city Medical Journal.* 2005; 9: 1-4.
8. Lu C, Hou G, Liu C, Geng Q, Xu X, Zhang J, et al. Single-stage transanal endorectal pull-through procedure for correction of Hirschsprung disease in neonates and nonneonates: A multicenter study. *J Pediatr Surg.* 2017; 52: 1102-1107. <https://bit.ly/31TcjD0>
9. Smith GHH, Cass D. Infantile Hirschsprung's disease - is a barium enema useful? *Pediatric Surgery International.* 1991; 6: 318-321. <https://bit.ly/2Lnk5Q1>
10. Tannuri AC, Tannuri U, Romao RL. Transanal endorectal pull-through in children with Hirschsprung's disease--technical refinements and comparison of results with the Duhamel procedure. *J Pediatr Surg.* 2009; 44: 767-772. <https://bit.ly/2FECxjI>
11. Teeraratkul S. Transanal one-stage endorectal pull-through for Hirschsprung's disease in infants and children. *J Pediatr Surg.* 2003; 38: 184-187. <https://bit.ly/2XdTrQQ>
12. Vu PA, Thien HH, and Hiep PN. Transanal one-stage endorectal pull-through for Hirschsprung disease: experiences with 51 newborn patients. *Pediatr Surg Int.* 2010; 26: 589-592. <https://bit.ly/2X7KsMa>
13. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg.* 2004; 240: 205-123. <https://bit.ly/2W6xpdj>
14. Agha RA, Borrelli MR, Vella-Baldacchino M, Thavayogan R, Orgill DP, STROCSS Group. The STROCSS statement: Strengthening the Reporting of Cohort Studies in Surgery. *Int J Surg.* 2017; 46: 198-202. <https://bit.ly/2V9Yvjb>
15. von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP, STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. *Int J Surg.* 2014; 12: 1495-1499. <https://bit.ly/2Xc91N4>
16. Rosenfield NS, Ablow RC, Markowitz RI, DiPietro M, Seashore JH, Touloukian RJ, et al. Hirschsprung disease: accuracy of the barium enema examination. *Radiology.* 1984; 150: 393-400. <https://bit.ly/31XdjNi>
17. Rita KM. Laparoscopic management of Hirschsprung'disease. *World J Lap Surg.* 2017; 10: 91-94. <https://bit.ly/2XmcaB>
18. Langer JC, Durrant AC, de la Torre L, Teitelbaum DH, Minkes RK, Caty MG, et al. One-stage transanal Soave pullthrough for Hirschsprung disease: a multicenter experience with 141 children. *Ann Surg.* 2003; 238: 569-583. <https://bit.ly/2LmyVq5>.