Original Article JCMCTA 2025 ; 36 (1) : 61-65

Transanal Endorectal Pull Through versus Laparoscopic Assisted Transanal Endorectal Pull-Through Procedures for Short Segment Hirschsprung's Disease

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Abstract

Background: The main goal in the treatment of patients with Hirschsprung's disease is resection of the aganglionic segment and pull down the normo-ganglionic bowel. The aim of the study was to compare the efficacy and safety of outcome following Laparoscopic Assisted Transanal Endorectal Pull through (LATEP) and transanal endorectal pull through procedures for short segment Hirschsprung's Disease.

Materials and methods: This quasi-experimental study was conducted at the Department of Pediatric Surgery in Chittagong Medical College Hospital (CMCH) Chattogram from June 2021 to june 2023. All the patients diagnosed as a case of a short segment Hirschsprung disease either by Barium enema or colonic/rectal biopsy with or without colostomy irrespective of age and sex were included. Total 18 patients were included in this study: Group- A laparoscopicassisted trasnanal endorectal pull through and Group- B transanal endorectal pull through which were randomly selected.

Results: No post-operative enterocolitis, postoperative adhesive bowel obstruction, incontinence was seen. Pain was more in trans anal endorectal pull through group than laparoscopic trans anal endorectal pull through group, pain scores 6.71 vs 5.0 respectively. In comparison of LATEP, readmission and other complication such as constipation, stricture rates were lower from TEPT LATEP offered several advantages, including an early visualization of the colon to identify the position of normal innervation and a direct visualization of the colon at the time of pull- through, therefore barring the threat of bowel twisting and muscle cuff folding and postoperative adhesive obstruction. Conclusion:Both procedures were safe and effective with LATEP having some added advantages.

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Submitted on : 10.02.2025
Accepted on : 30.04.2025

Key words: Hirschsprung's disease; Laparoscopic assisted transanal endorectal pull- through; Post operative pain; Transanal endorectal pull through.

Introduction

Hirschsprung's Disease (HD) is a common cause of intestinal obstruction in children.[1] The main thing in the treatment of cases with Hirschsprung's disease is resection of the aganglionic member and pull down the normo-ganglionic bowel. Several pull- through ways has been described. The most generally rehearsed open procedure is a Trans anal endorectal procedure.[2] The preface of minimally invasive surgery, classic pull through fashion were modified and bettered with laparoscopy. Studies from developed and developing countries suggested that laparoscopic pull through has some added benefit over open procedure.[3] Also, only many centresare rehearsing laparoscopic procedures for HD although numerouscentres are well equipped to perform the procedures. In this context, this study was conducted to compare the postoperative outcome of laparoscopic assisted and transanal endorectal pull through procedures for short segment Hirschsprung disease.

Materials and methods

A quasi-experimental study was conducted in Paediatric Surgery Department of Chittagong Medical College, Chattogram from June 2021 to September 2023. All patients presented with short segment Hirschsprung's Disease admitted in Department of Paediatric Surgery of Chittagong Medical College Hospital (CMCH) were included. Patients were divided into Group A- LATEP (9 patients) and Group B –TEPT (9 patients). Short segment was defined as where the aganglionic segment was limited to the rectum and a portion of the sigmoid colon.[4] Patients with Gross cardiac or other major congenital anomalies, history of previous pull through procedure, taotai colonic aganglionosis, massive proximal dilatation and large fecaloma with late presentation, severe

enterocolitis, history of admission for post-operative bands and adhesions following colostomy were excluded. The objective was to compare the post-operative outcome between transanal endorectal pull-through and laparoscopic-assisted transanal endorectal pull-through procedures for short segment Hirschsprung's disease with protective stoma. Duration of post-operative hospital stay, post-operative complications such as postoperative adhesive bowel obstruction, anastomotic stricture, need for readmission were analysed. Follow up period was 6 months.

In both groups, the patients were given doses of intravenous ceftriaxone and metronidazole 5 days and intramuscular doses of pethidine and Phenergan 8 hrly for 48 hours and intravenous ketorolac (0.5 mg/kg) as analgesic, urinary catheter was kept in situ for 3 days. The wound was dressed in sterile gauze soaked in povidone-iodine for at least 24 hours postoperatively. Parents were taught how to care for the wound. They were prescribed oral cefixime for 4 days and analgesic as required on discharge. Patients were discharged after meeting the discharge criteria and teaching parents the wound care and use of dilators after 14th post-operative day. After discharge they were asked to review on 14th post-operative day. They were also asked to visit early if they notice any wound infection, dehiscence, any features of systemic infection like not accepting feeds, irritability, fever, abdominal distension etc. The next follow up were done after 4 weeks, 3 months and 6 months. During follow up careful physical general and digital rectal examination was done to evaluate anastomotic line stricture. Readmission was advised for further evaluation by examination under anaesthesia. Discharge criteria were patient on oral diet, no need for injectable analgesic and antibiotics, afebrile for last 24 hours and normal bowel movements.

Data were processed and analysed by using SPSS-25 (Statistical package for Social Science). Different statistical methods were applied for data analysis. For presentation of quantitative data, mean ± SD and for qualitative data frequency and percentage was used. Difference between the groups was analysed by student t-test as regards normally distributed data. Categorical variables were compared with chi square test with necessary Fischer's exact test. p value was considered as statistically significant when it is less than 0.05 and confidence interval was set at 95% level.

Ethical clearance for the study was taken from ethical review board of Chittagong Medical College and study was performed according to Helsinki declaration.

Results

The mean (±SD) age of the study patients were 45.11 ± 35.635 months in LATEP group and 28.78±10.721 months in TEPT group. There was male predominance in both groups. In LATEP group, 8 (88.9%) patients were male and in TEPT group, all the 9 (100%) patients were male. The difference was statistically not significant ($p>0.05$) between the treatment groups regarding age and gender.

Duration of operation (Minutes) of the patients between the treatment groups. Median (IQR) duration of operation was 270 (225-330) minutes in group A and 280 (210-320) minutes in group B. According to p value, statistically no significant difference was observed between the study groups ($p=0.858$).

Statistically significant difference was observed among the groups regarding post-operative pain score at 1st, 2nd, 3rd and 4th POD ($p<0.05$) (Table I). But there were statistically no significant ($p>0.05$) differences between the groups regarding post-operative pain score at 5th and 6th POD.

Table I Post operative pain score of the study patients (n=18)

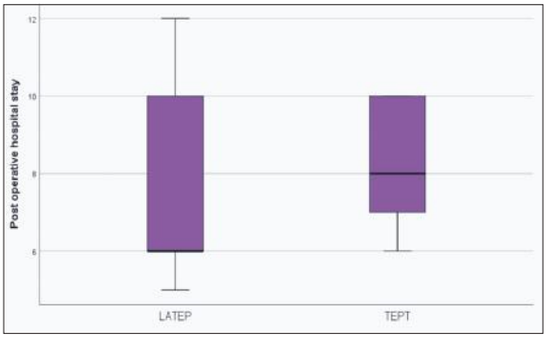
Pain Score	Group A	Group B	p value
1st POD Median (IQR)	5(5-6)	7(6-7)	0.003s
2nd POD Median (IQR)	4(4-5)	6(5-6)	0.002s
3rd POD Median (IQR)	4(3-4)	5(4-6)	0.009s
4th POD Median (IQR)	3(2-4)	4(3-4)	0.025s
5th POD Median (IQR)	2(1-3)	3(2-3)	0.125ns
6th POD	0(0-2)	2(1-2)	0.180ns

ns=not significant.

p value reached from Mann-Whitney U test.

No patients in group A and 3(33.3%) patients in group B suffered from post-operative stricture. Among 3 patients one had stricture 2 cm and two had stricture 1cm. They went under examination under anaesthesia. No patients need readmission in group A and 3 (33.3%) patients need readmission in group B. Statistically significant difference was observed among the groups regarding post-operative pain, stricture and readmission ($p<0.05$).

In group A, median (IQR) post-operative hospital stay was 6 (6-10) days and in group B, Median (IQR) post-operative hospital stay was 8 (7-10) days. However, statistically no significant difference was found between the study groups ($p=0.257$). (Figure 1).



Pain, stricture and readmission ($p<0.05$).

Figure 1 Post-operative hospital stays of the patients (n=18)

Discussion

Since Harald Hirschsprung's initial description in 1889, there has been controversy over the process of rectal dissection in Hirschsprung disease.[5]

In this study, mean (±SD) age of the study patients were 45.11 ± 35.635 months in LATEP group and 28.78±10.721 months in TEPT group ($p>0.05$, Table I). A study reported that the age at surgery ranged from 9 months to 14 years, and the median age was 6.5 years. The mean age was higher in laparoscopic group in this study than many other studies. A recent study by Fakhry et al. showed that the mean age of the patients at the time of operation were 18.9 months for the transanal group versus 21.3 months for the laparoscopic group.[5] A meta-analysis by Thomson et al. found that age of the patients who underwent laparoscopy ranged from 4 to 17 months.[6] Demir et al. reported their median age at 16.8 months.[7] The reason for the higher age in laparoscopy group in this study was mainly due to reluctancy of anaesthesiologist for giving anesthesia in earlier ages for safety concerns. Moreover, the surgical team was also inexperienced in dealing laparoscopy in neonates, infants, and toddlers. Another reason was that many of the patients also presented late to us. After performing several laparoscopic procedures, we planned to perform it at earlier age groups, but the majorities were delayed presenters. Arafa et al. also reported that laparoscopy groups had higher age range in their patients (3-7 years).[8]

In present study there was male predominance. In LATEP group, 8 (88.9%) patients were male and in TEPT group, all the 9 (100%) patients were male ($p>0.05$, Table I)) between the treatment groups regarding gender. Male predominance was also noted in the study by Fakhry et al.[5]

In this study, duration of operation was higher in laparoscopy group (270 vs 280 minutes in group A and B respectively). Fakhry et al. also found the mean operative time was more in laparoscopy group (120 minutes) than in open group (90 minutes).[5] However, other studies showed that duration was shorter in patients who underwent laparoscopy than open surgery. In the study conducted by Giuliani, S. et al. the duration was 195 versus 291 minutes in laparoscopy versus open technique respectively.[9] Georgeson and Robertson needed on average 147 minutes for LATEP procedure.[10] Craigie et al. also found that operation time was shorter in LATEPT than TEPT (198 minutes vs 219 minutes).[11]

There was statistically significant difference between the groups regarding post-operative pain score at 1st, 2nd, 3rd and 4th POD ($p<0.05$). However, the difference was not significant after 4th POD. Patients of both groups received Injection pethidine and injection ketorolac for 48 hours which was then changed to paracetamol. It is well known that laparoscopy has less postoperative pain than open surgery. It has also been proved to be true in Hirsch sprung disease.[12]

Anastomotic stricture is not uncommon after pull through procedures for Hirschsprung disease. In this study, no patients in group A and 3 (33.3%) patients in group B suffered from post-operative stricture ($p<0.05$). Postoperative strictures were

found on 4th week follow up by digital rectal examination. These patients were admitted and evaluated by examination under anaesthesia. However, the follow up period was not long, and stoma closure was not performed to give final comment about the post-operative stricture in these patients. Arafa et al. reported 13% anastomotic stricture in their 15 patients that responded to regular dilatation.[7] Demir et al. reported 2 cases of anal stenosis among 28 patients who underwent TERPT and responded to dilatation.[6] Kim et al. reported 17% anal stricture in transanal group.[12]

In this study, postoperative hospital stay was longer in TEPT group than LATEP group (Median 8 vs 6 days), but it was not statistically significant. Fakhry et al. found the postoperative hospital stay was more in transanal group compared to the laparoscopic group (5.3 days versus 3.3 days) respectively. By reducing postoperative pain and metabolic response to trauma laparoscopy may contribute to reducing hospital stay.[5] No patient needed readmission in group A and 3 (33.3%) patients needed readmission in group B ($p<0.05$).

In this study, it was also observed that laparoscopic procedure had some advantages over transanal procedure for Hirschsprung disease. These include early frozen section biopsy from the expected ganglionic zone to decide the level of pull through if prior biopsy had not been taken from dilated zone; dissection under direct and magnified vision, detection of adhesion, fecaloma, twisting of gut or other intra-abdominal condition, avoidance of injury to marginal vessels due to avoidance of forceful pulling from the anus, less bleeding and less perirectal injury. However, as the protective stomas were not still closed, bowel function related outcome such as constipation, incontinence and enterocolitis could not be evaluated.

To summarize, in this study, there were less postoperative pain, less hospital stays, less anastomotic stricture and less readmission in LATEP group although the surgical procedure took relatively longer time.

Although there will be continued debate about the pros and cons of laparoscopic surgery for Hirschsprung disease over transanal or open surgery, it is a demand of time that paediatric surgical centers start performing laparoscopic surgery for Hirschsprung disease.

Limitations

The study had several limitations. A larger sample size could have been taken for this study for making the findings generalizable. Due to the short study period, stoma closure could not be performed and for this reason bowel continence or constipation could not be evaluated in this study.The efficacy of LATEP could not be evaluated in neonates and infants in this study.Follow up period was not long enough to comment about the outcome.

Conclusion

This quasi-experimental study showed that LATEP has better outcome than TEPT in terms of post- operative pain, hospital stay, anastomotic stricture, and readmission for short segment Hirschsprung's disease. Operative time was more than expected but given the lower rate of complication, LATEP could be adopted for treating of short segment Hirschsprung’s disease.

Recommendation

Short segment Hirschsprung’s disease can benefit from LATEP or TEPT depending on the convenience and experience of the surgeon, but LATEP can be preferred. However further studies should be performed with larger sample size and more extended follow up period to completely clarify the issue of better technique between LATEP and TEPT.

Acknowledgement

All the authors express their gratitude to all associates of Pediatric Surgery of CMCH.

Contribution of authors

ES-Concept, data collection, manuscript writing and final approval.

MKAS-Design, critical revision and final approval.

TKC- Concept, data analysis, critical revision and final approval.

Disclosure

All the authors declared no competing interest.

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