Laparoscopic-Assisted Transanal Endorectal Pull-Through for Hirschsprung’s Disease: Experience with 15 Cases

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Abstract:

Background/Purpose: Hirschsprung’s disease (HD) is a aganglionosis of part of the colon for which most of the operations were targeted to remove this part and restore continuity of the bowel. Resection of rectum and distal colon (rectosigmoid region in most of the cases) by Soave procedure using minimally invasive surgery in the abdominal part is a recent trend. Transanal Endorectal Pull-through Technique (TEPT) guided by intraabdominal visualization and taking colonic biopsies by laparoscopy also is beneficial.

Materials & Methods: This study on 15 patients diagnosed as having HD by their clinical picture, barium enema study and rectal biopsy. Patients were classified into 3 groups: group I: included patients with a well defined funnel limited to rectosigmoid region; group II: included patients with long segment HD and well defined funnel and group III: where there’s no definite funnel and positive rectal biopsy. Patients presented with enterocolitis or obstruction were excluded from this study.

Results: Laparoscopic exploration was undertaken for 15 patients. Four cases with classic rectosigmoid HD for which transanal endorectal pull-through was undertaken with laparoscopic visualization (group I). Nine cases were with long segment HD and a well defined funnel, where laparoscopic-assisted transanal endorectal pull-through was done (group II). The other 2 cases showed ill defined funneling, multiple biopsies were taken by laparoscopic instruments (group III). No mortality was recorded in this series.

Conclusion: Laparoscopy in the management of cases of HD either for diagnosis or definitive management is a useful tool and early results seem favorable.

Index Word: Laparoscopy- Hirschsprung’s disease.

INTRODUCTION

Hirschsprung’s disease (HD) is a developmental disorder of the enteric nervous system characterized by absence of ganglion cells in myenteric and submucosal plexuses along variable portion of the distal intestine. Incidence is about 1:5000 infants. Numerous operations have been described for the definitive management of the disease which in itself implies that none of the procedures achieve perfect functional results. The use of minimally invasive techniques is a recent trend in the management of pediatric surgical diseases, but it is taking its place in many aspects and areas of pediatric surgery. Georgeson et al, in a multicentric study done in 1999, described the technique of primary laparoscopic-assisted endorectal pull through for HD as a new gold standard 1,2. In 2008, he published his new study with some technical modifications 3.

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PATIENTS AND METHODS

Fifteen patients with HD underwent surgery with laparoscopic assisted endorectal pull through technique during a time interval between November 2006 and November 2008.

Diagnosis was made by history, physical examination and investigations. Detailed history was taken, including time of first passage of meconium, periods of constipation, and history suggestive of intestinal obstruction or enterocolitis (those were followed up till resolving of the condition). Clinical examination included: general condition, presence of associated anomalies, abdominal examination for distention and signs of obstruction, rectal examination to detect absence of the rectal ampulla and the impacted stools. Investigatory work up was done including routine laboratory investigations, barium enema and rectal biopsy.

According to the findings of barium enema and rectal biopsy, patients were classified into 3 groups:

Group I: patients with rectosigmoid aganglionic segment and well defined funnel.

Group II: patients with long aganglionic segment and well defined funnel.

Group III: patients with ill defined funnel and positive rectal biopsy.

Clinical Picture of HD + Positive rectal biopsy + Barium enema

Laparoscopic visualization of the abdomen

Definite funnel at the rectosigmoid zone

Definite funnel above rectosigmoid zone

no Definite funnel

TEPT with Laparoscopic Visualization

Laparoscopic -Assisted TEPT

Laparoscopic biopsies

Preoperative decompression of the bowel for 2 days with saline irrigation through rectal tube negotiated through the aganglionic part was done. The patients were given nothing by mouth 12 hours preoperatively, only water was permitted with I.V fluids. Oral antibiotics were given as chemical preparation 24 hrs preoperatively in the form of erythromycin, neomycin and metronidazole. At induction of anesthesia, 3rd generation cephalosporin and I.V metronidazole were given.

Infants are positioned transversely at the end of the operating table with arm boards placed parallel to the long axis to increase width of table while older children were placed in a supine position (Lloyd Davis). The working surgeon stood at the patient’s head while working with the laparoscope in the abdominopelvic cavity. Pneumoperitoneum was obtained using an open technique through the umbilicus with pressure of 10-12 mm water. A 5 mm, 30° scope was introduced through a port placed below the liver edge in the right mid clavicular line. One 5 mm port was placed in the right lower quadrant, another in the suprapubic region and another one sometimes in the left lower quadrant. The exact position of the ports in relation to anterior superior iliac spine varied according to the age of the patient.

The transition zone was visualized and localized before any attempt was made to devascularize or mobilize the colon. Rectosigmoid funnel (group I) was an indication for beginning the transanal dissection and the working surgeon begins 1-2 cm above dentate line creating submucosal plane by sharp and blunt dissection until the colorectum turned inside –out indicating that the transanal dissection had advanced to the level of the internal perirectal plane. The rectal sleeve is then opened posteriorly to join the submucosal plane with the extramural plane and then carried circumferentially. At this step, the laparoscopic and perineal dissection planes were joined and the colon was pulled few centimeters above the funnel to avoid the area of hypoganglionosis. The rectal muscle cuff was made unfolded by inserting finger circumferentially with pushing the cuff upwards and then splitting it posteriorly to allow for neorectum reservoir. One layer anastomosis with interrupted absorbable sutures between the anal mucosa above the dentate and full thickness of neorectum was then made. Laparoscopic visualization was done for untwisting the descended colon and to exclude any bleeder or collection inside.
If a long aganglionic segment was encountered on laparoscopic visualization (group II), the sigmoid colon was mobilized preserving proximity to the marginal artery with division of lateral fusion fascia and sometimes freeing the splenic flexure until the colon above the funneling is long enough to reach deep into pelvis without tension. In those cases where there was no definite funneling by laparoscopic visualization (group III), seromuscular biopsies were taken by Metzenbaum endoscopic scissors and the site of the biopsies were closed by various types of sutures with various colors: (Prolene-blue, Maxon-green, PDS-violet, Undyed-White) to facilitate the pull-through surgery at another step.

Pneumoperitoneum was evacuated at the end of the procedure with the camera inside to facilitate perfect closure of port sites to prevent the occurrence of port site hernia.

An intraperitoneal open system tube drain was left in the pelvis to be removed after 24 hours.

No nasogastric suction was needed. Oral feeding was allowed when bowel motions returned. Antibiotics were continued parenterally during the period of the hospital stay. After discharge, oral metronidazole was continued for three weeks to avoid enterocolitis in the post operative period.

The patient was seen 2 weeks after discharge and careful rectal examination was done. Daily anorectal dilation is initiated if tightness is encountered.

**RESULTS**

Fifteen patients were operated upon, Eleven males & four females. Age of patients ranged from 3 months and 5 years.

Group I included 4 cases (27%). Group II included 9 cases (60%), while group III included 2 cases (13%).

Operating time varied according to the length of the aganglionic segment, average time for classic rectosigmoid aganglionosis (group I) was 1.5 hour, in cases where the funnel was extending higher (group II) the average time was 2.5 hours, and those for which multiple biopsies were taken (group III) the average time was about one hour.
In Eleven cases (73%) oral intake started 48 hours after operation, in three cases (20%) it was delayed to 72hr and in one case (6.7%) it was after 96 hours. The mean hospital stay was 5 days (range 4-7 days).

Early complications (within 3 months post-operatively) occurred in 11 cases: enterocolitis in 3 cases (20%) that responded to conservative measurement, fever in another 2 cases (13%) that was not explained to be due to enterocolitis, but was probably due to upper respiratory tract infection in one case, and urinary tract infection in the other case. Paralytic ileus occurred in 2 cases (13.3) and responded to NPO & intestinal prokinetic agents. Perianal excoriation occurred in 4 cases (26.4) that responded to zinc oxide ointment applications & constipating agents. There was no cases of anastomotic leak.

Late complications (after 3 months) occurred in 3 patients: 2 cases (13.3%) developed anastomotic stricture that responded to regular dilatations, and one cases had 2 attacks of enterocolitis at 6 and 9 months post operatively that needed hospital admission and the attacks had subsided under conservative measures in the form of parenteral antibiotics, intestinal antiseptics, I.V fluids and NPO.

There were no complications peculiar to the use of laparoscopy in this patients. Some patients had hypercarbia intra operatively that responded to modest hyperventilation. No inadvertent injury to intra abdominal structure. No port site hernia or wound infection. Estimation of fecal incontinence needs longer period of follow up but older children are showing good continence & regular bowel habits in the late follow up. No mortalities occurred in this series.

**DISCUSSION**

The endorectal pull-through technique avoids injury to the pelvic nerves by remaining within the muscular cuff of the aganglionic segment with lower incidence of constipation, sexual dysfunction & micturation disturbances.

Georgeson et al in 1995 had the initial experience in laparoscopic assisted endorectal colon pull-through in 12 children with good results. In 1999, he published the multi centric study on 80 patients. Some modifications and technical points are valuable in describing the technique in his publication in 2008, as shifting from creating the pneumoperitoneum by verses needle to open transumbilical technique. In all cases in this study the open technique showed safer introduction and reliability especially in those children with distended colon.

Portless technique was used in this work especially in those sites where reentry is limited in grasping the colon as the thin abdominal wall in children does not hinder working freely.

It was described by some pediatric surgeons that the role of laparoscopy in the interventional surgery for Hirschsprung's disease is limited to those with long aganglionic segment based on contrast enema study.

In this study, the majority of cases were selected with long segment & definite funnel to get the benefit of intra abdominal dissection (group II, 9 cases) and the work was extended to those with indefinite funnel on barium study to obtain direct visualization & to take seromuscular biopsies for planning of definite surgery with minimal manipulation on viscera to avoid later adhesions.

In the algorithm described in the study, the clinical picture of Hirschsprung's disease, positive rectal biopsy & contrast enema were the basis of the selection of the procedure to be taken and the laparoscopic visualization at the beginning to confirm the site of funnel was used as diagnostic tool and then to assist in the procedure.

In cases where there was no definite funnel, biopsies were taken to level the aganglionosis and to guide for the further procedure. In one of the 2 cases of group III, there was total colonic aganglionosis that needed total colectomy with ileal pull through in a later step by open approach. Undertaking the whole procedure of colectomy in this cases needs good laparoscopic surgical expertise and has a high conversion rate.

A point to be mentioned is the ability to do colonic dissection more easily in younger age group. The mesentery of the colon can be pulled through without twist and with less manipulation through the cuff. Younger group are more challenging in their anesthesia with more incidence of hypothermia especially when there's port leak.

When the endorectal dissection is facilitated by laparoscopic mobilization of the rectosigmoid colon, there's less risk of weakening the patient's internal sphincter by over dilatation.
Children over five years of age and adults with a late diagnosis are not considered for a single stage repair by the laparoscopic assistance because of the hugely dilated chronically obstructed bowel proximal to the aganglionic colon. However the role of laparoscopic assisted stoma formation can be considered in further studies.

Exclusion criteria from this study were active enterocolitis & obstructed patients, and those with deteriorated general health or life threatening general condition.

The shortest length of resected aganglionic segment was 18 cm while the longest was 38 cm. In other studies the length of the aganglionic part was related to the conversion to laparotomy.

The postoperative hospital stay ranged between 4 to 7 days (mean = 5 days). Georgeson et al in his multicenteric study reported a mean of 4.8 days. He reported that earlier in his study he used to keep the patients for 7 days and then later they were discharged on the 2nd or 3rd days. In an EPSA study, mean hospital stay was 4.8 days.

Complication rate in this study was comparable to other studies. The incidence of enterocolitis was 20% which is nearly more than double the incidence in the Georgeson et al multicentric study (7.5%) and little more than in EPSA multicentric study (17.8%) and in wang et al on 61 patients was 21% but fortunately all cases responded to conservative measures. Anastomotic stricture occurred in 13% responded to regular dilatations.

Conversion to conventional open procedure was reported in 2 cases (2.5%) in Georgeson multicentric study but not reported with Wang et al or in this study.

No colonic perforation or anastomotic leak occurred in this study. Perforations occurred in one case (1.6%) in Wang et al and no perforations with Georgeson et al. Leak occurred in 2 cases in Georgeson’s (2.5%) and 2 patients (3.3%) in Wang et al that was managed by diverting colostomy.

No mortality was reported in the follow up period.

Continence to stools needs longer period of follow-up especially in younger age group. On those children above 3 years, continence results were satisfactory in the follow up period and reported to be good by some authors. The procedure is cost-effective and accepted by the parents.

CONCLUSION

For most patients with Hirschsprung’s disease, laparoscopic-assisted transanal endorectal pull-through can be performed in a single stage.

Laparoscopy gives beneficial aspects regarding diagnosis & management of the condition. The idea of minimal invasive surgery seems satisfactory to the parents and ameliorates the impact of the decision of surgery on them.

The use of laparoscopy has many advantages being a one stage procedure with less post operative stay especially in long segment cases, less post operative pain, early post operative recovery of intestinal motility, minimal intra operative manipulation and small access wounds that decrease post operative morbidity regarding adhesions and cosmetic disfiguring.

Additional advantages of the laparoscopic assist for transanal pull-through include the flexibility afforded to perform almost all procedures for correcting Hirschsprung’s disease.

It can allow a delay in the definitive surgery for permanent histologic confirmation if rapid frozen section indicates a long aganglionic segment or if rapid frozen section is indeterminate as to the position of transition zone.

REFERENCES


