



Laparoscopic-assisted Duhamel procedure with ex-anal rectal transection for total colonic aganglionosis



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ABSTRACT

Purpose: Laparoscopic-assisted Duhamel procedure has a larger anastomosis and a reservoir which allows early recovery of defecation frequency, but concerns have been raised regarding the long operative time, high incidence of pouchitis and Hirschsprung associated enterocolitis (HAEC). The purpose of this study was to evaluate the postoperative complications and functional outcomes for patients with TCA undergoing modified laparoscopic-assisted Duhamel procedure (MLDP) with ex-abdominal partial colectomy and ex-anal rectal transection.

Methods: From 2011 to 2014, 16 patients with TCA who underwent MLDP were reviewed at our institution. Main modified techniques were to mobilize partial bowel through abdominal stoma opening, mobilize remaining colon, and dissect the retro-rectal space using laparoscopy, pull out and transect rectum ex-anally using a linear stapling device for creation of a short rectal pouch of 35 ~ 45 mm. Seven patients who underwent classical laparoscopic Duhamel procedure (CLDP) with a long rectal pouch of 50–60 mm between 2009 and 2011 were used as control group. Data were collected including demographics, laparoscopic technique, operative time, stool frequency, complications and continence outcomes.

Results: The operative time in MLDP group was significantly shorter than control group (3.0 h vs. 4.7 h, $p = 0.02$). The incidence of postoperative HAEC in MLDP group was lower than control group (12.5% versus 42.9%; $p = 0.03$) within the second postoperative year. Two patients (28.6%) experienced episodes of pouchitis in CLDP group and none was found in MLDP group. There was no significant difference in overall functional outcome between two groups, but the performance of MLDP group was better in terms of diapers required than CLDP group (1.80 ± 0.45 vs. 1.00 ± 0.64 ; $p = 0.02$). All patients after 4 years of age had a normal defecation frequency in both groups.

Conclusions: MLDP is a safe, simple, and reliable technique for TCA. It has fewer postoperative complications due to the short rectal pouch. However, longer follow-up and a larger sample size are necessary to prove the efficacy in the treatment of TCA.

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Total colonic aganglionosis (TCA) is a rare and severe phenotype of Hirschsprung's disease (HD) occurring in about 2–13% of cases [1], it shows the relatively higher morbidity and mortality rates and poorer postoperative functional outcomes when compared to recto-sigmoid HD [2], and it also represents a major challenge for pediatric surgeons. It is quite common that patients may suffer from several postoperative complications, including liquid stool, fecal soiling, perianal excoriation, and recurrent Hirschsprung associated enterocolitis (HAEC), pouchitis, persistent diarrhea and so on. Many techniques and their modifications have been described for treating TCA [3–6], but there is no consensus as to which method is superior to others as described in a recent

systematic review [5–7]. Recently, many surgeons accept the Duhamel procedure as a favorable option in TCA because it allows better recovery of defecation frequency and improvement of bowel continence through preserving part of aganglionosis rectum as a neorectal reservoir and reducing pelvic dissection. But the postoperative complications such as recurrent HAEC and pouchitis were also noted and proved to be closely associated with preserving a long pouch during the procedure [8]. Research reports that the short rectal pouch is important for the better defecation function and lower incidence of HAEC and pouchitis for recto-sigmoid HD [9]. At the same time, laparoscopic technique for TCA has been reported to have better cosmesis and comparable postoperative outcomes than open surgery. However, the classical laparoscopic Duhamel procedure (CLDP) is difficult to allow a short pouch and also takes long operative time [10,11]. Here, we applied modified laparoscopic Duhamel procedure (MLDP) with ex-anal rectal transection for short-

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pouch for the surgical management of TCA, and evaluated the postoperative complications and fecal continence.

1. Patients and methods

This study was approved by the Ethics Committee of Union Hospital, Tongji Medical College, Huazhong University of Science and Technology. We retrospectively analyzed the medical records of 23 consecutive patients with TCA who were treated at our institute from February 2009 to January 2014. Of the 23 children, 16 (7 boys, 43.8%) underwent MLDP from May 2011 to January 2014, 7 (3 boys, 42.9%) underwent CLDP from February 2009 to May 2011. In MLDP group, 16 patients underwent initial diverting ileostomy at the age between 3 day and 5 months because of the intestinal obstruction or intestinal perforation, while 7 patients underwent initial diverting ileostomy at the age between 5 days and 4 months in CLDP group. The definitive pull-through procedure was performed at the mean age of 8.6 ± 2.1 months (range 4–14 months) and 9.4 ± 4.5 months (range 5–16 months) in MLDP and CLDP group, respectively. The confirmed diagnosis of TCA was established by an intraoperative frozen-section biopsy and postoperative pathological examination in the definitive procedure. All the surgeries were performed by the same surgical team.

1.1. Surgical technique for modified laparoscopic Duhamel pull-through

We first separated the stoma through a peristomal skin incision, then the ileocecum, ascending colon, transverse colon or splenic flexure of the colon were mobilized using ultrasonic scalpel and removed using the Endo-GIA Stapler through abdominal storm opening (Fig. 1), and in order to facilitate subsequent intestinal pull through, we connected the proximal and distal bowels using suturing. Then, we used this abdominal opening to place two 5 mm trocar as working port; another 3 mm trocar was inserted in the left upper quadrant for a traction forceps (Fig. 2). Once the laparoscopic instruments were in place, remaining colon was mobilized and rectal dissection was continued in retrorectal space up to the pelvic floor.

A Lone Star retractor (Lone Star Medical Products, Stafford, TX, USA) was used to expose the anus. Full-thickness hemicircumferential incision (1.5–2.0 cm) was made using cautery in the posterior wall of the rectum 0.5–1.0 cm above the dentate line. Retrorectal dissection was performed using forceps extending upward to create a retrorectal tunnel. A tissue-grasping forceps was subsequently introduced through the rectal incision into the pelvic cavity, under laparoscopic visualization; the rectum was grasped and pulled down through the retrorectal tunnel (Fig. 3), facilitating extra-anally division of rectum perpendicular to the anus using Endo-GIA, in order to obtain a short rectal pouch of 3.5–4.5 cm (Fig. 4). The ileorectal end-to-side anastomosis was

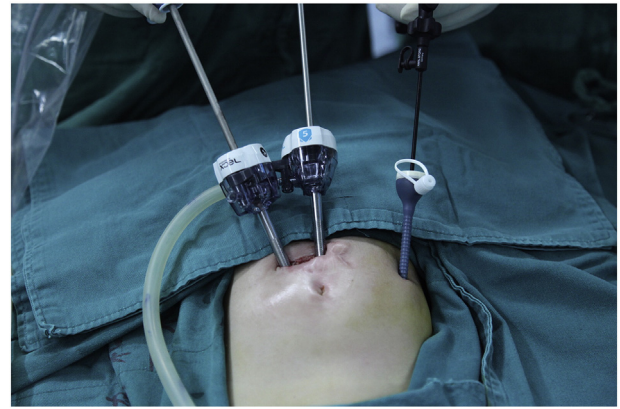


Fig. 2. Trocar placement for the patients with colostomy.

completed using a single layer 4–0 Vicryl interrupted sutures. The side-to-side ileorectal anastomosis was completed by using Endo-GIA Stapler through the anus under laparoscopy. Usually, one cartridge (45 mm in length) was triggered (Fig. 5).

1.2. Surgical technique for classical laparoscopic Duhamel pull-through

The operative technique was similar to that described previously [12]. Three 5 mm ports and one 12 mm port (right lower quadrant) were used to dissect the entire colon. Under laparoscope, retrorectal space was created and intra-abdominal transection of the rectum was achieved with a rectal stump of 5.0–6.0 cm (Fig. 6). After the ganglionic ileum was pulled through, and the aganglionic rectum was anastomosed to the ganglionic ileum in the same fashion as described above. The ileorectal spur was divided using Endo-GIA Stapler through the anus. Usually, one or two cartridges (60 mm in length) were triggered.

1.3. Postoperative management

Patients were kept on intravenous (IV) total parenteral nutrition, and oral enteral nutrition was started once bowel sounds resumed and gradually transitioned to the normal diet. If the enteral nutrition was intolerant, they would continue to get parenteral nutrition (PN) to maintain the nutritional input. IV antibiotics were given for 2–3 days and urinary catheter was removed after 24 h. The parents were instructed about perianal skin care and the symptoms of HAEC before discharge. The patients were discharged when they were able to tolerate a full oral diet and clinically stable. At 2 weeks postoperatively, the patients underwent a routine digital rectal examination.

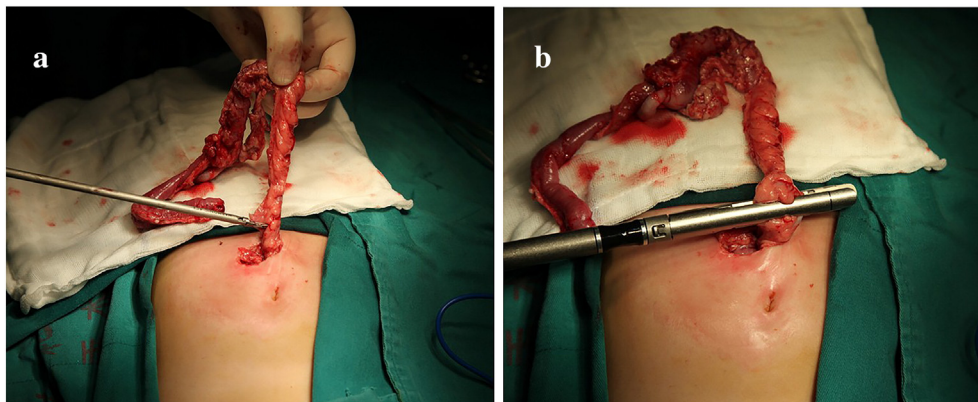


Fig. 1. a) Separated the stoma and mobilized the ileocecum, ascending colon, transverse colon and splenic flexure through abdominal storm opening. b) Removed the mobilized colon using the Endo-GIA Stapler through abdominal storm opening.

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