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SURGICAL ENDOSCOPY
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# Laparoscopic cecostomy button placement for the management of fecal incontinence in children with Hirschsprung's disease and anorectal anomalies

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**Abstract**
*Background:* Antegrade colonic enemas offer a surgical solution for many children with chronic constipation and encopresis associated with Hirschsprung's disease and anorectal malformations. This study demonstrated the feasibility of a new laparoscopic technique for cecostomy button placement (LCBP) to allow antegrade enema treatment.
*Methods:* Charts of children with encopresis who underwent LCBP between 1999 and 2001 were reviewed. The age, weight, primary diagnosis, operative time, hospital stay, associated complications, follow-up duration, and outcome of the patients were recorded. The surgical technique used a ''U-stitch'' method and a chait tube or a standard gastrostomy button. A follow-up telephone survey was conducted to assess parental satisfaction and overall success in continence.
*Results:* Seven patients ages 4 to 12 years (mean, 7.3 ± 1.3 years) and weighing 15 to 44 kg (mean, 24.5 ± 4 kg) underwent LCBP over a 2-year period. The mean follow-up period was 15 ± 4 months (range, 6–33 months). Four patients had anorectal malformations, and three patients had Hirschsprung's disease. For all the patients, LCBP was accomplished without any intraoperative complications. The mean operative time was 33 ± 2 min, and the hospital stay was 2 to 5 days (mean, 3.8 ± 0.5 days). The patients received one or two daily antegrade enemas, and none had accidental bowel movements. Episodes of soiling at night once or twice a week were observed with two children. Two patients had hypertrophic granulation tissue formation, which responded to topical therapy. The button was uneventfully changed twice in one patient because of mechanical malfunction.
*Conclusion:* To manage overflow incontinence of children with anorectal malformations and Hirschsprung's disease, LCBP is a technically straightforward, effective, and reversible method for the placement of a cecostomy button.

**Key words:** Anorectal anomalies — Antegrade colonic enemas — Chronic constipation — Fecal incontinence — Hirschsprung's disease — Laparoscopic cecostomy button

Chronic constipation and encopresis are common problems of children with anorectal malformations and Hirschsprung's disease [1, 17]. These problems can be socially disabling for the patient and the patient's family. To date, the most consistently successful method for the management of both constipation and encopresis has been the complete emptying of the entire colon by use of a large-volume transanal enema [2]. The administration of an enema to a person who lacks tone in the anal sphincters requires insertion of an inflatable retention device into the anal canal. As children mature, parental administration of enemas is perceived as an invasion of privacy and independence. The regimen is therefore often abandoned, despite prior success in achieving continence.

Recently, as an alternative to the enema, Malone et al. [11] described a continent, catheterizable appendicostomy as a conduit for the administration of prograde irrigating fluid. This permits the possibility of continence for children who have found other methods unsuccessful or unsuitable.

The Malone procedure has undergone many surgical modifications, aimed either at simplifying the surgical technique or at achieving a continent stoma not prone to stenosis with minimal morbidity [4, 5, 16, 20]. Still, however, the most common problem is painful catheter insertion, causing some children and parents to abandon the procedure [13].

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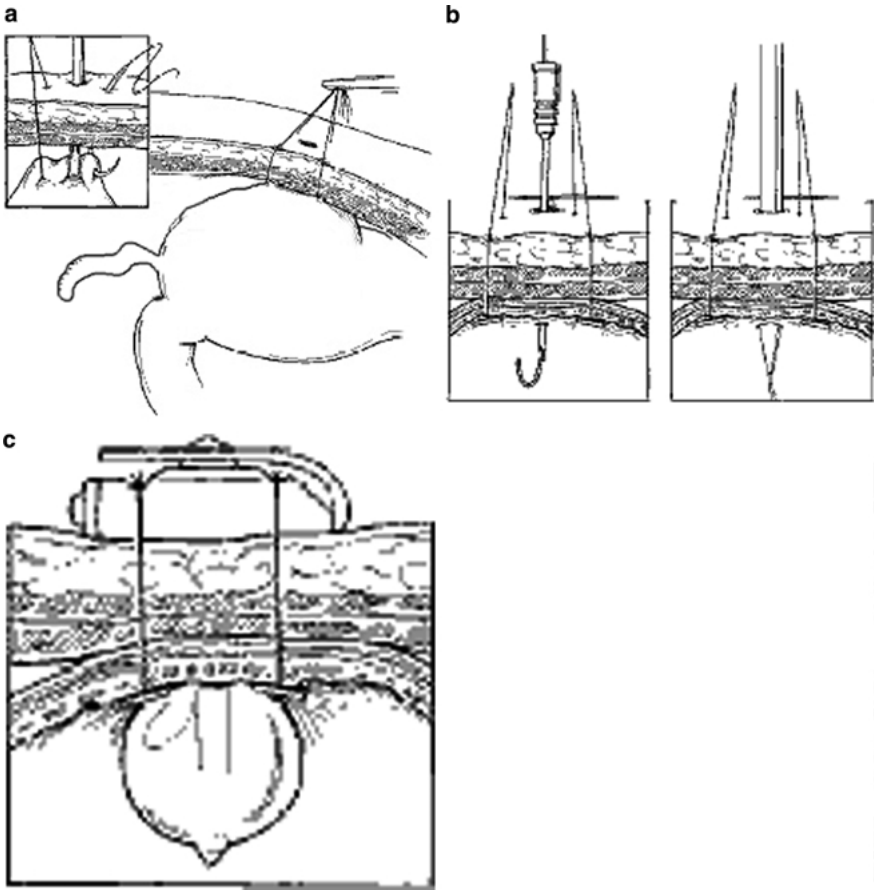


**Fig. 1.** Schematic representation of laparoscopic cecostomy button placement: **a** Placement of traction "U" stitches under laparoscopic guidance; **b** Introduction of the guidewire through the anterior wall of the cecum via a single wall needle, and dilation of the tract; and, **c** Final view of the cecostomy button.

We describe a laparoscopic technique for cecostomy tube button placement that is simple and effective. The clinical results are retrospectively reviewed.

## Methods and materials

### *Operative technique*

A tube cecostomy is created using a "U-stitch" technique under laparoscopic exposure, as previously reported and used extensively for the creation of button gastrostomy [7]. A single-dose, broad-spectrum intravenous antibiotic is administered preoperatively, then continued for 3 days and changed to an oral form for 7 more days. No special bowel preparation is performed for the procedure.

The button site is selected and marked on the skin before insufflation to avoid placement too near the iliac crest. The peritoneum is accessed through the umbilicus using a Veress needle technique. Carbon dioxide pneumoperitoneum is established (10 to 12 cm of water pressure), and a 4- to 5-mm trocar (Versastep™, U.S. Surgical, Norwalk, CT, USA) is placed, followed by a 3- to 4-mm 0° or 30° telescope.

The site for cecostomy chosen by external abdominal wall inspection is confirmed by direct laparoscopic vision, and a stab wound is made through all layers of the abdominal wall via this site with a no. 11 or 15 blade. A 3-mm laparoscopic bowel grasper (Ethicon Endosurgery, Cincinnati, OH, USA) is passed through the stab wound into the peritoneal cavity, and the underlying anterior wall of the cecum is grasped at a site sufficiently remote from the ileocecal valve that will easily reach the anterior abdominal wall. A large semicircular needle attached a monofilament suture (36.4 mm) (PDS, Ethicon, Cornelia, GA, USA) is passed through the abdominal wall under laparoscopic visualization, then through 1 to 2 cm of the anterior cecal wall and back through the abdominal wall (Fig. 1a). A second U-stitch is assed on the other side of the clamp grasping the cecum. The intestinal clamp then is withdrawn from the abdomen. A single-wall needle (Cook, Bloomington, IL, USA), which allows for a guidewire, is passed through the anterior abdominal wall stab wound and introduced through the anterior wall of the cecum between the two PDS suspending/traction sutures. A guidewire is introduced through the needle, and the needle is removed (Fig. 1b). The tract of the guidewire is widened using serial dilators 8 Fr to 16-20 Fr in size (Cook, Bloomington, IL, USA). A chait tube (Cook) or an 8-Fr "gastrostomy" button (Cook) is advanced over the guidewire into the cecum under direct laparoscopic visualization. The U-stitches are tied over the wings of the button to secure the cecum up to the posterior aspect of the right lower-quadrant anterior abdominal wall (Fig. 1c). In the operating room, the cecostomy button is accessed using the accompanying drainage tube (Cook) flushed with saline (10 ml) and placed for gravity bag drainage. The umbilical access site is closed with 2-0 PDS at the fascia and 4-0 Vicryl rapide (Ethicon, Cornelia, GA, USA) at the skin.

### *Postoperative care*

The cecostomy button is flushed with saline (10 ml) twice daily and otherwise clamped during the hospital stay. Irrigations with 100 ml of volume once a day (90 ml of normal saline and 10 ml of glycerin) are begun 10 to 14 days after placement of the button and advanced to an appropriate volume for the age and function. The external cecal tacking sutures are removed 2 weeks after the operation.

### *Data collection and analysis*

The charts of patients who underwent surgery between 1999 and 2001 were reviewed retrospectively. Patient age, weight, primary diagnosis, operative time, hospital stay, associated complications, and duration of follow-up evaluation were recorded. A follow-up telephone survey to assess the quality of bowel function was conducted. It mainly examined parental assessment of overall success in continence, including the frequency of soilage and accidental bowel movements.

**Table 1.** Patients' Demographics

| Patient | Sex | Age | Weight | Diagnosis | Op time | Hosp stay | F/U period |
|---|---|---|---|---|---|---|---|
| CDK | Male | 6 | 20 | Status post pull-through for Hisrschsprung's disease. Chronic entercolitis with fecal incontinence | 37 | 5 | 12 |
| DH | Male | 6 | 20 | Hirschsprung's disease with chronic entercolotis | 27 | 2 | 12 |
| MW | Male | 11 | 30 | Imperforate anus with fecal incontinence | 30 | 5 | 5 |
| LG | Female | 12 | 44 | Post repiar of high imperforate anus with fecal incontinence | 37 | 3 | 5 |
| SF | Female | 4 | 15 | Status post repair for imperforate anus with hypoplastic right pelvic muscle and fecal incontinence | 30 | 4 | 29 |
| SKC | Female | 5 | 18 | Imperforate annus, long history of constipation and incontinence | 37 | 4 | 2 |

## Results

Seven patients ages 4 to 12 years (mean, 7.3 ± 1.3 years) and weighing 15 to 44 kg (mean, 24.5 ± 4 kg) underwent laparoscopic cecostomy button placement. The indication for all the patients was intractable fecal incontinence and constipation attributable to anorectal malformations ($n = 4$) or Hirschsprung's disease ($n = 3$). All had undergone a successful enema program preoperatively. Button placement was successful for all the patients with no intraoperative complications. The mean operative time was 33 ± 2 min, and the hospital stay was 2 to 5 days (mean, 3.8 ± 0.5 days).

The caregivers of all patients were contacted for a follow-up telephone interview. According to the interviews, 71% of the parents (5 of 7) were satisfied with the procedure. One parent was neutral, and one was dissatisfied (the child had vigorous nausea at every attempted antegrade colonic enema). None of the patients had accidental bowel movements with one or two daily enemas. The patients were mostly accident free unless suffering from gastroenteritis.

Despite this general satisfaction with the continence of their children, two caregivers did report persistent problems with episodes of soiling during nights once or twice a week. All the patients needed one enema daily, with the exception of a 6-year-old boy who required two enemas daily to remain accident free.

The volume for the enema was titrated to effect (400 to 1,000 ml). The time required for an irrigant to infuse by gravity was 10 min to 1 hour (mode, 10 min). The time required for an enema to obtain a result was 5 min to 1 hour (mode, 5 min).

Two patients had hypertrophic granulation tissue formation around the cecostomy button, which responded to topical silver nitrate therapy. Two unscheduled, uneventful cecostomy button changes were performed for one patient because of mechanical button malfunction. The mean follow-up period was 15 ± 4 months (range, 6–33 months). The demographic properties of the patients are listed in Table 1.

## Discussion

Encopresis is a social challenge to both the child and his or her family. Traditional management consists of one or several of the following: diet modification, laxatives, enemas, suppositories, and biofeedback. All these therapies require patience and long-term compliance [9]. Many patients, especially teenagers, find parentally administered anal enemas to be unacceptable, and therefore abandon this otherwise successful regimen.

The antegrade enema procedure, first described by Malone et al. [11], is a highly successful method for dealing with this problem. Unfortunately, the Malone procedure requires a laparotomy. It can be performed laparoscopically if the appendix is intact, as described by Lynch et al. [10] in their series of 30 children. The main complication with this technique was found to be stomal stenosis, with an incidence of 27%. Also, pain during catheter insertion is one of the most common problems. Especially among young children, this could be devastating for both the parents and the child, and some could abandon the procedure [13].

Laparoscopic cecostomy button creation, as described in this report, is a simple and safe alternative to the technically more complex Malone procedure or one of its modifications [10]. In addition, the laparoscopic cecal button procedure is applicable for children who do not have a patent appendix, or those who have previously undergone an appendectomy. Moreover, it has the great advantage of no stomal catheterization and less pain.

The complications of traditional surgical cecostomy or appendicostomy include stomal stenosis, stoma leakage, difficulty intubating the stoma, and appendiceal necrosis [12]. A button is a cosmetically acceptable alternative that eliminates these problems. Additionally, preservation of the appendix for future urologic reconstruction is appealing [8, 18, 19].

The use of the appendix for the continent colonic stoma precludes its use for urinary diversion, which often is necessary in the same patient population [4]. A tube cecostomy with a button allows sparing of the appendix.

Placement of cecostomy tubes using laparotomy, percutaneous, and colonoscopic techniques has been described previously. Use of a cecostomy button with laparotomy was first reported in 1996 for three patients, who achieved satisfactory results [6]. Duel and Gonzales [5] described similar success, but cited the need for laparotomy as a disadvantage. Shandling et al. [3, 16] reported a percutaneous technique for tube cecostomy.

The percutaneous antegrade enema technique has several potential advantages over the operative ap-

pendicocecostomy, especially the reduction in postoperative discomfort and in-patient stay. It also is a quick, simple technique that is easily reversed if the patient does not tolerate the antegrade enema washout regimen. It is possible to perform the technique with the patient under local anesthesia, but it is limited in young patients who have normal sensation of the abdominal wall. Percutaneous cecostomy is not as simple as percutaneous gastrostomy because of the variable position of the cecum and its greater mobility, which makes the initial puncture more difficult and increases the chance of leakage of colon contents and the risk for peritonitis [15].

Rivera et al. [15] reported the endoscopic technique for cecostomy tube placement. The advantage of this technique is direct visualization of the cecostomy site, which avoids inadvertent placement of the cecostomy in the terminal ileum or other undesirable site.

Inability to control bowel function may be permanent (as in patients with myelodysplasia), self-limiting (as in patients who have fecal soiling after a pull-through operation for Hirschsprung's disease), or partial (as in many patients who have undergone repair of anorectal malformation) [14].

The technique described in this report enables a reversible procedure, which is convenient for the aforementioned situations (i.e., self-limiting and partial fecal incontinence). When the patient's continence problem is resolved, the tube can be extracted easily, and the orifice will heal without the need for any other closure. Yeung and Lund [20] described a laparoscopic cecostomy for anterior ectopic anus with constipation in a 26-year-old woman.

This report describes the first application of laparoscopic cecostomy button placement in the pediatric age group. The laparoscopic method allows tube placement under direct vision. This technique brings with it all of the advantages of laparoscopic surgery: clear visualization, decreased postoperative pain, and cosmesis. Additionally, this procedure is straightforward, with an average operative time of 32 min. Although our series was limited, the only complication was local granulation tissue, which was managed topically.

## Conclusion

Laparoscopic cecostomy button placement is feasible and effective for the treatment of overflow incontinence in pediatric patients.

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