Continent catheterizable ileum–based reservoir

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Antonio Macedo
Universidade Federal de São Paulo

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Chapter 53
Continent Catheterizable Ileum-based Reservoir
A. Macedo Jr and E. M. Srougi

Introduction
The development of new techniques of bladder augmentation and clean intermittent catheterization (CIC) have changed the prognosis of end-stage bladder disease in children. When both augmentation and suprapubic continent stoma for CIC are required, the classic approach is to create an intestinal reservoir and, additionally, incorporate an efferent tube to it (appendix or Monti tube). We describe a technique in which the conformation of the reservoir includes a tubular, continent outlet for catheterization; therefore the time spent preparing the appendix with its pedicle or making a Monti tube from a second isolated segment of ileum is saved.

Patient counseling and consent
If there is a mean stoma continence of 95%, consider 10–15% surgical revision of the stoma due to stenosis or leakage. Mucus production by the intestinal reservoir, increased risk of urinary stones, and metabolic disorders (acidose) are all possible complications.

Indications
• Neurogenic bladder.
• Bladder extrophy.
• Posterior urethral valve bladder.
• Whenever a bladder augmentation is needed in association with a Mitrofanoff channel.

Limitations and risks
• Severe urethral incontinence (consider performing a bladder neck procedure as well).
• Social and orthopedic status: ability to perform self-catheterization of the reservoir.
• Compliance to urologic follow-up.

Contraindications
See above.

Preoperative management
Prepare the antegrade bowel with 600–1000 mL of mannitol solution 10%.

Anesthesia
General anesthesia with spinal block for pain control.

Special instruments/suture material
Special instruments are not required, although a Denis-Brown retractor is useful. Intestinal autosutures can be used although they are not necessary.

Operative technique
See Figs 53.1–53.10.

Tips
• Isolate 30 cm of the ileum for augmentations; for bladder substitutions we suggest a further 10 cm for a Studer afferent loop and refluxive ureteral reimplantation (total of 40 cm).
• Open the bladder dome extensively for a wide anastomosis (augmentations).
• The reservoir is created by running 3/0 Vicryl sutures. The valve mechanism is created by 2/0 Prolene interrupted sutures (four to five sutures).
• An infraumbilical pseudoumbilical stoma is preferred in cases of bladder augmentation. The angle of the reservoir anterior wall to the channel is then kept closed, reinforcing the efficiency of the valve. We additionally anchor the reservoir dome to the abdominal wall in order to further increase the resistance of the outlet tube against the abdominal wall. The
distal part of the tube should exit the valve and find the stomal skin without tortuosity to ease the passage of the catheter through it.

- We applied the same principle to the transverse colon in three previously irradiated rhabdomyosarcoma patients with excellent results.

**Postoperative care**

- The nasogastric tube is removed on day 1 or 2.
- A 12 Fr silicone Foley tube and cystostomy are left in place for 3 weeks. Parents or the patients themselves should clean the reservoir with 20 mL of saline solution daily to prevent mucus occlusion of the urinary tubes.
- Patients are readmitted on day 21 for self-catheterization training by a specialist stoma nurse.

**Complications**

- Partial dehiscence of the skin closed to the stoma: keep the Foley tube for an additional 1 or 2 weeks.
- Urinary retention due to mucus obstruction: substitute the urethral tube.

**Troubleshooting**

- Difficulties with the first catheterization of the stoma: do not force, provide an endoscopic evaluation of the outlet channel, place a Foley tube, and wait 4–6 weeks to restart with CIC.

- Stoma stenosis: this can be treated initially by local dilatation under sedation or, if necessary, by reanastomosis of the tube.
- Severe channel stenosis and total incontinence: these are better treated by appendiceocystostomy.

**Results**

- n = 65.
- Two patients were excluded (undiversion).
- Total continence: 61/63 (after > 4 h).
- Partial continence: 63/63 (after > 2 h).
- Reoperations: 9/63 (14.3%).

**To do**

- Evaluate the leak point pressure to define urethral resistance (and the necessity of bladder neck repair).
- Augmentation: create a pseudoumbilical stoma between the pubis and umbilicus.
- Substitution: place a stoma at the umbilical scar.
- Provide a preoperative nurse interview to explain the care and procedures related to abdominal CIC.

**Not to do**

- Do not remove the outlet stomal tube before 3 weeks.
- Do not insert a urethral tube with force when resistance is noted during the initial CIC, to avoid perforation of the channel. Check the tube endoscopically.

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**Figure 53.1** A lower midline incision is made with a small left-sided circumferential skin flap for further pseudoumbilical stoma creation.
**Figure 53.2** Detubularization of the ileal segment (flap definition).

**Figure 53.3** Creation of the reservoir plate.

**Figure 53.4** The flap can be further incised to produce a longer tube.
Figure 53.5  Insert a running suture to close the plate of the reservoir.

Figure 53.6  A 12 Fr silicone Foley tube is used to allow tubularization of the flap to create an efferent tubular conduit.

Figure 53.7  The reservoir after anterior wall closure.
**Figure 53.9** The pouch is closed completely for bladder substitution.

**Figure 53.10** The reservoir is anastomosed to the native bladder in cases of augmentation cystoplasty.

**Figure 53.8** The tube is embedded to provide continence.