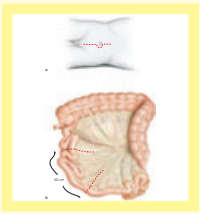
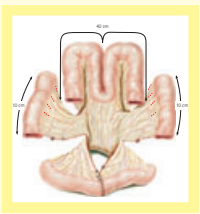
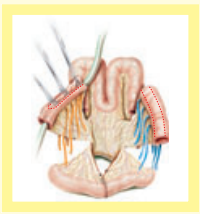
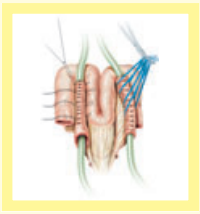
Surgery Illustrated









Surgical Atlas

A continent cutaneous ileal neobladder using the serous-lined extramural valves

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ILLUSTRATIONS by STEPHAN SPITZER, www.spitzer-illustration.com

INTRODUCTION

To create a continent cutaneous urinary reservoir, three elements are required: a low-pressure compliant reservoir, a reliable antirefluxing uretero-intestinal anastomosis, and a stable, easily catheterizable continent stoma. To this end, we reported the use of an ileal reservoir, which relies on the construction of two serous-lined tunnels, one for preventing reflux and the second for creating a continent stoma. The procedure was initially tested experimentally [1], and thereafter our experience was reported in the clinical setting [2,3].

INDICATIONS AND SELECTION OF PATIENTS

The indications include patients with pelvic malignancy requiring a cystectomy and who are unsuitable candidates for an orthotopic bladder substitution. Patients with a neuropathic bladder when conservative measures fail comprise the second important indication. Selected candidates should have reasonable manual dexterity and be motivated to use clean intermittent catheterization at regular intervals. The procedure is contraindicated if there is a history of heavily irradiated bowel, history of previous bowel resection and patients with impaired renal function (creatinine clearance <40 mL/min).

PREOPERATIVE PREPARATION

As the small bowel is used, no specific preparation is necessary. Fasting overnight with administration of i.v. fluids to ensure good hydration is required. A parenteral broad-spectrum antibiotic is given just before the induction of anaesthesia and maintained for 3 days after surgery.

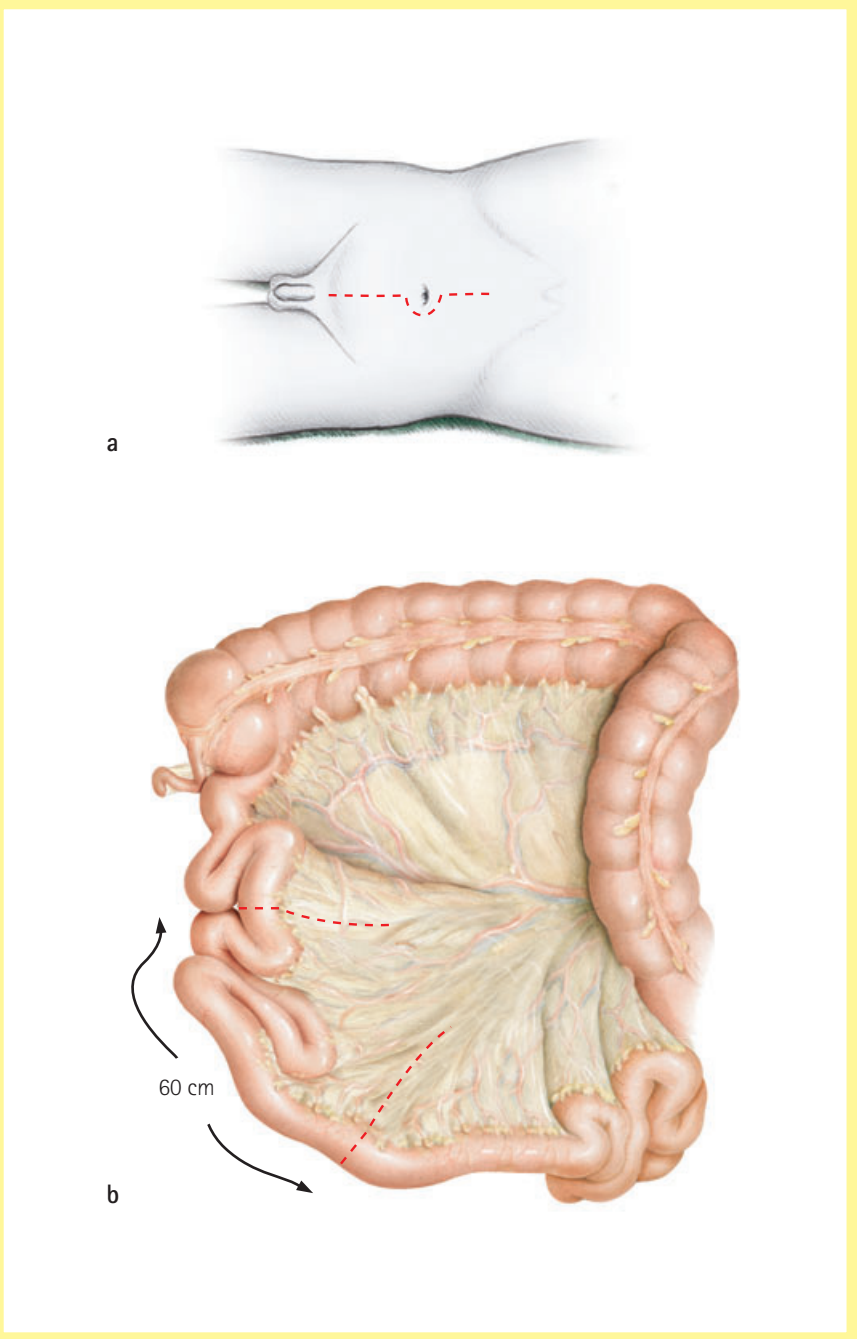
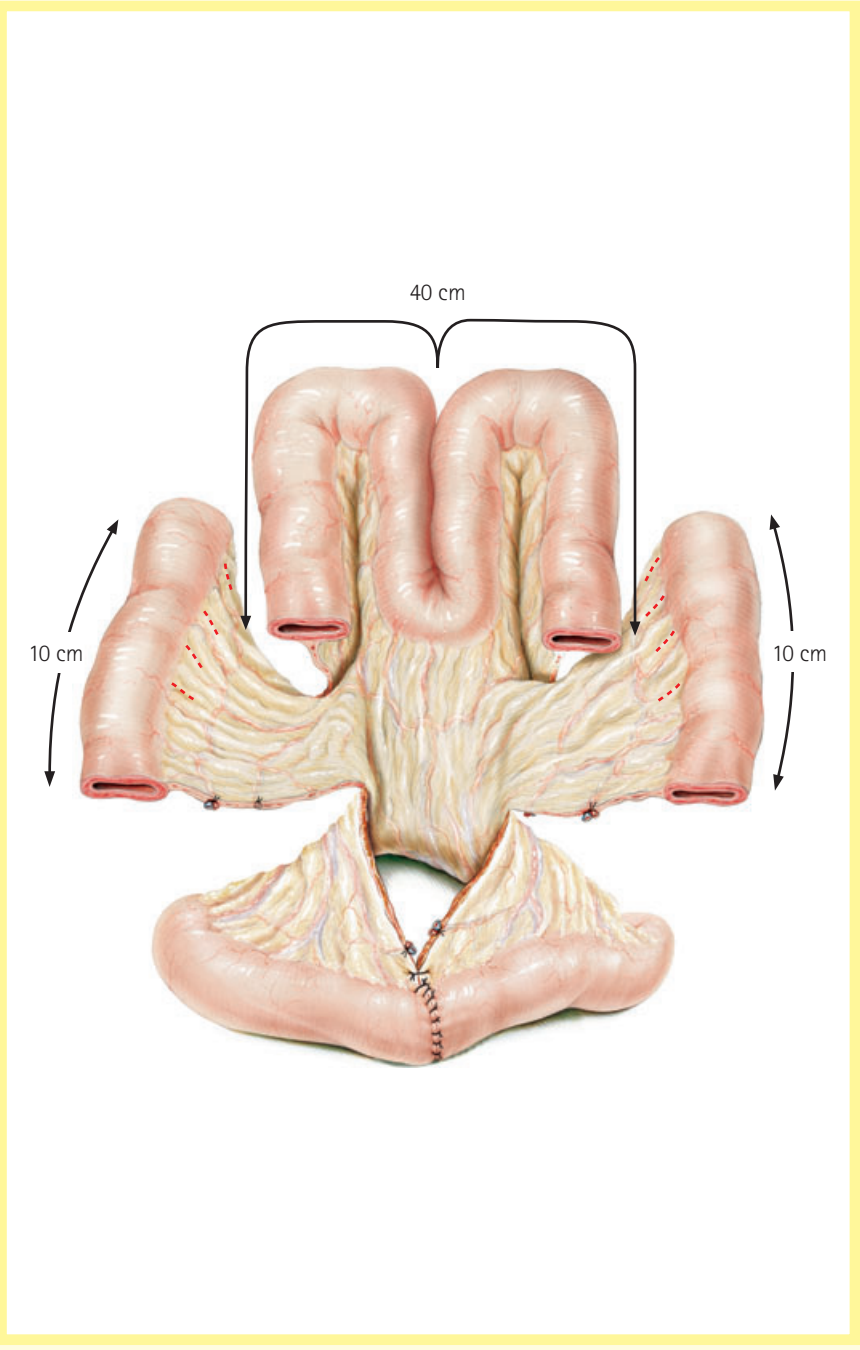


Figure 1

The patient is placed supine with a Trendelenberg tilt. The surgical area to be sterilized and draped extends from the lower chest down to the upper thighs. A midline incision is made from a point halfway between the umbilicus and xyphoid superiorly, and the pubis inferiorly. The incision encircles the umbilicus by 1–2 cm to the left. With the help of back transillumination, a 60-cm segment of the terminal ileum is isolated.

Figure 2

The continuity of bowel is re-established by an end-to-end anastomosis. The isolated bowel is subsequently divided into three parts with the preservation of their blood supply. The middle 40-cm segment is used for constructing the reservoir and is arranged in a W-shaped configuration. The 10 cm proximal segment is used for creating the antireflux mechanism, and the distal 10 cm segment for creating the outlet valve.



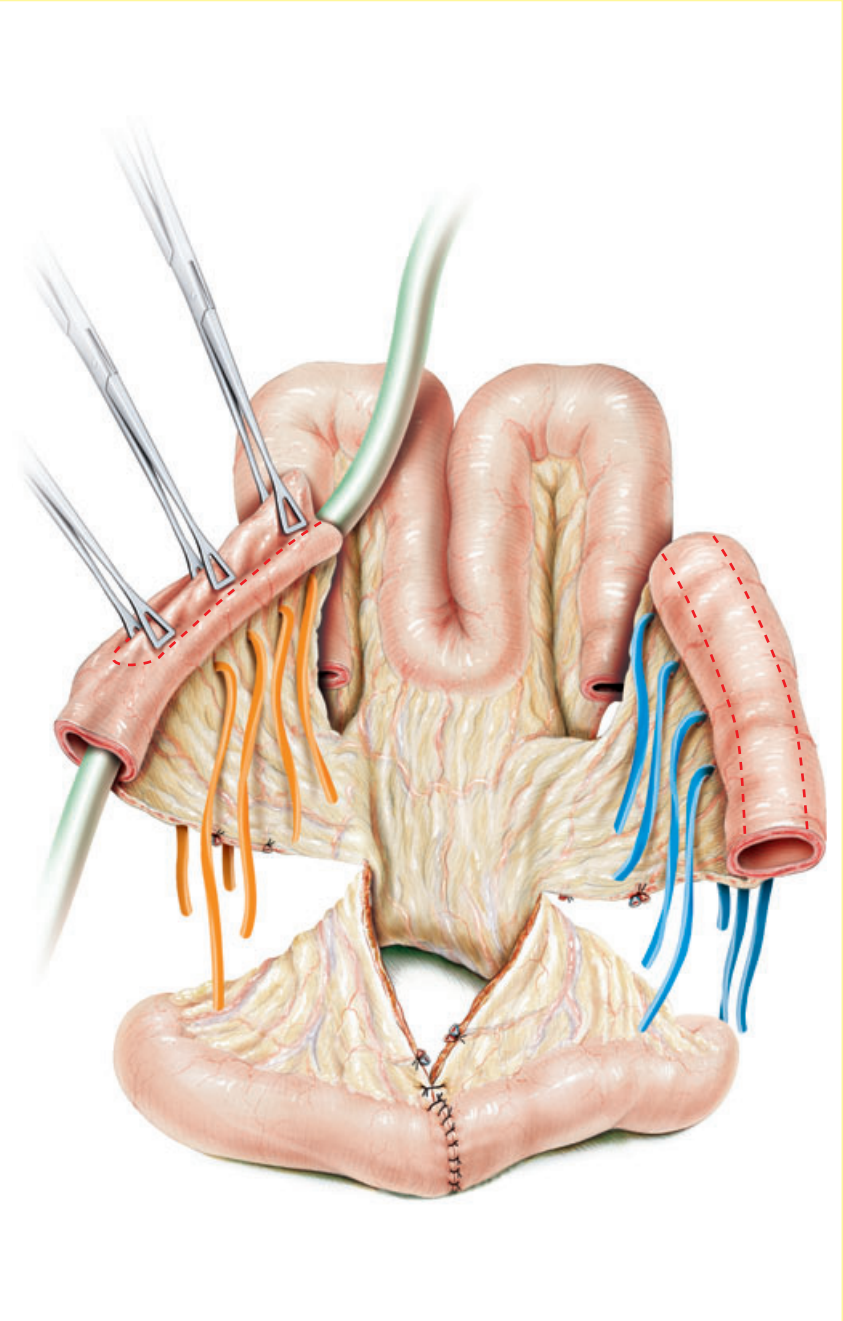
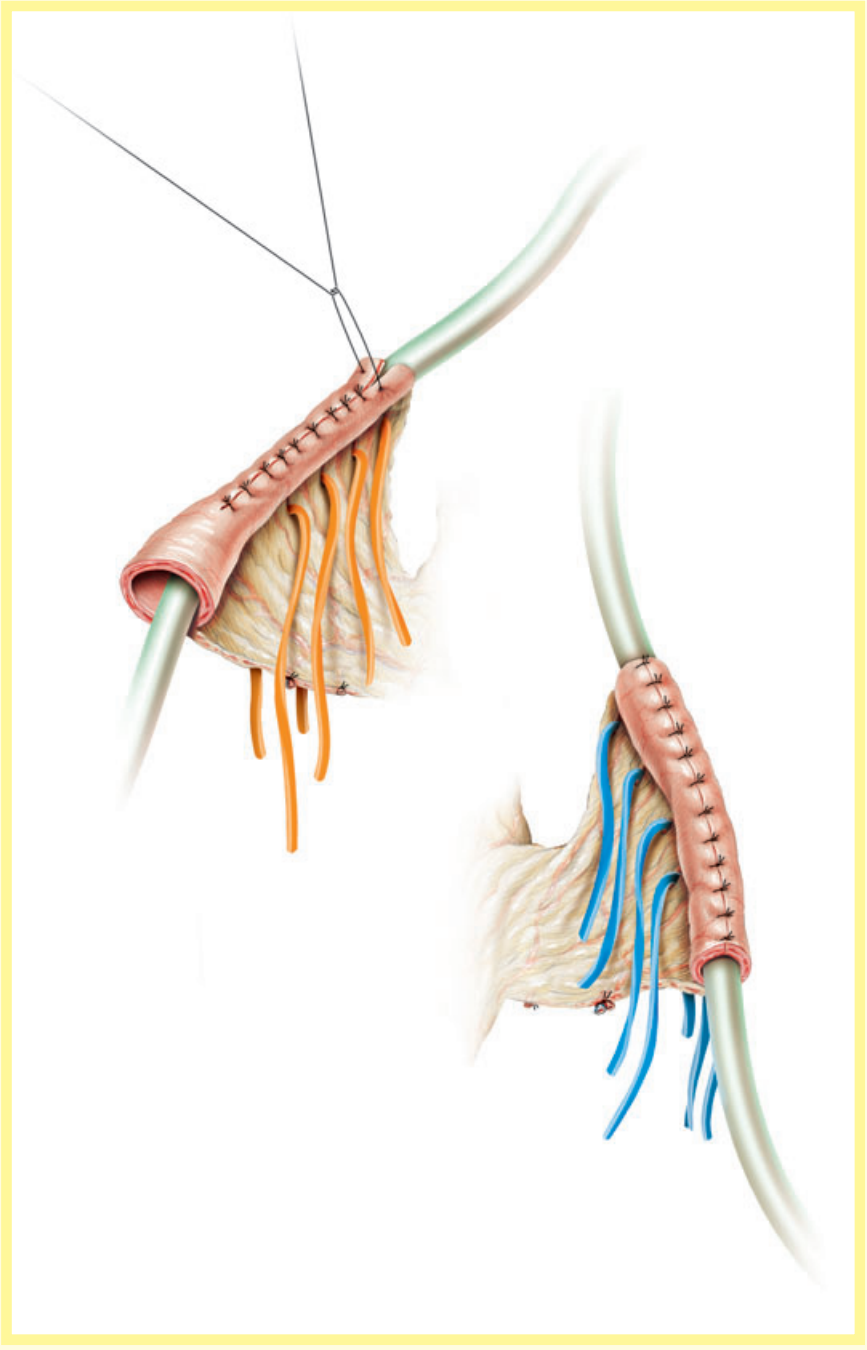


Figure 3

Three to four mesenteric windows are created in the proximal and distal segment close to the mesenteric border. These windows are marked by a series of vessel loops. This later facilitates the easy passage of suture material through the mesenteric windows.

Figure 4

The proximal and distal short segments are then tapered around a 22 F catheter; this could be done by simple excision using a diathermy knife followed by suturing, or by using a gastrointestinal stapler. The proximal third of the inlet (proximal) segment is left untapered for ureteric anastomosis.



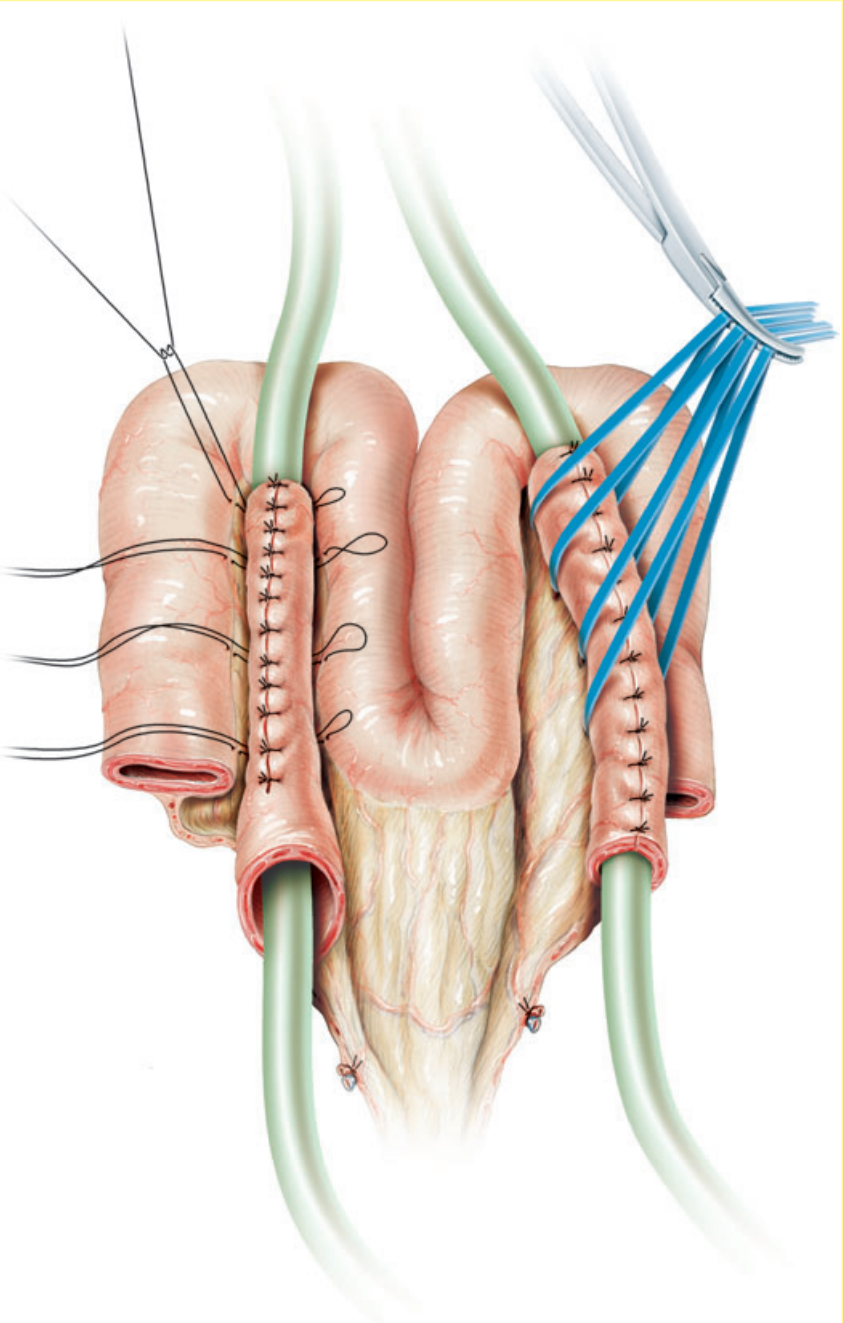
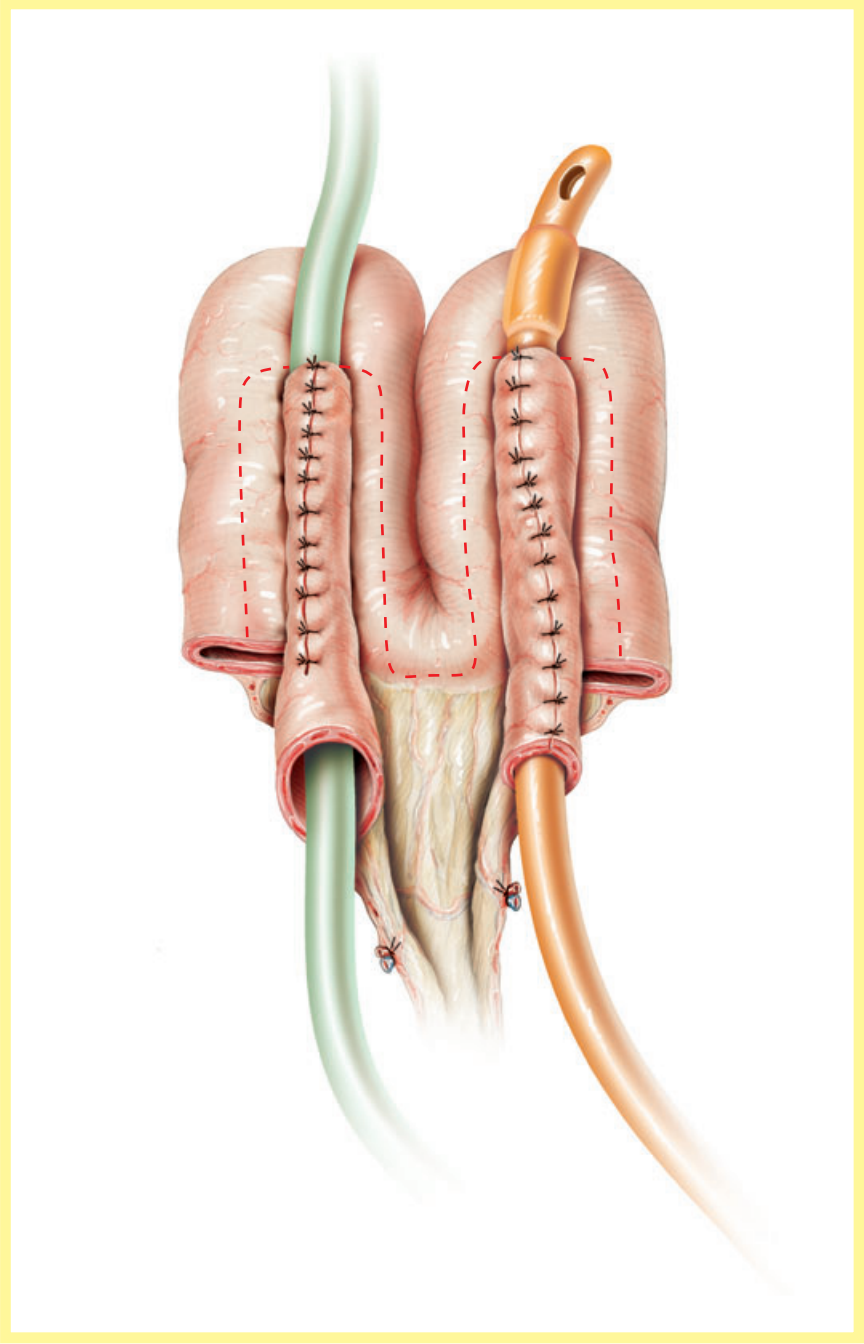


Figure 5

Each of the tapered segments is now laid between the corresponding two lateral limbs (troughs) of the reconfigured W-shaped loop of bowel. The two adjacent limbs of each trough are approximated using 3/0 silk seromuscular sutures which pass through the previously created mesenteric windows, guided by the inserted vessel loops. The tapered ileal segments are thus fixed within a serous-lined trough with no interruption of their blood supply, and the bulky mesentery is excluded behind the pouch.

Figures 6 and 7

The W-shaped middle segment destined to form the future reservoir is now incised along its whole length at its antimesenteric border, using a diathermy knife. The edges of the ileal troughs are closed in front of the tapered segment using interrupted 4/0 polyglactin suture. Their spatulated ends are anastomosed to the tunnel flaps. In this fashion the inlet and outlet valves are embedded in a serous-lined extramural tunnel.



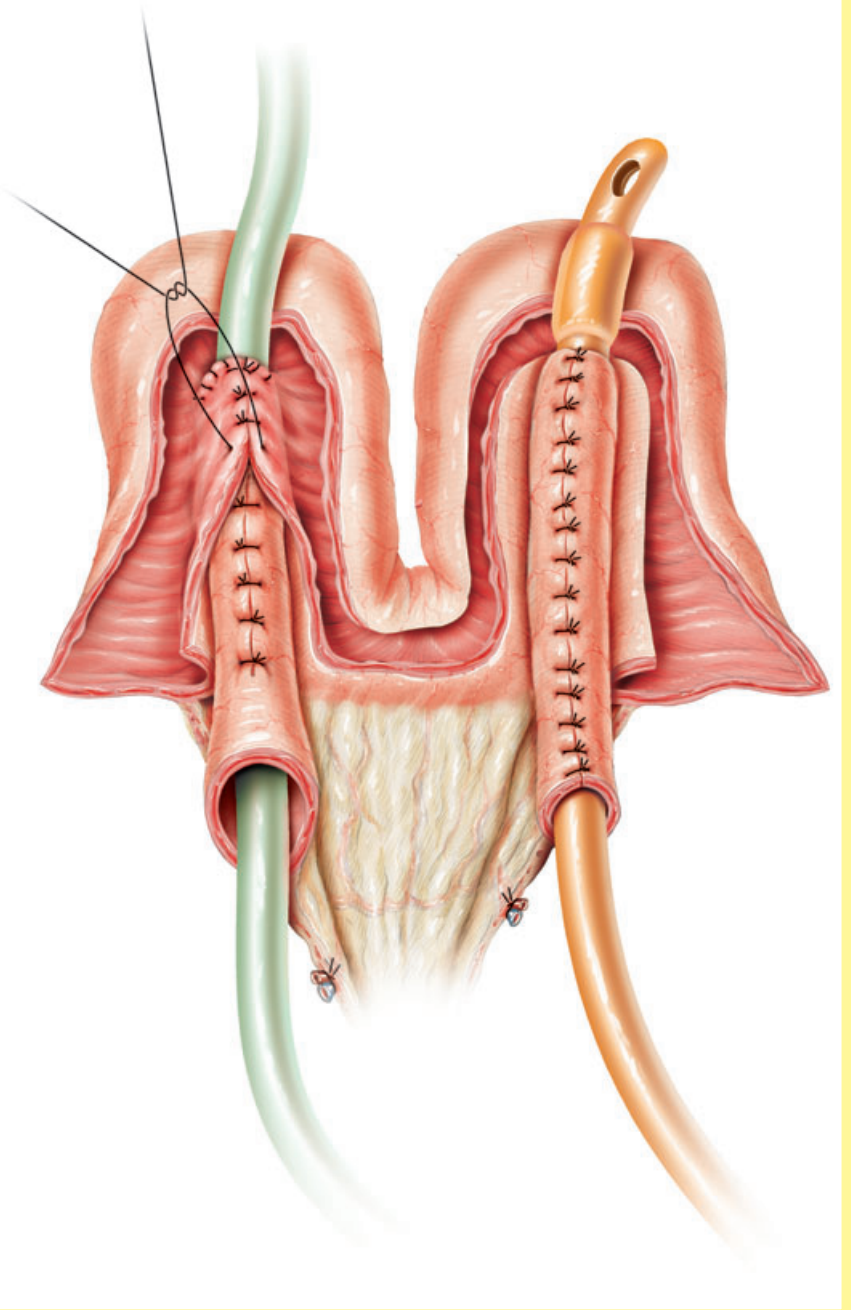
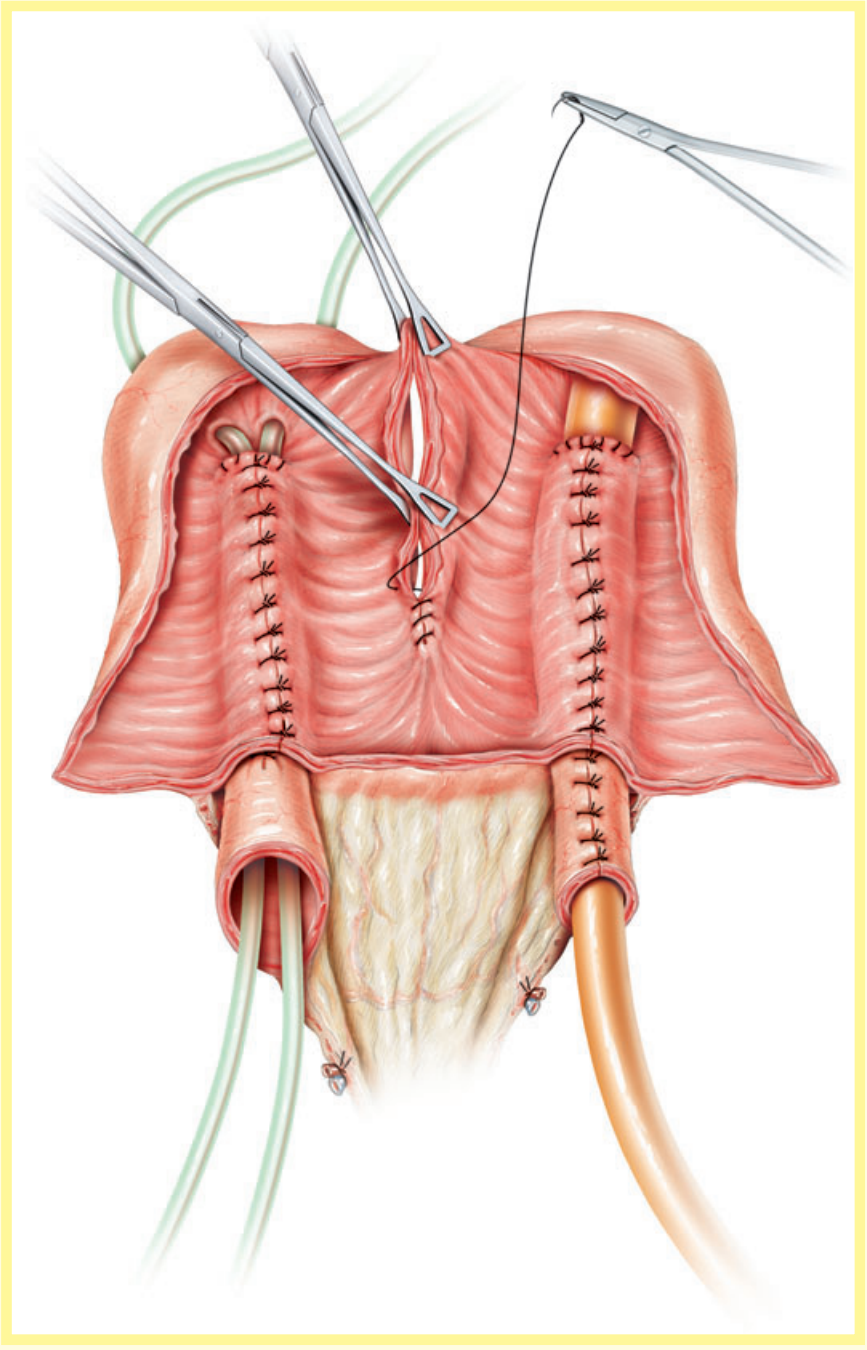


Figure 8

The edges of the two medial flaps of the W-segment are then joined together by a single layer of continuous 3/0 polyglactin suture. Two soft siliconized 8–10 F stents are threaded through the inlet segment and secured in place by 4/0 chromic gut sutures. An 18 F Foley catheter is inserted in the outlet valve.



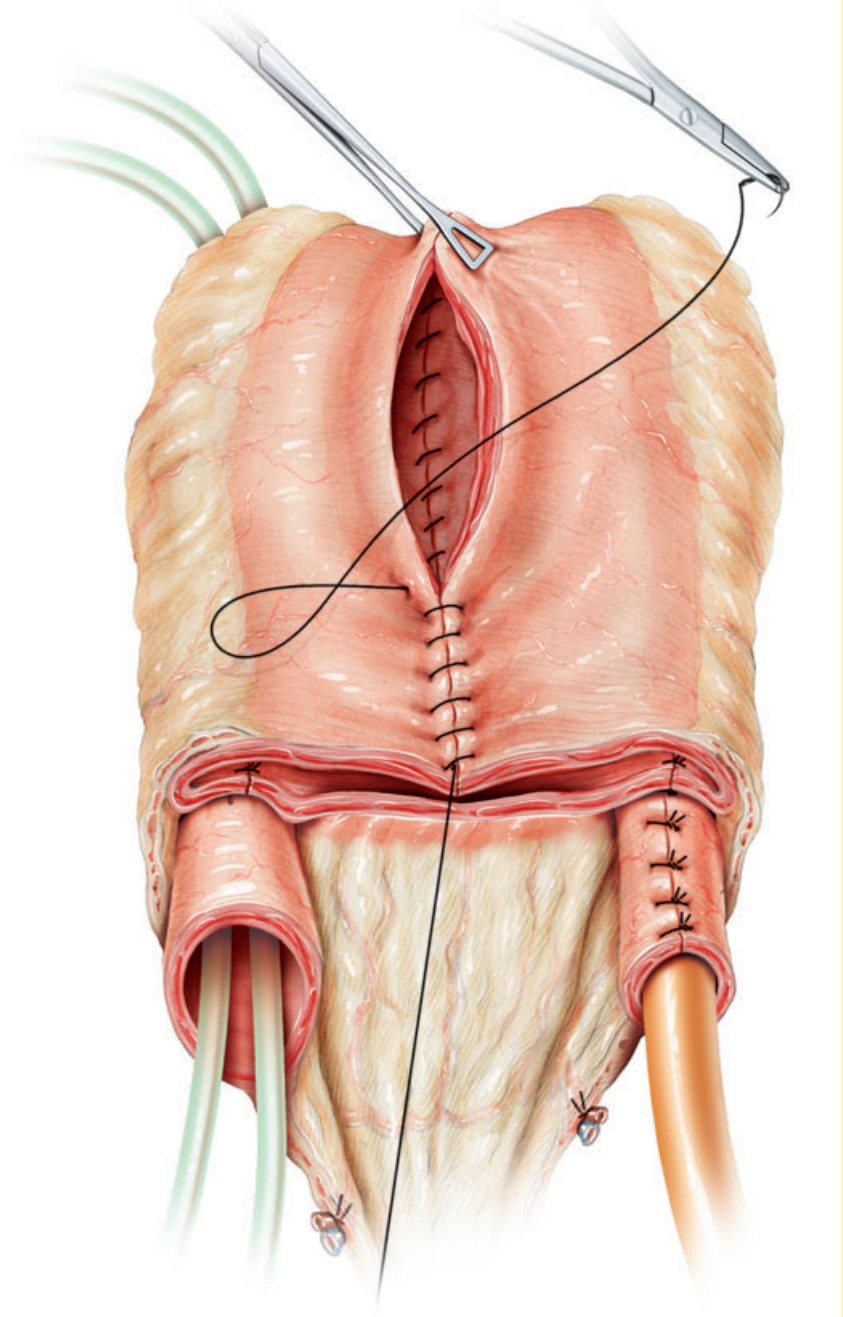
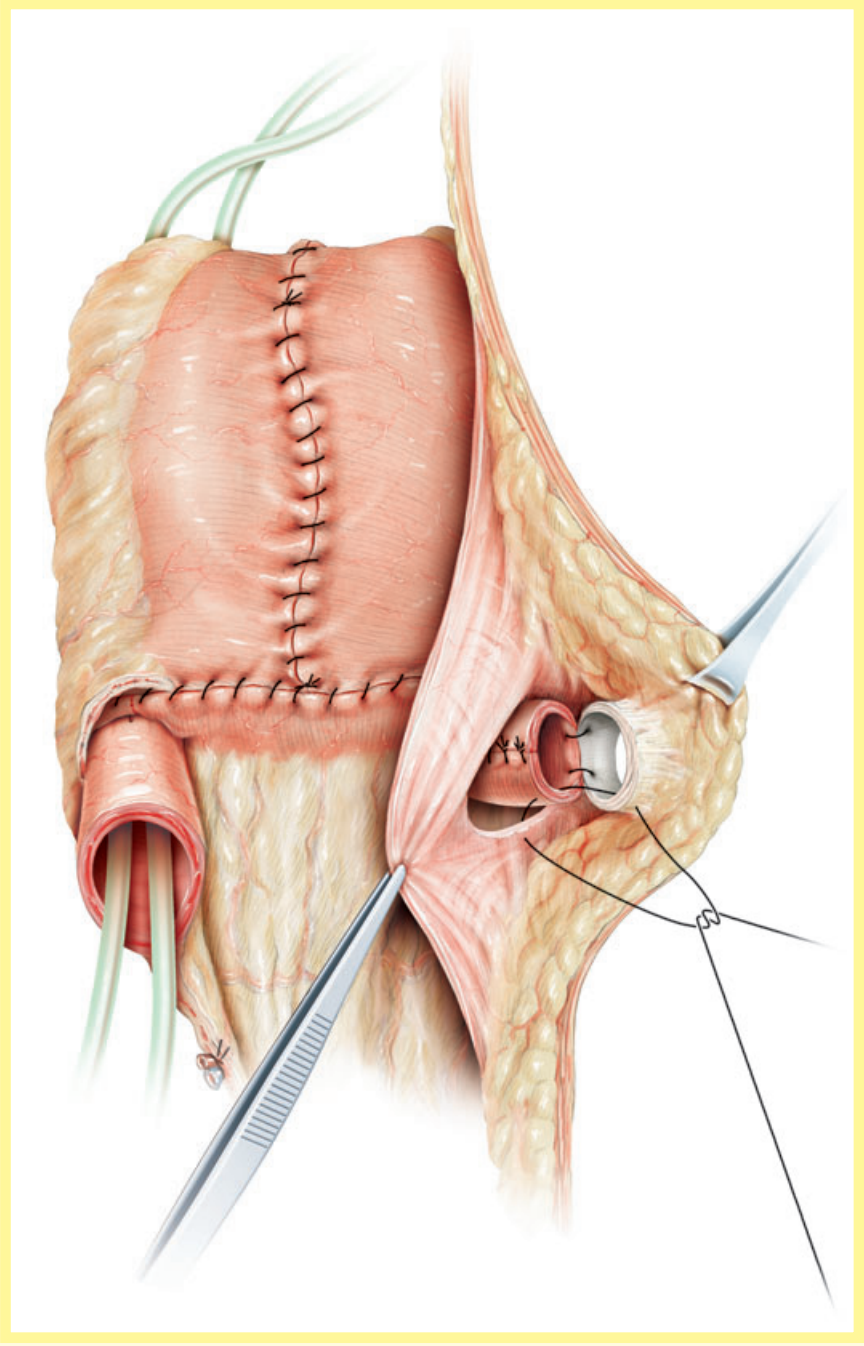


Figure 9

The pouch plate is then closed by approximating the most lateral ileal flaps anteriorly.

Figure 10

The skin of the umbilical funnel is raised and separated from the underlying rectus fascia. A fascial cruciate incision is made which can admit a 20–24 F catheter. A suitable buttonhole is excised from the invaginated umbilical skin. The distal end of the outlet segment is pulled through the aperture in the rectus fascia. The edge of the intestinal outlet is sutured to the buttonhole created in the umbilical funnel using interrupted monofilament 4/0 poliglecaprone 25 sutures, including the rectus fascia.



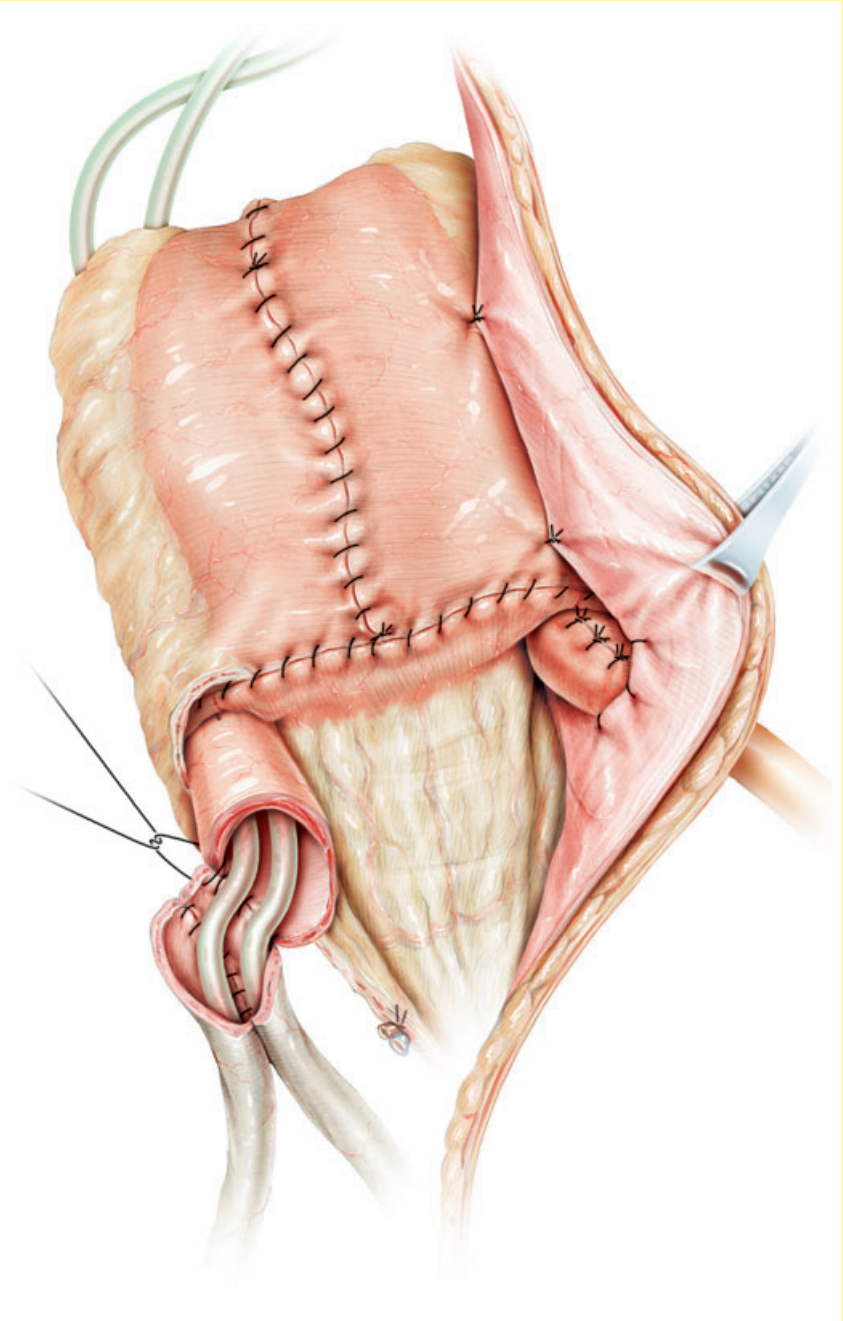


Figure 11

The reservoir wall around the outlet segment is then fixed to the inner aspect of the abdominal wall. This avoids difficulties in later catheterization. The reservoir is drained by an 18 F Foley catheter inserted in the outlet thus created. The left ureter is passed through a wide fenestration created in the left mesocolon. The right ureter is passed behind the mesentery of the neobladder. A stented and tension-free anastomosis is then made between the widely spatulated ureters and the inlet segment. An end-to-side or a Wallace anastomosis can be used, with interrupted 4/0 or 5/0 polyglactin sutures. (Wallace anastomosis shown).

The ureteric stents are exteriorized through the anterior wall of the reservoir. The pelvic cavity is drained by two tube drains. Gastric drainage is established by a nasogastric tube or a gastrostomy.

AN ALTERNATIVE OUTLET USING THE APPENDIX

If the appendix is judged to be suitable to serve as an outlet, it is mobilized and detached at its base from the caecum. The tip of the isolated appendix is cut and spatulated; its lumen is dilated up to 16–18 F using straight dilators. Four windows are created in the meso-appendix. The appendix is then embedded in the serous-lined trough as previously described.

POSTOPERATIVE CARE

Parenteral fluids are maintained until bowel habit resumes. Prophylactic antibiotics are given routinely for 3 days. Low molecular-weight heparin is given for 10 days. The draining tubes are removed when the drainage ceases. The reservoir is irrigated with 30–60 mL of normal saline every 8 h to prevent mucus retention. The ureteric stents are removed 10–12 days after surgery. The pouch is kept drained for 21 days. Training by intermittent catheter clamping is then used; all patients start self-catheterization 2 days before discharge from the hospital, and a 2-h interval is allowed during the first week, which is increased gradually until the pouch matures. By the end of the sixth week most of the patients evacuate the pouch every 4–5 h.

OUTCOMES

The complications and functional outcomes of this procedure were discussed in detail previously [3]. In summary, 95% of patients were dry with a catheterization interval of 4–5 h. There was stomal stenosis with difficulty in catheterization in 6% of patients, two-thirds of whom had an appendix stoma. Five patients had a wet stoma due to failure of the continence mechanism, and had a revision.

COMMENT

Embedding the tapered ileum within the serous-lined tunnel significantly reduces the likelihood of fistula formation. Furthermore, embedding provides an outer support. A straight channel is created and catheterization is easy. The mucous lining of the continent outlet tolerates the trauma of and provides a natural lubricant for catheterization. Continence is provided by a passive mechanism derived from tubular resistance of the tapered ileal segments and a dynamic mechanism that results from embedding the outlet within the wall of the reservoir. The former prevents leakage at low pressure while the latter prevents leakage during filling of the reservoir and/or at high pressure. As a result of the high leak-point pressure encountered with this system, incorporation of an efficient antireflux mechanism is mandatory to guard against upper tract damage.

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