

TOTAL AND IMMEDIATE DAYTIME AND NIGHTTIME CONTINENCE WITH A RIGHT COLONIC NEOBLADDER—WHAT MAKES IT POSSIBLE? AN 11-YEAR FOLLOWUP

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ABSTRACT

Purpose: We report the long-term functional results of the colonic neobladder and provide the physiological and urodynamic foundations for them.

Materials and Methods: From March 1993 to February 2004, 38 patients with cystectomy received a neobladder constructed from detubularized, remodeled right colon and intact cecum following our design at the urology service at our institution. Most patients underwent urodynamics and videourodynamics as postoperative followup. We defined total continence as not using any protection whatsoever (neither pads nor a night alarm), which was immediate upon removing the urethral catheter.

Results: A total of 37 patients achieved total daytime continence immediately and the remaining 1 was totally continent after 30 days (100%). Nighttime continence was total and immediate in 36 patients (92%) and satisfactory in 2. Micturition was immediate, satisfactory and total in 37 patients with an average maximum flow of more than 26 ml per second. The patient who did not achieve micturition required clean intermittent catheterization. Videourodynamic studies revealed that continence resulted from the low pressure developed in the large capacity reservoir (more than 600 ml) and from intact intestine haustral contractions, which ejected urine toward the detubularized and remodeled area. In turn, micturition was attained through a combination of abdominal wall tension and mass contractions of the nondetubularized segment, which generated a pressure of more than 100 cm.

Conclusions: The functional results of this new neobladder are significantly greater than those achieved with other procedures already described in the literature because of the different way in which it functions.

KEY WORDS: urinary diversion, cystectomy, bladder neoplasms, colon, urinary continence

For urologists urinary diversion and reconstruction of the lower urinary tract have always been some of the greatest challenges. Up to the early 1980s several orthotopic diversion procedures had been developed that incorporated nondetubularized intestinal flaps. Even when these procedures achieved good daytime continence, they could not prevent nighttime incontinence.

Since the 1980s, the use of detubularized, remodeled flaps has made it possible to achieve reservoirs of enhanced capacity and accommodation. Thus, protection of the upper urinary tract and daytime continence were greatly improved. However, to our knowledge the effective control of nighttime incontinence had not yet been achieved.

As of 1993, at the urology service at our institution a new method for constructing a neobladder has been developed that combines the use of a segment of detubularized intestine with another segment that is intact. Two components form the structure of this new substitute. The upper one, which has great volume and low filling pressure, is constructed with the upper third of the ascending colon and the detubularized right half of the transverse colon remodeled into a spherical shape. The lower one is constructed of the intact cecum and the lower third of the ascending colon, preserving their haustral and mass contractions. The former contractions contrib-

ute to the continence mechanism and the latter contractions contribute to the evacuation mechanism.¹

We report the course of patients in the long term after 11 consecutive years of experience with this neobladder. We highlight its advantages compared to other procedures used in terms of its construction and functional results, especially as far as nighttime continence is concerned.

MATERIALS Y METHODS

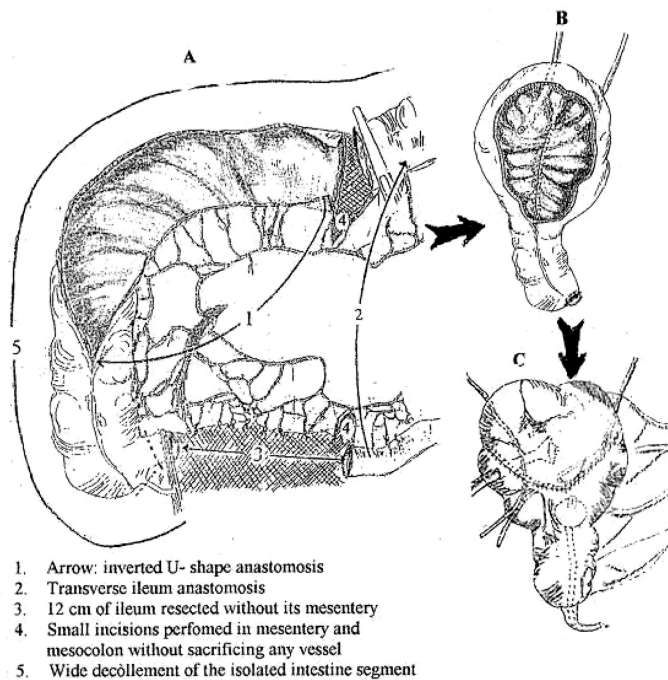
Between February 1993 and March 2004 the lower urinary tract was reconstructed in 38 patients following radical cystectomy. Of the patients 36 were male and 2 were females 44 to 72 years old.

Cystectomy was indicated following infiltrating transitional carcinoma in 37 patients and superficial grade 3 transitional carcinoma with associated carcinoma in situ that was resistant to conservative treatment in the remaining patient. In 3 patients intraoperative frozen analysis verified positive lymph nodes, although a palliative procedure was continued for local control of the condition. The patients and their relatives were informed beforehand about the possibility of the proposed neobladder not being viable due to oncological or technical reasons. Should that have been the case, the replacement would have been continent cutaneous diversion, such as the Florida pouch,² because it uses almost the same segment of intestine.

The basic principles of the surgical technique have been previously described (fig. 1).¹ We describe the procedure

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1. Arrow: inverted U-shape anastomosis
2. Transverse ileum anastomosis
3. 12 cm of ileum resected without its mesentery
4. Small incisions performed in mesentery and mesocolon without sacrificing any vessel
5. Wide decollement of the isolated intestine segment

FIG. 1. Colonic neobladder surgical technique. A, isolated intestinal segment. Detubularization does not include cecum or lower third of ascending intestine. 1, inverted U-shaped anastomosis (arrow). 2, transverse ileal anastomosis. 3, 12 cm ileum resected without mesentery. 4, small incisions in mesentery and mesocolon without sacrificing any vessel. 5, wide decollement of isolated intestinal segment. B, creation of reservoir rear wall. C, final spherical configuration of detubularized portion.

briefly. 1) The segment of isolated intestine is the cecum, the ascending colon and the right half of the transverse colon. 2) The colon is detubularized up to the first 3 or 4 cm, while the ascending colon together with the cecum remain without detubularization. Initially detubularization included all of the ascending colon, leaving only the cecum intact. 3) Wide mobilization of the colon, especially at the colonic hepatic angle level, enables greater movement for the future reservoir as well as easy descent into the pelvis minor. 4) An inverted U-shaped suture is made in the detubularized transverse colon to the ascending colon and direct ureteral reimplantation is done without antireflux technique. 5) The anterior face is closed in transverse or oblique fashion, thus, achieving a spherical shape. 6) At the most inferior area of the cecum a 2 cm incision is made and, after everting the mucosa, it is anastomosed to the urethra, as in prostatectomy.

A No. 2 Pezzer catheter is left indwelling. It is removed later together with the ureteral catheters through another incision in the right side of the abdominal wall. Subsequently the cecum and the upper part of the detubularized area are fixed to the endopelvic fascia and abdominal wall, respectively.

At 21 days after surgery voiding cystourethrography is performed in every patient upon withdrawing the urethral catheter to rule out extravasation or significant residual urine. Most patients were urodynamically assessed postoperatively at between 6 months and 3 years. The 6 patients with 5 to 11-year followup were videourodynamically evaluated at our hospital as well as at other academic centers in Buenos Aires.

Intrareservoir, abdominal and detrusor pressures, corresponding to the muscles of the neobladder, were simultaneously recorded with the patient standing. Intrareservoir pressure was transurethrally measured with a triple lumen 8Fr catheter. Abdominal pressure was determined with a

rectal balloon catheter. Detrusor pressure was estimated by electronic subtraction from intrareservoir and abdominal pressures. Total continence was defined as continence with no protection whatsoever, neither pads nor a night alarm, that was immediate upon withdrawing the urethral catheter. Satisfactory continence was defined as the use of no more than 1 pad nightly.

RESULTS

Voiding cystography revealed bilateral reflux during the filling phase in 2 patients and unilateral reflux during micturition in 3, all on the left side. In 2 patients contrast extravasation was observed and another patient failed to achieve micturition. Bilateral reflux in 1 patient disappeared. In the remaining refluxing renoureteral units there was no functional deterioration. Extravasation was treated with a permanent catheter for 10 more days, while the patient who did not urinate required intermittent catheterization.

Preserved renal function was found in all patients and improvement was noted in 2. Excretory urography and computerized tomography with contrast medium revealed a dilated left collecting system in 3 patients, in whom asymptomatic obstruction of the left ureter developed at the site of the ureterointestinal anastomosis. It was not treated.

Unilateral reflux and obstructions developed on the left side. This led us to consider that these conditions were secondary to a rather tense ureterointestinal anastomosis because in some patients, especially obese ones, passage from the left ureter to the right side of the abdomen below the mesentery is difficult to achieve and it remains tense. An alternative for avoiding such a situation would be to pass the ureter over the upper mesenteric artery.

Mild hyperchloremia without acidosis (bicarbonate approximately 24 mmol/l) was present in more than half of the patients. Two patients with gastroenteritis and another with pneumonia had severe hyperchloremia acidosis following dehydration and prerenal failure. Two of these patients required supplemental oral therapy to maintain serum bicarbonate levels. No patient was asked to increase micturition frequency to avoid long-term exposure of the intestinal mucous membrane to urine.

Asymptomatic urinary tract infection was present in many patients, although it was only treated if associated with irregular or improper voiding habits. Pyelonephritis with fever was diagnosed in 1 patient with bilateral reflux and in another with significant residual urine due to tumor relapse in the urethroreservoir anastomosis.

Continence. Of the 38 operated patients 37 achieved complete, immediate daytime continence upon catheter removal. The remaining patient, who was a woman, achieved it 30 days later (100%). Nighttime continence was complete and immediate in 36 patients (92%) and in the remaining 2 it was satisfactory.

Micturition. Voiding was complete and immediate in 37 patients, while the remaining 1 failed to achieve it and required clean intermittent self-catheterization. Two patients had episodes of acute urine retention, including 1 at 3 years and the other after 6 years. Each case was due to recurrent tumor in the urethroreservoir anastomosis area.

Urodynamics. After 6 months reservoir filling showed large capacity (mean 730 ml, range 450 to 900). Pressure at the end of filling (accommodation) was 26 cm water with minimal noninhibited contractions. Filling was continued until patients responded and some with 300 to 400 ml had spontaneous involuntary micturition. Even in these cases filling pressure before micturition was less than 30 cm water. Videourodynamic fluoroscopic images during this phase showed periodic milking of urine from the cecum to the upper segment of the reservoir (fig. 2).

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