

Determinants of Success and Failure of Seromuscular Colocystoplasty Lined With Urothelium

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Purpose: Seromuscular colocystoplasty lined with urothelium is a method of bladder augmentation that avoids incorporating intestinal mucosa into the urinary tract. Others have reported a repeat augmentation rate of 23%. We analyzed the results in 20 patients who underwent the procedure, as performed by one of us (RG), at 3 institutions.

Materials and Methods: After receiving institutional review board approval we retrospectively reviewed the charts of all patients operated on since 1998. Preoperative and postoperative bladder capacity at 30 cm H₂O, expressed as the percent of expected capacity for age using the equation, bladder capacity in ml = (age + 1) × 30, as well as prior, concomitant and subsequent bladder or bladder neck procedures, continence and the need for repeat augmentation were recorded.

Results: There were 20 patients, including 7 females, with a mean age at surgery of 9 years and a mean followup of 53 months. All patients had neurogenic bladder dysfunction. An artificial urinary sphincter was implanted at the time of seromuscular colocystoplasty in 10 patients, preoperatively in 6 and postoperatively in 1. A sling was used in 3 females. Patients were divided into 2 groups. The 15 group 1 patients underwent no concomitant procedure in the bladder and the 5 in group 2 underwent creation of a continent channel at seromuscular colocystoplasty. There were no failures of augmentation in group 1, in which bladder capacity increased from 60% of that expected for age to 100%. All patients were continent. Three of the 5 patients in group 2 required repeat augmentation.

Conclusions: Seromuscular colocystoplasty lined with urothelium has proved to be an effective method to augment the bladder in patients who have an artificial urinary sphincter or who undergo simultaneous artificial urinary sphincter implantation. We do not recommend constructing a continent catheterizable channel at the time of seromuscular colocystoplasty lined with urothelium.

Key Words: urinary bladder; urothelium; urinary sphincter, artificial; catheterization; colon, sigmoid

Abbreviations and Acronyms

AUS = artificial urinary sphincter

BC = bladder capacity

CCC = continent catheterizable channel

SCLU = seromuscular colocystoplasty lined with urothelium

Study received institutional review board approval.

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SEROMUSCULAR colocystoplasty lined with urothelium was designed as a method of enterocystoplasty that avoids incorporating intestinal mucosa into the urinary tract, thus, avoiding the potential complications that arise from this incorporation.¹ The technique involves 75%

detrusorectomy, after which the exposed bladder mucosa is covered with a reconfigured seromuscular segment of sigmoid colon. We have previously reported our results with short-term followup, which were particularly rewarding when SCLU was done in conjunction with an AUS.²

In the course of our experience we have observed that SCLU works best when it is done in patients with high outlet resistance and the urothelium is not violated in the course of the operation. Unfortunately this requirement disqualifies for the operation patients who need additional intravesical procedures at the time of augmentation, such as ureteral reimplantation or a CCC.

A recent publication from Detroit suggests that up to 23% of patients previously operated on by one of us (RG) have required repeat augmentation after 5 years of followup.³ It should be noted that that surgeon did not participate in the analysis of the results or in the writing of that publication. Since the patients reported on from Detroit represented an early experience with this technique, we analyzed the outcome in patients operated on more recently by that surgeon at 3 institutions.

MATERIALS AND METHODS

We performed an institutionally approved, retrospective chart review of all patients who underwent SCLU in Wilmington, Salzburg and Zurich in the last 10 years. Cystomanometry was performed with a similar technique at the 3 institutions. Preoperative and postoperative BC at 30 cm H₂O, expressed as the percent of expected capacity for age using the equation, BC in ml = (age + 1) × 30, as well as prior, concomitant and subsequent bladder or bladder neck procedures, continence, the need for repeat augmentation and upper tract status were recorded. Status of the upper tract was evaluated by ultrasonography. Additional tests were done as needed. Continence was defined as not requiring any protection of any kind during the day or night.

Patients were considered to require an outlet procedure such as an AUS based on a leak pressure of less than 40 cm H₂O. Also, we have observed that partial detrusorectomy can further lower outlet resistance (unpublished data).

After surgery a transurethral bladder catheter was left indwelling for 5 to 7 days. The catheter was vented to prevent a siphon effect and kept with a gentle curve over the bed railing to maintain a bladder pressure of about 20 cm H₂O. Cystogram was performed at 30 cm H₂O immediately before catheter removal to rule out leaks and intermittent catheterization was resumed. If a leak was noted, the catheter was kept for an additional period until the leak healed. In patients in whom an AUS was implanted the AMS 800™ model was used around the bladder neck except in 1 postpubertal male with a bulbous urethral implant.

To determine possible causes of failure patients were divided retrospectively into 2 groups. Group 1 consisted of patients who underwent SCLU without a concomitant procedure that violated the urothelium. Group 2 consisted of patients who underwent simultaneous construction of a CCC and, therefore, had an opening in the urothelium that may have led to leaks and prolonged catheterization.

RESULTS

A total of 20 patients were operated on at the 3 institutions during a 10-year period, including 15 in group 1 and 5 in group 2. The 13 males and 7 females had a mean age at surgery of 9 years (range 4 to 17) and a mean followup of 53 months (range 15 to 117). All patients had neurogenic bladder and sphincter dysfunction caused by myelomeningocele in 17, sacral agenesis in 2 and the sequelae of removal of a spinal tumor in 1. Of the patients 17 also underwent AUS implantation and 3 simultaneously received a bladder neck sling. The AUS was implanted at the time of SCLU in 10 patients, preoperatively in 6 and postoperatively in 1.

Patient characteristics were similar in the 2 groups. In group 1 mean followup was 58 months (range 15 to 117). No patient required repeat augmentation and BC at 30 cm H₂O increased from a mean of 180 to 330 ml. More importantly the percent of BC at 30 cm H₂O for age increased from 60% (range 21% to 100%) to greater than 100% (range 77% to greater than 100%). No patient experienced upper tract deterioration. Three patients subsequently received a CCC. Hourglass deformities corrected at reoperation developed in 2 patients and in 1 a bladder calculus was surgically removed. One patient experienced bladder perforation after neglecting catheterization for a long period 5 years postoperatively, requiring surgical repair. All patients in group 1 were continent.

The 5 patients in group 2 had a mean followup of 50 months (range 42 to 57). Two patients had a good result with a 2.4-fold increase in BC from a mean of 162 to 388 ml. One of these patients catheterizes through the appendiceal CCC without difficulty. The other patient with successful augmentation underwent 2 CCC revisions because of difficulty with catheterizing a conduit constructed from a segment of sigmoid colon reconfigured with the Yang-Monti technique. This patient currently catheterizes per urethra. The 2 patients are continent.

The other 3 patients in group 2 had early leaks requiring prolonged catheterization. In these cases BC failed to increase significantly, that is it increased from a mean of 100 to 160 ml. All 3 patients have undergone ileocystoplasty.

DISCUSSION

The results of combining SCLU with AUS implantation have been reported previously.² In that study, which included 27 patients, 89% become continent and only 1 required reoperation. However, mean followup was only 1.7 years. In 2007 Bandi et al reported a comparison of SCLU with conventional augmentation.³ SCLU had been performed by one of us while working in Detroit. That series included 32 conventional enterocystoplasties and 26 SCLUs. Mean

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