

## Stricture of the Afferent Isoperistaltic Tubular Segment: A Late and Rare Cause of Bilateral Dilation of the Upper Urinary Tract After Ileal Bladder Substitution

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### OBJECTIVE

To evaluate the etiology and treatment of bilateral hydronephrosis not responding to bladder substitute drainage after ileal bladder substitution using an afferent isoperistaltic tubular segment.

### MATERIALS AND METHODS

A retrospective analysis was performed of a consecutive series of 739 patients who had undergone bladder substitution from April 1985 to August 2012.

### RESULTS

Of the 739 ileal bladder substitute patients, 10 (1.4%) developed bilateral hydronephrosis unresponsive to complete bladder substitute drainage. The etiology was stenosis of the afferent isoperistaltic tubular segment. The median interval to presentation was 131 months (range 45-192). The incidence of afferent tubular segment stenosis was significantly higher in the 61 ileal bladder substitute patients with recurrent urinary tract infection (9 [15%]) than in the 678 without recurrent urinary tract infection (1 [0.15%];  $P < .001$ ). Urine cultures revealed mixed infections (34%), *Escherichia coli* (18%), *Staphylococcus aureus* (13%), enterococci (11%), *Candida* (8%), *Klebsiella* (8%), and others (8%). Seven patients underwent 10 endourologic interventions, only 1 of which was successful (10%). After failed endourologic treatment, 7 open surgical revisions with resection of the stricture were performed, with all 7 (100%) successful.

### CONCLUSION

Bilateral dilation of the upper urinary tract after ileal orthotopic bladder substitution unresponsive to complete bladder substitute drainage is likely to be caused by stenosis of the afferent isoperistaltic tubular segment. The stenosis occurs almost exclusively in patients with long-lasting, recurrent urinary tract infection and can develop many years after the ileal bladder substitution. Minimally invasive endourologic treatment is usually unsuccessful; however, open surgical revision offers excellent results. UROLOGY 82: 466–470, 2013. © 2013 Elsevier Inc.

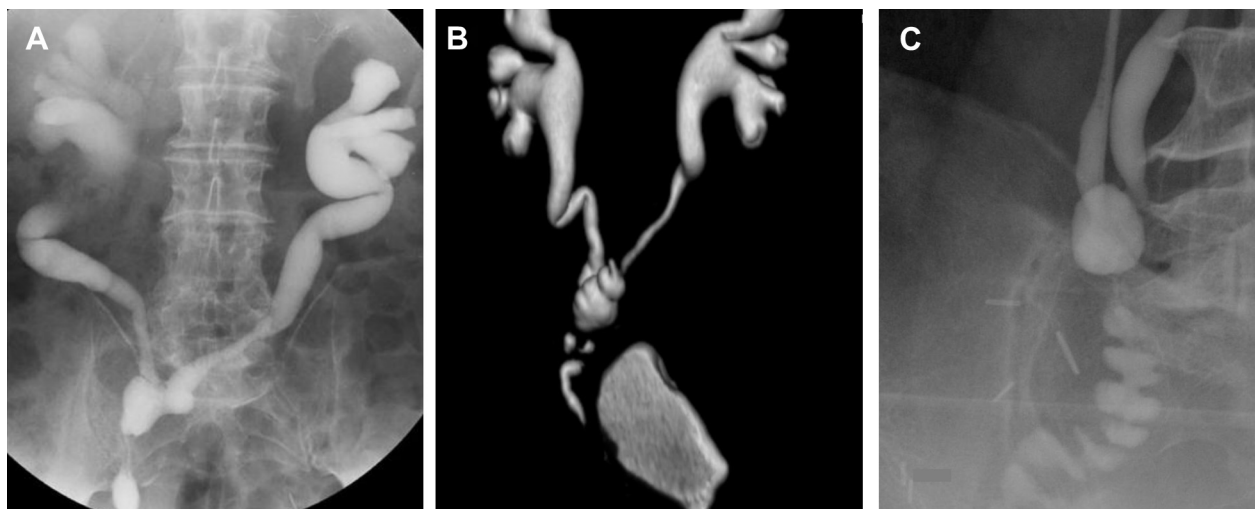
After almost 3 decades, ileal orthotopic bladder substitution has become a well-established method of urinary diversion after radical cystectomy.<sup>1</sup> This has largely been because of the better quality of life it offers compared with, for example, urinary diversion with an ileal conduit.<sup>2,3</sup> Various bladder substitution techniques have been described,<sup>1</sup> among which the Studer pouch is one of the most frequently used. It has the advantage of having an afferent isoperistaltic tubular segment, which makes antireflux implantation of the ureters redundant.<sup>4</sup> This accounts for the low (2.7%) incidence of ureteroileal strictures with consecutive unilateral dilation of the upper urinary tract (UUT).<sup>5</sup> Another common complication after orthotopic bladder substitution has been spontaneous voiding failure, with consequent high residual urine volume, which

occurs in  $\leq 21.2\%$  of patients, depending on the reconstruction technique.<sup>6-8</sup> Urinary retention, in turn, results in bilateral dilation of the UUT. In the large majority of these patients, resolution of the bilateral UUT dilation can be achieved by transurethral catheterization in the short term and by infravesical de-obstruction in the long term.<sup>6</sup> However, bilateral dilation occasionally persists despite optimal drainage of the bladder substitute. We, therefore, retrospectively evaluated a consecutive series of patients receiving an orthotopic ileal bladder substitute using an afferent isoperistaltic tubular segment to identify the patients with episodes of bilateral UUT dilation not responding to bladder substitute drainage and to analyze its frequency, etiology, and types and effectiveness of treatments.

### MATERIAL AND METHODS

A retrospective analysis was performed of the data from the charts and radiographs of a consecutive series of 739 patients (646 men and 93 women) who had undergone orthotopic bladder substitution from April 1985 to August 2012. The

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**Figure 1.** Radiographic image of a stricture of the afferent tubular ileal segment with bilateral dilation of the upper urinary tract. **(A)** Intravenous urography (50 minutes). **(B)** Computed tomography urography (urographic phase; 3-dimensional reconstruction). **(C)** Antegrade pyeloureterography.

surgical technique has been previously described in detail.<sup>5,9</sup> In brief, a 54-56 cm ileal segment 25 cm proximal to the ileocecal valve is isolated for construction of the ileal reservoir, together with the afferent tubular segment. The aboral 40-44 cm of the isolated ileal segment is opened along its antimesenteric border. The ureters are implanted in an end-to-side fashion in the proximal end of the afferent tubular segment according to the Nesbit technique. After ureteral stent placement, the distally opened end is cross folded twice and closed using seromuscular continuous sutures.

### Diagnostic Evaluation

Bilateral obstruction of the UUT was diagnosed using routine ultrasound examinations, which were performed at every regular follow-up visit, in accordance with our institutional protocol.<sup>10</sup> Initially, a transurethral catheter drain was placed for drainage in all patients to rule out de novo infravesical outlet obstruction. If bilateral dilation of the UUT persisted after 7-10 days of continuous bladder substitute drainage, the UUT was evaluated using computed tomography or intravenous urography (Fig. 1). Additional radiologic evaluation included cystography in all patients and—if unilateral percutaneous nephrostomy was required—antegrade pyeloureterography. If the stenosis was suspicious for tumor recurrence, biopsy specimens were obtained preoperatively from the strictured area.

Midstream urine was collected for additional analysis at every outpatient visit when patients were first asked to void their bladder substitute. The postvoid residual urine volume was then checked by catheterization. If residual urine was found, it was used for culture instead of the initial midstream urine. Bacteriuria was defined as  $10^3$ - $10^4$  colony forming units (CFU). Urinary tract infection (UTI) was defined as a urine culture showing  $\geq 10^5$  CFU. The occurrence of  $\geq 2$  positive urine cultures within 1 year was considered recurrent UTI.

### Stricture Treatment

Endourologic procedures ( $n = 10$ ) included retrograde and/or antegrade dilation using a NephroMax high-pressure,

30F, inflated balloon catheter (15 atm, equivalent to 220 psi for 5 minutes), with subsequent temporary stenting for 4-6 weeks.

Open surgical revision ( $n = 7$ ) consisted of resection of the stenotic part of the afferent tubular segment and end-to-end re-anastomosis in 4 patients, complete resection and replacement by a new 12-14 cm long ileal afferent tubular segment in 2 patients, and conversion in an ileal conduit in 1 patient.

Treatment success was defined as normalized or improved creatinine clearance and radiologically improved UUT morphology, combined with the absence of long-term stenting or postoperative nephrostomy tube placement.

### Statistical Analysis

Pearson's chi-square test was used for statistical analysis of the incidence of stenosis in relation to the incidence of UTI. Otherwise, the results are purely descriptive owing to the small patient sample.

## RESULTS

Bilateral UUT dilation that did not resolve after continuous bladder substitute drainage was found in 10 of the 739 (1.4%) bladder substitute patients. The median interval from cystectomy to presentation was 131 months (range 45-192). The etiology in all patients was stenosis of the afferent isoperistaltic tubular segment. The stenosis was located in the proximal third (approximately 2 cm distal to the ureteroileal anastomosis) of the afferent segment in 7 patients and in the distal part in 2 patients. One patient developed a second stenosis of the distal part of the tubular afferent segment 125 months after resection and end-to-end repeat anastomosis of a stenosis at the proximal part (Table 1). Of 739 bladder substitute patients, 61 (8.3%) presented with recurrent UTI. The incidence of stenosis of the afferent tubular segment was significantly higher in the 61 ileal bladder substitute patients with recurrent UTI (9 [15%]) than in the 678

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