Application of Self-Expandable Metal Stents for Ureteroileal Anastomotic Strictures: Long-Term Results

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Purpose: We report our long-term experience with the management of benign ureteroileal anastomotic strictures using self-expandable metal stents.

Materials and Methods: A total of 16 male and 2 female patients with a mean ± SD age of 72 ± 7 years (range 66 to 78) with benign fibrotic strictures at the site of ureteroileal anastomosis underwent implantation of self-expandable metal stents with a nominal diameter of 6 to 8 mm. A total of 24 ureteroileal conduits were treated. The external nephrostomy tubes were removed after fluoroscopic validation of ureteral patency. Patients were followed with blood biochemistry, ultrasonography, urography and/or virtual endoscopy. Retrograde external-internal catheter insertion through the cutaneous stoma was performed in cases of recalcitrant stricture.

Results: The technical success rate of ureteroileal stricture crossing and stenting was 100% (24 of 24 cases). Mean followup was 21 months (range 7 to 50). The clinical success rate during the immediate post-stenting period was 70.8% (17 of 24 cases). The 1 and 4-year primary patency rates were 37.8% and 22.7%, respectively. Secondary interventions included repeat balloon dilation in 15 ureters, of which 8 also underwent subsequent coaxial stent placement. The 1 and 4-year secondary patency rates were 64.8% and 56.7%, respectively. Except in 2 patients who died external-internal Double-J® catheters continued to be inserted retrograde in 6 ureteroileal conduits. They are periodically exchanged to prevent mucous inspissation and stent encrustation.

Conclusions: Metal stents served as the definitive treatment for stricture in more than half of the cases, whereas in the remainder the stents allowed the uncomplicated and regular exchange of Double-J catheters in retrograde fashion. This combined, less invasive treatment for ureteroileal anastomotic strictures may help patients avoid surgical revision and preserve quality of life.

Key Words: ureter, ureteral stricture, prostheses and implants, stents, urinary diversion

Radical cystectomy and urinary diversion to an ileal loop conduit represent the standard surgical technique for invasive transitional cell carcinoma of the bladder. The most serious postoperative complication is late development of a ureteroileal anastomotic stricture in 4% to 11% of the cases.[1,2] The onset of such strictures is clinically occult and ureteral obstruction may gradually progress and jeopardize renal function. Open surgical revision with intraoperative biopsy and ureteral reimplantation remains the definitive treatment but it may prove technically demanding due to the formation of fibrotic adhesions and/or secondary ischemia after previous surgery or even impaired healing due to radiotherapy. In addition, it carries a significant risk of postoperative morbidity.[3] Nevertheless, many patients are not eligible or even refuse to undergo a second operation.

This was the impetus for the development of alternative, minimally invasive strategies for the obliteration of ureteroileal strictures. Semirigid fascial dilators, electrocautery cutting balloons and repetitive high pressure dilation with standard angioplasty balloons have been applied with moderate success for treating stenosis since they are characterized by a high recurrence rate.[3–5] In the era of rapidly evolving interventional medicine and widespread clinical use of MSs the use of a permanent MS for ureteroileal anastomotic strictures has already been reported with promising results.[6–9]

Since 1996, we have been investigating the application of MSs in the urinary tract and we have reported a small preliminary experience in the setting of ureteroileal strictures.[6,10,11] However, to our knowledge there are no literature data on the long-term outcome of these devices. Based on our early favorable outcome[6] we designed a prospective study investigating self-expandable MSs for ureteroileal anastomotic strictures. We analyzed the long-term performance of the endoprosthesis in the ureteroileal conduit.

MATERIALS AND METHODS

Patient Enrollment

Between January 1999 and June 2005, 16 male and 2 female patients with an ileal loop conduit and late postoperative stricture at the site of the ureteroileal anastomosis were

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treated at our institution. The underlying pathological condition for primary cystectomy and urinary diversion was transitional cell carcinoma in 16 male patients and uterine cervical carcinoma in 2 female patients. Bilateral ureteral ileostomy with 1 crossed-over ureter had been performed in all patients. The anastomoses were all end to side.

Patients manifested symptoms of flank pain, urinary infection or hydronephrosis (12) or presented with compromised renal function with bilateral ureteroileal strictures (6). The mean ± SD interval between ileal loop surgical construction and the diagnosis of anastomotic stricture was 15 ± 9 months (range 6 to 40). Hydronephrosis was initially detected on transabdominal ultrasonography and the diagnosis was confirmed by excretory urography, which documented severe stenosis or complete obstruction of 1 or 2 ureteroileal anastomoses. The institutional review board approved the protocol and all patients signed an informed consent form before the intervention. Eligibility criteria for study inclusion included at least 1 of remote metastatic disease, stricture relapse after surgical revision once, refusal to undergo surgical revision and associated systemic comorbidities with increased perioperative risk. Patients with stricture recalcitrant to repetitive balloon dilation were enrolled in the study, whereas patients with documented carcinoma relapse and infiltration of the anastomotic site at biopsy were excluded.

Interventional Procedure

After intravenous conscious sedation the patient was placed on the fluoroscopy table in an oblique supine position to expose the respective lumbar fossa for percutaneous nephrostomy and concomitantly permit access to the cutaneous stoma of the ileal loop. Initially percutaneous nephrostomy was performed using standard image guided interventional techniques. Subsequently antegrade nephrostogram was done to identify the anastomotic stricture and evaluate its exact location and length. If the patient was febrile and/or signs of urinary tract infection coexisted, the patient was left on external nephrostomy drainage with proper antibiotic therapy for 1 week. Otherwise transversal of the stricture, balloon dilation and implantation of a self-expandable MS were done at the same session.

Following percutaneous nephrostomy a 7Fr long sheath was placed in the dilated ureter to facilitate the insertion of hydrophilic instruments and negotiate the stricture. Stricture transversal was attempted with a combination of a 0.035-inch straight or angled hydrophilic guidewire and a straight or angled 4Fr glide catheter. After crossing the stricture the hydrophilic guidewire was advanced into the ileal loop, preferably out of the cutaneous stoma. It was subsequently exchanged for a rigid 0.035-inch Amplatz guidewire to secure luminal passage during balloon dilation and ureteral stent placement.

Dilation of the fibrotic anastomotic ureteroileal strictures involved a 2-step procedure. The stricture was predilated with 6 to 7 mm wide high pressure angioplasty balloons up to 30 atm. After fluoroscopy revealed ureteral continuity a self-expandable MS was inserted at the level of the anastomosis to fully restore and secure ureteral patency. A standard vascular self-expandable MS with a 6 to 8 mm nominal diameter and a length of 4 to 10 cm was applied (fig. 1). The distal part of the stent was positioned in the ileal conduit, protruding approximately 0.5 cm within the conduit. This was an off label application and stent brands were chosen according to commercial availability without any specific preference criteria. In cases of highly resistant anastomotic strictures, which may even induce waisting of the stent mesh and compromise stent integrity, final high pressure post-dilation was performed.

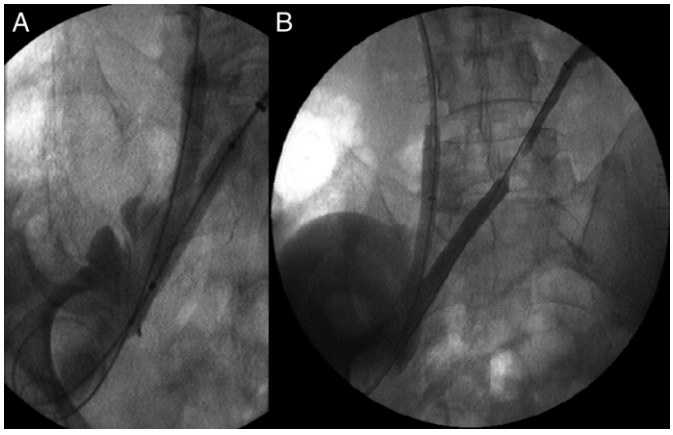

FIG. 1. *A*, balloon predilation of bilateral ureteroileal anastomotic strictures. *B*, final fluoroscopic image after bilateral deployment of 8 mm self-expandable MS. Note complete restoration of patency and trumpet configuration of left ureter proximal to inserted stent.

Patient Followup

After the intervention the patient was left with an external capped nephrostomy tube for 48 hours to 1 week to examine ureteral patency on antegrade nephrostogram and assess any periprocedural complications or early stent obstruction. A regular followup program with blood biochemistry, ultrasonography and/or excretory urography was established for prompt detection of any stricture recurrence. Patients were scheduled for followup 1, 3, 6 and 12 months after stent implantation and yearly thereafter. In exceptional cases computerized tomography at a late secretory phase was performed and virtual endoscopic images were produced.

If recalcitrant obstructions due to excessive mucous secretion and/or urothelial hyperplasia occurred, repeat balloon dilation up to 2 times and then coaxial overlapping stenting only once were performed. In cases of eventual failure an attempt was made to drain the kidney retrograde through the cutaneous stoma by an external-internal nephro-uretero-ileal Double-J catheter, as described previously.[12] Briefly, an external-internal nephro-uretero-ileal Double-J catheter was inserted retrograde through the cutaneous stoma up to the renal pelvis with an over the wire technique and with its outer port draining in the stoma bag. Regular exchanges of the external-internal catheter at 3-month intervals were performed, likewise obviating the need for repeat percutaneous nephrostomies and favoring patient comfort.

Statistical Analysis

Technical success was defined as successful transversal and stenting of the ureteroileal strictures. Clinical success was defined as the depiction of an unobstructed stent and a patent ureteroileal conduit at the post-procedural nephrostogram with nondeteriorating renal function. Life table