Spiral Sling Salvage Anti-Incontinence Surgery in Female Patients With a Nonfunctional Urethra: Technique and Initial Results

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Purpose: Female patients with severe urethral incompetence are a unique surgical challenge. Urethral closure and continent diversion are often the next step in the treatment of these patients. We present a technique that provides circumferential coaptation of the urethra as a salvage procedure in this severe subset of patients.

Materials and Methods: We prospectively evaluated 47 patients who had a spiral sling. A 1 × 15 cm piece of soft polypropylene mesh was prepared with a zero polyglactin suture applied at each end. A clamp was used to pass the mesh between the urethra and pubis. The ends of the mesh were crossed at the ventral aspect of the urethra, creating a complete circle around the urethra. The sutures were transferred to the suprapubic area and tied without tension. The surgical outcome was determined by patient self-assessment, including symptom, bother and quality of life questionnaires.

Results: Mean patient age was 59 years. At presentation patients had undergone a mean of 2.6 incontinence procedures and wore a mean of 6 pads daily. Mean daily pad use decreased to 0.9 ($p < 0.005$). Preoperatively mean SUI symptom severity and bother scores were 2.8 and 2.9, respectively, on a scale of 0—none to 3—severe. Postoperatively these values decreased to 0.6 and 0.4, respectively (each $p < 0.005$). There was a mean 87% overall improvement in symptoms.

Conclusions: The spiral sling is an effective salvage transvaginal procedure that may be considered in a small subset of female patients with a nonfunctional urethra as a last resort before urethral closure procedures.

Key Words: female; urinary incontinence, stress; prostheses and implants; urethra; polypropylenes

SUI caused by urethral hypermobility or intrinsic sphincter deficiency is treated successfully with urethral sling procedures, resulting in up to a 90% cure rate.[1–7] However, in some patients there is persistent or worsening incontinence after surgery. Management options are urethral bulking agents, urethrolysis, a repeat urethral sling procedure and arguably an AUS. The last resort is often bladder neck closure with continent catheterizable augmentation.

Female patients with urethral incompetence and severe incontinence due to multiple failed surgeries, neurological injuries or congenital anomalies represent a unique surgical challenge. In these patients posterior urethral support alone is insufficient for continence. These patients represent up to 8% of all patients (47 of 618) requiring anti-incontinence surgery in our referral practice. The majority of our patients with refractory incontinence eventually are left with urethral closure and continent diversion as the final option. A review of the literature for alternatives to urethral closure in adults showed no reported techniques.

We describe a transvaginal sling in women that encircles the urethra, providing circumferential coaptation (part *A* of figure). We call it a spiral sling and consider it to be a salvage procedure in a small but severe group of female patients.

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MATERIALS AND METHODS

Study Population

Between August 1999 and October 2004, 47 patients underwent a spiral sling procedure. We initially selected patients with congenital or neurological disease as candidates for this procedure but since March 2002 we have included those with multiple failed surgeries with an incompetent lead pipe urethra.

Preoperative evaluation included history and physical examination, stress test at half bladder capacity, videourodynamic study, cystoscopy and patient self-assessment by questionnaires. VLPP was determined at a bladder volume of 200 ml. VLPP was reported as the lowest intravesical pressure at which urine leakage was visualized on fluoroscopic evaluation in the absence of a detrusor contraction. VLPP measurements are reported as differential values, that is vesical pressure at leakage subtracted from baseline vesical pressure. Patients were followed at 3-month intervals during year 1 and at 6-month intervals thereafter. Evaluation included history, physical examination, urine flow rate, post-void residual urine and patient self-assessment questionnaires. Questionnaires consisted of the validated UDI-6, a standardized symptom questionnaire that assesses the presence or absence and frequency of symptoms, and a urinary symptom specific, global QOL question validated for the evaluation of patients with benign prostatic hyperplasia on a scale of 0—delighted to 6—terrible, as previously published.[3,8] Outcomes were determined only by

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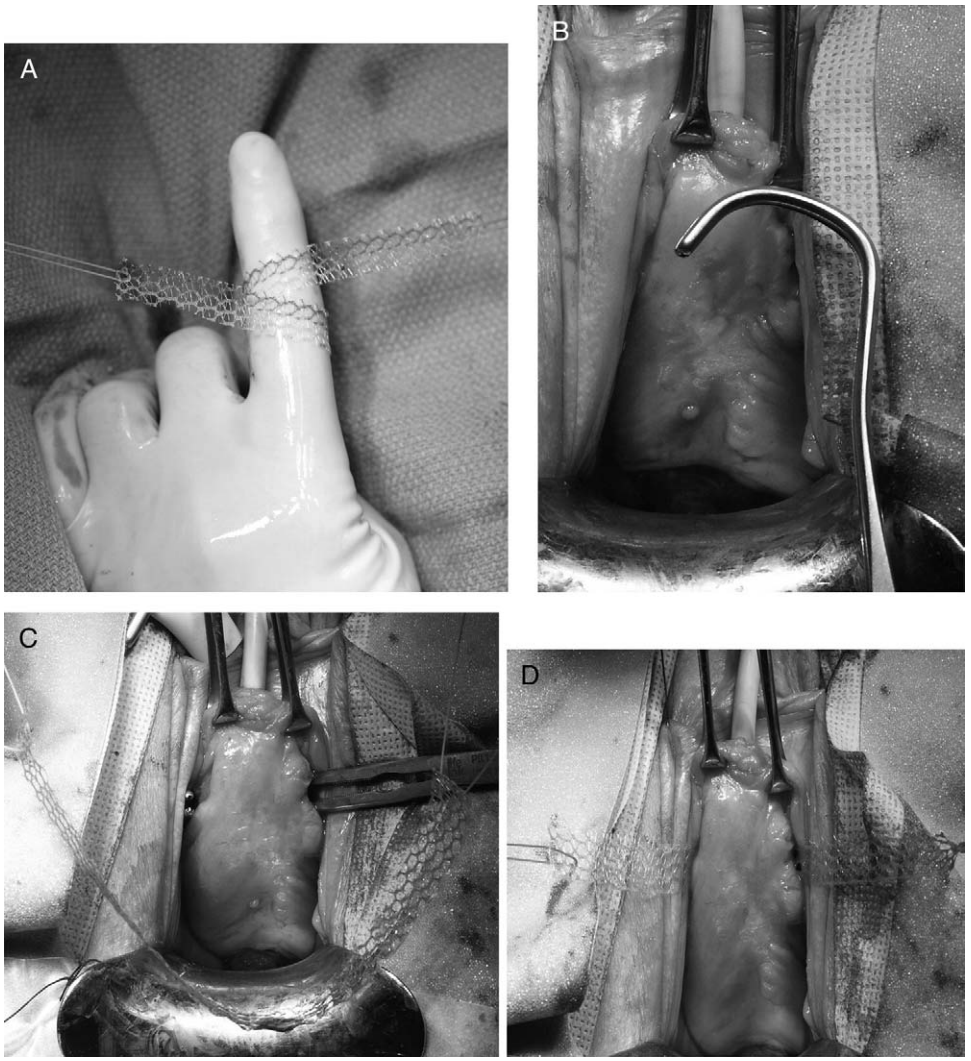

A, complete spiral. *B*, Satinsky clamp oriented for passage. *C*, Satinsky clamp between urethra and pubis after urethrolysis. *D*, spiral sling in retropubic space.

patient self-assessment. On the postoperative questionnaire patients were also asked to rate symptom improvement on a scale of 0% to 100%.

Surgical Technique

The initial approach to the operative technique is similar to placement of a distal urethral polypropylene sling.[3,9,10] A 1 × 15 cm soft polypropylene mesh is prepared with a zero polyglactin suture applied at each end. Two parallel distal oblique incisions are made in the anterior vaginal wall. The retropubic space is entered and complete urethrolysis is performed by detaching the urethropelvic ligaments from the arcus tendineus fascia pelvis and freeing all retropubic adhesions. The urethral dissection is started in the mid urethral area just proximal to the pubo-urethral ligaments and carried proximal to free the rest of the urethra and the bladder neck. By following the dissection close to the periosteum of the pubic bone the dorsal venous complex and bladder or urethral injuries are avoided.

The dorsal aspect of the urethra is freed from the pubis. A tunnel is created between urethra and vaginal wall, connecting the 2 oblique incisions. A Satinsky clamp is used to pass the 1 × 15 cm soft polypropylene mesh dorsal between the urethra and pubis (parts *B* to *D* of figure). The ends of the mesh are crossed ventral through the previously made vaginal tunnel with a right angle clamp. This creates a complete circle of mesh around the urethra. A small suprapubic stab incision is made and a double pronged needle is passed under finger guidance through the fascia and retropubic space. The previous placed zero polyglactin sutures are passed to the suprapubic incision. To ensure securing of the sling under no tension an Allis clamp is placed through each vaginal incision to hold the sling in place in the horizontal plane while the assistant ties the sutures suprapubically.

Cystoscopy is performed to rule out inadvertent cystotomy or urethral perforation. The retropubic space is irrigated with povidone-iodine solution. The vaginal and suprapubic incisions are closed with 3-zero polyglactin suture. A vaginal pack and suprapubic dressing are applied. Patients are given the option of learning intermittent catheterization, having a Foley catheter for 48 hours or having a suprapubic tube.

Postoperative Care

All patients are monitored in the recovery room for 2 hours. Each patient then has the vaginal pack removed and the

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