Urethral Buttressing in Patients Undergoing Artificial Urinary Sphincter Surgery

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Purpose: We evaluated the safety and feasibility of what we believe to be a novel technique of buttressing the urethra with a fibrin coated collagen fleece in patients undergoing artificial urinary sphincter surgery in the presence of urethral atrophy.

Materials and Methods: A total of 17 consecutive men were treated with urethral buttressing for urethral atrophy during artificial urinary sphincter surgery. Continence, complications and patient reported outcomes were assessed by preoperative and postoperative pad use, chart review, patient interview and validated questionnaires.

Results: Mean ± SD followup was 38 ± 3.0 months (median 34, range 23 to 71). One patient was excluded from further evaluation due to accidental iatrogenic urethral injury elsewhere. At 3-month followup the mean improvement in pad use was 5 ± 0.5 pads (median 5, range 2 to 9). Of 16 patients 9 (56%) and 2 (13%) used 1 and 0 pad per day, respectively. According to the Patient Global Impression of Improvement questionnaire, 12 of 16 patients (75%) described their condition as much or very much better after surgery. Mean ± SD postoperative Incontinence Impact Questionnaire and Urogenital Distress Index scores were 2 ± 0.8 (median 1, range 0 to 11) and 4 ± 1.0 (median 3, range 0 to 11), respectively. No intraoperative complications were observed. During followup 2 of 16 patients (13%) underwent placement of a second cuff due to unsatisfactory postoperative continence, 1 (6%) underwent artificial urinary sphincter revision for clean urethral erosion and 1 (6%) underwent revision for pump malfunction.

Conclusions: Urethral buttressing with a collagen fleece appears to be a safe, feasible option for urethral atrophy in patients treated with artificial urinary sphincter implantation or revision.

Key Words: urinary bladder; urethra; atrophy; urinary sphincter, artificial; collagen

Abbreviations and Acronyms

AUS = artificial urinary sphincter

MRI = magnetic resonance imaging

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ARTIFICIAL urinary sphincter implantation is the gold standard surgical treatment for severe post-prostatectomy urinary incontinence.[1–5] Despite a dry rate of up to 90%, constant pressure on the urethral wall can cause atrophy and erosion.[6–8] Urethral erosion occurs in up to 6% of patients with an AUS and it is associated with secondary infection and a high reoperation rate of 27% to 36%.[9,10] In most cases removal of the entire system becomes necessary.

After removal, the standard surgical option is de novo sphincter reimplantation after a healing phase of at

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least 12 weeks.[11] However, cuff placement at the same position is associated with a high probability of repeat erosion, which has prompted the development of new surgical approaches.[12–15] Transcorporeal cuff placement and other complex measures to buttress or reconstruct the urethra have been performed with varying results.[16–18] Using cadaveric allograft fascia around the urethra and beneath the sphincter cuff was claimed to improve coaptation in urethral atrophy cases but reports of long-term outcomes are still limited.[18,19]

A novel approach that appears promising is buttressing the urethral wall before inserting another AUS cuff. We evaluated the safety and feasibility of urethral buttressing with a fibrin coated collagen fleece in patients undergoing AUS surgery when urethral atrophy was present.

MATERIALS AND METHODS

We performed a single institution study of 17 consecutive patients who underwent urethral buttressing for urethral atrophy during AMS 800® implantation or revision, as performed by a single surgeon at a tertiary referral center between January 2007 and December 2010. In all patients we used TachoSil®, a fibrin coated collagen fleece, to buttress the urethral wall. Study inclusion criteria were significant intraoperative signs of urethral atrophy, such as urethral wall thinning, hypovascularity and pale fragile tissue. Before initial AUS implantation, all patients underwent urodynamic evaluation and flexible cystoscopy. Exclusion criteria for AUS implantation were urethral stricture, lichen sclerosus, anatomical malformation, untreated overactive bladder and mental unfitness for AUS handling. A history of radiation therapy more than 12 months before AUS placement was not considered an exclusion criterion.

The AUS was placed according to our routine protocol. A perineal approach was used for cuff placement and a Gibson incision was made in the right lower abdomen for reservoir placement. A 12Fr Foley catheter was inserted intraoperatively and removed on postoperative day 2. The AUS was activated after 4 to 6 weeks.

The buttressing technique included placement of the dry fleece on the urethra in wraparound fashion using the AUS measuring tape with the Foley catheter in situ (fig. 1). The fleece was then moisturized with a gentamycin soaked sponge for 3 to 5 minutes. Subsequently, the sphincter cuff was placed over it. The dry, equine fibrin, adhesive coated collagen sponge forms a dense tissue-like fleece when moisturized and put under gentle pressure. The sealant separates tissue since it is anti-adhesive to other structures, such as the AUS cuff.[20]

Cross-sectional MRI of the AUS region was done to evaluate the local effect of collagen fleece at the implantation site. Histopathological evaluation of the previously implanted collagen fleece sponge was available in 1 patient after permanent AUS removal due to iatrogenic urethral injury from prolonged urethral catheterization without cuff deactivation. This occurred while he was treated for cardiac arrest elsewhere.

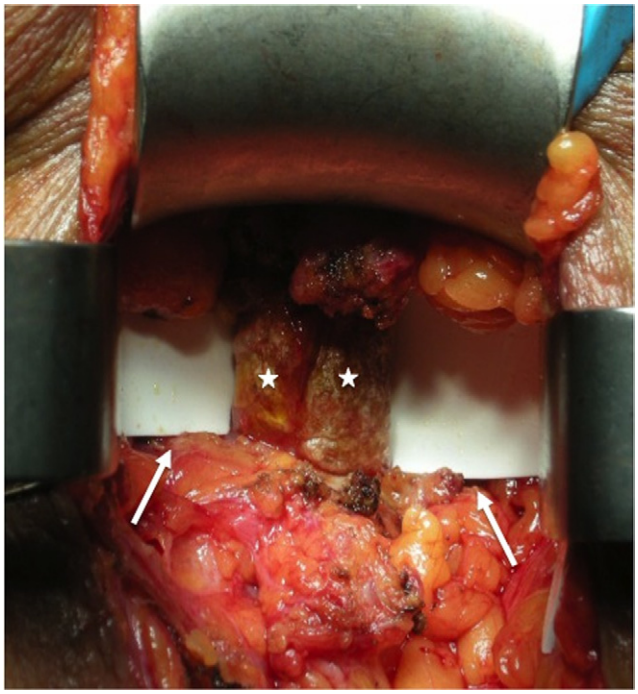

Figure 1. Intraoperative image shows collagen fleece (asterisks) placed circumferentially around urethra with aid of AUS measuring tape (arrows).

Patients were evaluated for daily pad use before and after surgery by telephone or personal interview. They completed the Post-Operative Patient Global Impression of Improvement, Incontinence Impact Questionnaire-Short Form and Urogenital Distress Index-Short Form. Complications were assessed by chart review and personal interview. Results of routine postoperative blood tests were obtained, including C-reactive protein and leukocyte count. Followup began at AUS implantation and ended at the time of the last patient contact.

Summary statistics were calculated as the mean ± SD, and median and range for continuous variables, and as the frequency and percent for categorical data. Statistical significance was considered at $p < 0.05$. Calculations were made using PASW®, version 18.0. Approval was obtained from the institutional review board and the Medical University of Vienna ethics committee approved the study.

RESULTS

A total of 17 patients underwent urethral buttressing with collagen fleece at AUS implantation or revision. Significant intraoperative signs of urethral atrophy were present in all patients. One man was excluded from further analysis due to iatrogenic urethral injury elsewhere that was unrelated to our procedure.

The table shows the demographics of our patient population and procedure characteristics. The cuff used was 4.0 cm in 15 patients and 4.5 cm in 1. One patient received a double cuff system, consisting of a 4.0 cm cuff and a 4.5 cm cuff. Diabetes was diagnosed