

RECONSTRUCTIVE UROLOGY

Reconstructive urethroplasty using porcine acellular matrix: preliminary results

[Article in Italian]

Mantovani F, Trinchieri A, Mangiarotti B, Nicola M, Castelnuovo C, Confalonieri S, Pisani E.

Department of Urology, IRCCS Ospedale Maggiore, Milano, Italy.

Arch Ital Urol Androl. 2002;74:127-8

Objective: The use of “porcine acellular matrix”, obtained from small intestine submucosa, could simplify the repair of long urethral strictures, whereas single stage techniques can be carried out only by means of grafts, as buccal mucosa; or flaps, as prepucial skin. To our knowledge we report the first use of porcine intestine submucosa in urethroplastic surgery.

Materials and Methods: From May 2001 to December 2001, five urethral reconstructions were completed using “porcine acellular matrix”. Four male patients had urethral strictures longer than 10 cm. After circumcision and penile degloving, we extended the surgical approach to the perineum-scrotal region by a midline longitudinal incision. The urethra was exposed, dissected from corpora cavernosa, then rotated of 180 degrees and on this side longitudinally incised throughout all the stenotic length. Urethroplasty was accomplished with matrix tissue modelled according to the length of the stenosis and grafted by a 5-0 polyglycolic acid running suture. The enlarged urethra was then derotated, laying the graft dorsally, closed to corpora cavernosa, to prevent pouching. A further graft was accomplished in a female patient with a 3 cm long urethral stricture. All urethroplasties were stented for 14 days. No complication developed.

Results: After 1 month urethral patency was satisfactory compared with preoperative images and the urinary flow was normal. After 2 months the urethra was endoscopically verified: it was easy to appreciate the homogeneous transformation of the graft into the native tissue. At 6-month follow-up radiological and urodynamic outcome is still satisfactory in all patients.

Conclusions: According to our preliminary experience “porcine acellular matrix” is a promising approach for the repair of long urethral strictures. Its safety and effectiveness encourage us to treat more cases in male and female patients.

Editorial Comment

The authors are probably the first to report on porcine acellular matrix for male patients with long urethral strictures.

There are several critical points, which should be mentioned. One of them is why alternative methods such as penile skin or buccal mucosa had not been used in these patients. This brings up another question regarding ethical committee approval: How do you obtain informed consent in these patients where alternatives exist?

Nevertheless this paper has been published and provides now for the first time a clinical experience with acellular matrix as a substitute for the male urethra. We have to await now how this porcine material will react in the human host in the long term. Will it be replaced by human collagenous tissue? We still don't know if this replaced tissue has some elasticity or whether the material will be encapsulated by fibrous tissue. This may then possibly lead to late reactions, both locally and systemically at a much later date. Furthermore porcine acellular matrix still contains DNA and viral transmissions are a possibility. Altogether further long term observations are mandatory before any larger series with this material should be initiated.

Dr. Arnulf Stenzl

*Professor and Chairman of Urology
Eberhard-Karls-University Tuebingen
Tuebingen, Germany*

Urethral stricture repair with an off-the-shelf collagen matrix

El-Kassaby AW, Retik AB, Yoo JJ, Atala A

From the Center for Genitourinary Tissue Reconstruction, Department of Urology, Harvard Medical School, Boston, Massachusetts, and Ain-Shams, University, Cairo, Egypt

J Urol. 2003; 169:170-3

Purpose: In select patients with urethral strictures in whom genital skin is insufficient alternative tissues are needed for urethral reconstruction. We explored the feasibility of using a bladder submucosa collagen based inert matrix as a free graft substitute for urethral stricture repair.

Materials and Methods: A total of 28 patients 22 to 61 years old with a diagnosis of urethral stricture underwent reconstructive surgery using a collagen based inert matrix for urethral repair. The inert collagen matrix was trimmed to size as needed for each patient and the neourethra was created by anastomosing the matrix in an onlay fashion to the urethral plate with continuous 6-zero absorbable sutures. The size of the created neourethra ranged from 1.5 to 16 cm. A voiding history, physical examination, retrograde urethrography, uroflowmetry and cystoscopic examinations were performed preoperatively and postoperatively. Random urethral biopsies were also performed.

Results: After a 36 to 48-month followup (mean 37) 24 of the 28 patients had a successful outcome. The remaining 4 patients had a slight caliber decrease at the anastomotic sites on urethrography. A subcoronal fistula developed in 1 patient which closed spontaneously 1 year after repair. Mean maximum urine flow rate increased from the preoperative value of 9 +/- 1.29 to 19.7 +/- 3.07 ml. per second postoperatively. Cystoscopic studies revealed adequate caliber conduits and normal appearing urethral tissues. Histological examination of the biopsy specimens showed the typical urethral stratified epithelium.

Conclusions: Use of an off-the-shelf collagen inert matrix appears to be beneficial for patients with urethral strictures and obviates the need for obtaining an autologous graft, thus eliminating donor site morbidity.

Editorial Comment

The authors are known for applying biomaterials for reconstructive purposes of the lower urinary tract. This paper deals with their first experience of acellular collagen matrix obtained from cadaveric human bladder

tissue for the surgical treatment of urethral stricture disease. Half of the patients had some form of penile urethral strictures, which are usually the more difficult ones to treat. Still, a successful surgical outcome was claimed in 24 of 28 patients after a follow-up ranging from 36 to 48 months. It is remarkable that in 4 patients endoscopic biopsies revealed normal urethral tissue.

Acellular cadaveric tissue can nowadays be produced in larger quantities and would thus be storable for regular use in urethral reconstructive surgery. It has the advantage of unlimited availability avoiding secondary harvesting at the time of urethral reconstruction.

The potential and the advantages are obvious but one should still be cautious about immediate use of acellular collagen matrix. Possible remnant DNA, the issue of prions, and the still unproven fate of the cadaveric tissue must be explored in larger series of patients and under a long-term follow up. It will be especially interesting to see whether there are systemic immunologic changes or adaptations in these patients.

Despite these cautious marks the future of reconstructive surgery of the lower urinary tract seems to be promising for absorbable biomaterials derived from human or animal sources.

Dr. Arnulf Stenzl
Professor and Chairman of Urology
Eberhard-Karls-University Tuebingen
Tuebingen, Germany