

INVESTIGATIVE UROLOGY

Urethral Replacement Using Epidermal Cell-Seeded Tubular Acellular Bladder Collagen Matrix

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Objectives: To investigate the feasibility of replacing urinary epithelium cells with foreskin epidermal cells to reconstruct engineered anterior urethra with an acellular collagen matrix.

Materials and Methods: Acellular collagen matrices were generated from allogeneic rabbit bladder submucosa. In nine rabbits, autologous foreskin epidermal cells were isolated, expanded in vitro, and labelled with 5-bromo2'-deoxy-uridine (BrdU) before seeding onto a tubular acellular collagen matrix (1.5 x 1 cm). In male rabbits, a urethral mucosal defect was created, and urethroplasty performed with a tubular acellular collagen matrix seeded with epidermal cells (nine rabbits) or with a matrix with no cell seeding (nine rabbits; control group). Urethrography was done at 1, 2 and 6 months after grafting. The urethral grafts were harvested and analysed grossly and histologically.

Results: In the control group, gross views and urethrography revealed stricture of repaired defects at the different sample times. In the experimental group, a wide urethral calibre was maintained with no sign of strictures. Histology in the control group showed a single layer of epithelium cells with disorganized muscle fibre bundles in the submucosa layer at 1 month after grafting, and a transitional cell layer surrounded by disorganized muscle fibre bundles at 2 and at 6 months. Grafts seeded with epidermal cells formed a single-layer structure by 1 month, and at 2 and 6 months there were several layers of epidermal cells with abundant vessels in the submucosa. There was an evident margin between graft epidermal cells and host epithelium at 6 months. The implanted cells expressed keratin, shown by staining with anti-pancytokeratins. Immunofluorescence for BrdU confirmed the presence of implanted epidermal cells at 1 month after grafting; there were fewer positive cells at the implantation site at 2 months. At 6 months, there were several layers of epidermal cells with no signs of BrdU staining.

Conclusions: Urethral reconstruction was better with an acellular collagen matrix seeded with epidermal cells than with the acellular collagen matrix alone. Foreskin epidermal cells seem adequate in replacing urethral epithelium cells for urethral reconstruction.

Editorial Comment

It has been demonstrated that tissue engineering techniques are useful for urethral reconstruction and acellular collagen matrices derived from donor bladder submucosa have been used both experimentally and clinically for onlay urethral replacement with good success (1). Other materials have been also used with varied successful results, both for urethral and bladder replacement (2,3).

In the present study, the authors examined the feasibility of using an epidermal cell-seeded or -unseeded scaffold for tubularized urethral replacement in a rabbit model. It was found that the acellular collagen matrix had a structure of loose collagen with no nucleoli, and proposed that it might be important for avoiding rejection. Histological analysis shown that the mucosal membrane of the graft is thin, and strictures were formed in the unseeded group, with many disorganized muscle fiber bundles around the urethral lumen. On the other hand, the study demonstrated that seeded implants had a thin epidermal cell layer at 1month, with normal multiple layers of epidermal cells at 2 and 6 months. Repeated urethrograms demonstrated that a wide urethral caliber was maintained with no sign of strictures.

The authors must be commended for such well-designed experimental work, which provides more evidence in animal models that acellular matrix might be suitable for urethral repair. Nevertheless, it is still uncertain whether larger defects can be corrected with such a matrix.

Although promised, tissue engineered for urethral substitution remains arguable, since buccal mucosa is easy to obtain and the buccal defect heals well. Also, the buccal mucosal grafts are tough, resilient, easy to harvest, and leave no scar as demonstrated recently (4,5). Also, these homologous grafts appear to be an optimal substitute even for anterior and posterior long urethral strictures in repeated urethroplasty (5).

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The Penile Suspensory Ligament: Abnormalities and Repair

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Objective: To assess men presenting with abnormalities of the penile suspensory ligament (PSL) and its correction. **Patients and Methods:** In all, 35 men presenting with abnormalities of the PSL that were subsequently repaired were included in this series. The causes included; sexual trauma (15 men), congenital absence of the PSL/ congenital penile curvature (14), and two each with venogenic erectile dysfunction, Peyronie's disease and penile dysmorphic disorder. The diagnosis was made clinically by the presence of a palpable gap between the symphysis pubis and the penis, together with medical history and examination of penile torsion or instability. The surgical repair used nonabsorbable sutures placed between the symphysis pubis and the tunica albuginea of the penis.

Results: A 'good' surgical outcome was defined as correction of the penile deformity or instability and achieving normal sexual function. There was a good surgical outcome in 91% of men as defined, and 86% of the men were happy with the outcome. There were no significant complications, but three men needed a repeat PSL repair.

Conclusion: Men with abnormalities of the PSL can present with a variety of clinical symptoms, but when correctly diagnosed the repair is a simple technique with a successful cosmetic and functional outcome.

Editorial Comment

This is a welcome original contribution dealing with a neglected and poor recognized urological pathology. Anatomists and urologists well recognized that penile suspensory ligament (PSL) is important because it supports

and maintains the erect penis in an upright position during sexual intercourse, and its defect would cause significant deformations hindering normal erections and intercourse (1). Since 1979, patients with defects in the suspensory ligament were recognized in the urological literature (2), including congenital etiology. Nevertheless, the authors of the present paper, in the best of my knowledge, described systematically by the first time the clinical history, physical findings and treatment of suspensory ligament abnormalities.

Here, I would like to highlight some points described by the authors in the article. The PSL has susceptibility to trauma following sexual intercourse, particularly with forced downwards pressure, leading to penile instability, deformity and a variable degree of erectile dysfunction (ED). Penile pain was the predominant symptom in 11 of the 15 patients who presented after sexual trauma, and ED was the presenting symptom in 13 of the 35 men. Other symptoms were penile instability and deformity. Concerning diagnosis, the authors showed that it is made clinically, characterized by the presence of a palpable gap between symphysis pubis and the penis. Nevertheless, this is not always present, and in this series only 15 of the 35 men had this sign; thus, the authors emphasize that a supportive history such as penile trauma or evidence of penile deformity/instability on examination also helps in formulating the diagnosis. The surgical technique for treating PSL abnormalities presented here is simple and offers good results.

The authors pointed out that a fractured penis is one of the differential diagnoses to PSL trauma since the mechanism of injury is usually similar in both conditions and both can present with the patient complaining of hearing a “snap”. Nevertheless, the authors teach us that men with a fractured penis usually have significant swelling and immediate detumescence; whereas men with PSL rupture usually do not have these signs.

The final message of the authors from the present series is that abnormality of the PSL is a subtle diagnosis and men with this injury could present with a variety of symptoms and a variable degree of ED.

I recommend this paper for all urologists involved with andrology and reconstructive surgery.

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RECONSTRUCTIVE UROLOGY

Fournier’s Gangrene: A Review of 43 Reconstructive Cases

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Background: Fournier’s gangrene is a rare and potentially fatal infectious disease characterized by necrotic fasciitis of the perineum and abdominal wall, along with the scrotum and penis in men and the vulva in women.