

# INITIAL EXPERIENCE WITH PROCESSED HUMAN CADAVERIC ALLOGRAFT SKIN FOR RECONSTRUCTION OF THE CORPUS CAVERNOSUM IN REPAIR OF DISTAL EXTRUSION OF A PENILE PROSTHESIS

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## ABSTRACT

We describe our initial experience with the novel application of processed human cadaveric allograft skin in reconstruction of a damaged corpus cavernosum associated with distal extrusion of a penile prosthesis. The material was evaluated for ease of reconstruction, adequacy of repair, and outcome. Human processed dermis allograft requires no intraoperative harvesting, is technically easy to fashion, and offers adequate tensile strength in the reconstruction of damaged corpora cavernosa. This initial experience with processed human cadaveric dermis in reconstruction of damaged corpora cavernosa is encouraging. Further evaluation to define the long-term efficacy and scope of application of this material in urologic reconstructive procedures is warranted. *UROLOGY* 53: 1222–1224, 1999. © 1999, Elsevier Science Inc. All rights reserved.

The ideal replacement material for repairing defects in the tunica albuginea has yet to be defined. Current experience has used synthetic or harvested natural materials to reconstruct defects present in the corpora cavernosa. Synthetic materials have included polytetrafluoroethylene products such as Gore-Tex, Marlex, and Dacron. These materials are readily available, resilient, and inert. However, complications surrounding their use have been observed, including inelasticity of the graft and formation of a reactive capsule around the patch. Several investigators have reported a high rate of infectious complications with polytetrafluoroethylene grafting. Knoll *et al.*<sup>1</sup> reported a 30% infection rate in 57 patients with cavernous fibrosis who received a prosthesis with synthetic graft material and a 5% infection rate in a similar group of 20 patients who received a downsized inflatable prosthesis to obviate the need for synthetic grafting. Similarly, Jordan *et al.*<sup>2</sup> reported three infections in 7 patients with synthetic grafts on penile implants for phallic reconstruction.

Corporal defects have also been repaired with

autologous grafts, including dermis, vein segments, temporalis fascia, and tunica vaginalis.<sup>3–6</sup> These materials have the advantage of being non-immunogenic and are less likely to become infected. However, harvesting autologous grafts may extend the operative time, and these grafts may lack the tensile strength and distensibility of the synthetic materials presently available.<sup>7</sup> Additionally, donor site pain and morbidity can be significant. We report our preliminary experience with processed human cadaveric allograft skin in reconstruction of a damaged corpus cavernosum. The patient required repair of a two-piece inflatable penile prosthesis (Mentor Mark II) with right distal cylinder extrusion and left distal cylinder crossover.

## MATERIAL AND METHODS

A 63-year-old man presented with penile pain and was found to have extrusion of the right distal cylinder 4 years after a radical retropubic prostatectomy and 2.5 years after insertion of a two-piece self-contained Mentor Mark II penile prosthesis. This cylinder was palpable beneath the skin just proximal to the glans penis. Additionally, the left cylinder was found to have crossed into the right corpora distally. His past medical and surgical histories were otherwise unremarkable.

## OPERATIVE TECHNIQUE

Preoperative prophylactic antibiotics consisting of 1 g vancomycin and 120 mg gentamycin were administered intravenously. Before surgery a 15-minute mechanical wash with a

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scrub brush was performed, a Foley catheter placed, and a penoscrotal incision created. The corpora were exposed bilaterally and opened longitudinally using cutting electrocautery. The distal component of each cylinder was delivered separately. Redilation of the left corpus was then performed with Metzenbaum scissors and subsequently with sequential Hagar dilation. The distal portion of the left cylinder was then placed into its appropriate corpus.

Windsock reconstruction of the right corpus was then performed. A 4 × 8-cm piece of AlloDerm (Life Cell Corporation, The Woodlands, Tex) with a thickness of 0.6 mm was hydrated for 15 minutes in sterile saline, as described by the manufacturer. The material was then used to create a windsock over a 14-mm Hagar dilator using a running 3-0 polydioxanone suture. The completed windsock was then placed over the distal penile cylinder and, using a furrow insertion tool with a Keith needle, the cylinder was replaced into the defective right corpus. The windsock was secured to the intact portion of the right corpus cavernosum with two 3-0 polydioxanone sutures. The incised tunica albuginea was closed with a running 3-0 polydioxanone suture. A two-layer closure was then performed with 3-0 chromic suture, and the skin closed with interrupted 4-0 chromic sutures. Collodion was placed on the incision and a scrotal support with fluffs applied.

## RESULTS

Strong closure of the defective distal right corpus was achieved with the processed human allograft skin. The operative time was 1 hour and 45 minutes, with an estimated blood loss of 100 mL. Windsock construction using this material required no harvesting, and the material was easy to fashion. After reconstruction of the right corpus with the windsock, no significant difference in palpation between the distal portions of the right and left corpora could be appreciated.

The patient ambulated and tolerated a regular diet on the night of surgery. The prosthesis was inflated overnight and deflated on the first postoperative day. No wound drainage and minimal postoperative edema and ecchymosis were noted. The Foley catheter was removed on the first postoperative day. The patient remained afebrile throughout. He received 48 hours of intravenous antibiotics and was discharged and prescribed 2 weeks of oral ciprofloxacin. The patient received instructions to abstain from all sexual activity for 6 weeks. The most recent follow-up at 1 year revealed no evidence of infection, good cylinder placement, and distal corporal integrity. The patient continues to successfully use the prosthesis, and both he and his partner are satisfied with the results.

## COMMENT

After failure or rejection of less invasive therapies, insertion of penile prostheses is considered appropriate therapy for organic erectile dysfunction. One complication of the procedure is the extrusion of the prosthesis through the tunica albuginea of the corpora cavernosa. Both synthetic and

natural materials have been used to repair ruptured tunica albuginea. We describe the novel application of processed human cadaveric allograft skin for reconstruction of corpora cavernosa after extrusion of an inflatable cylinder.

Synthetic materials such as polytetrafluoroethylene or polypropylene are readily available and are widely used in reconstructive procedures of the corpora. These materials are resilient, inert, and readily available but are associated with an increased risk of infection because of the foreign matter present. It has been suggested that the increased infection rate associated with synthetic materials may be related to reactive production of bacterial extracellular polysaccharides, called glycocalyx or slime, that interfere with natural host defenses.<sup>8</sup> Additionally, Nickel *et al.*<sup>9</sup> suggested that the glycocalyx associated with these materials decreases bacterial susceptibility to antibiotics.

Although different autologous materials have been used to repair damaged tunica albuginea, they are all associated with multiple intrinsic difficulties. Autologous grafts likely extend operative time and are associated with donor site pain and morbidity. These materials may also lack the strength associated with synthetic reconstructive materials.

Because of the problems associated with synthetic materials and autologous grafts, the search continues for materials that combine the positive characteristics of both. We describe the application of a processed human allograft skin (AlloDerm), now commercially available, for the windsock correction of distal cylinder perforation and septal perforation from cylinder crossover.

This material consists of human cryopreserved allogenic dermis from which the epidermal and dermal cellular components have been removed by a process that preserves the basement membrane complex.<sup>10</sup> The source of the allograft is carefully screened in accordance with all requirements of the American Association of Tissue Banks. AlloDerm has already been used for many different applications in plastic surgery, including repair of skin defects after thermal injury,<sup>11</sup> nasal reconstruction,<sup>12</sup> labial reconstruction,<sup>13</sup> and repair of tissue defects of the face.<sup>14</sup>

Urologic applications of AlloDerm will continue to be defined and so far have included the creation of a fascial sling for female urinary stress incontinence. We report the creation of a windsock for repair of corpora cavernosa after distal extrusion of a penile prosthesis. Other potential urologic applications include treatment for Peyronie's disease, repair of hypospadias and urethral strictures, and bladder augmentation.

## CONCLUSIONS

Our early result with AlloDerm for windsock reconstruction of the corpora cavernosa after distal cylinder extrusion is promising. Successful repair of the corporal defect was attained while avoiding the problems associated with autologous graft harvest and application. Additionally, AlloDerm may not be associated with the complications typically experienced with synthetic materials.

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