The use of human acellular dermal matrix (AlloDerm®, Lifecell Corp, Branchburg, NJ) in reconstructive and aesthetic plastic surgery has increased exponentially over the past several years. Numerous experimental animal studies have investigated the biocompatibility and tissue integration of acellular dermal matrix in efforts to support its clinical application in humans. 

Subsequent clinical use of acellular dermal matrix grafts has been widely published, for instance in abdominal wall hernia repair, particularly in the contaminated setting. Likewise, the grafts are gaining popularity in virtually every surgical subspecialty for the closure of soft tissue defects, structural support, or tissue augmentation. Large fascial defects of the lower extremity can result from tumor excision, soft tissue flap harvest, history of direct trauma or fasciotomy, or the result of a necrotizing infection. The reconstructive surgeon facing this problem currently has limited options to repair such defects.

Experience with treating posttraumatic fascial defects using ADM is scant and to our knowledge, no reports using ADM in lower extremity fascial reconstruction exist. In selected patients, the use of acellular dermal matrix grafts for lower extremity fascial reconstructions produces adequate soft tissue coverage and optimal aesthetic and functional results.

**Abstract:** Background. AlloDerm® acellular dermal matrix ([ADM], Lifecell Corp, Branchburg, NJ) is gaining increasing popularity in virtually every surgical subspecialty for use in the closure of soft tissue defects, structural support, or tissue augmentation. There is limited experience in lower extremity fascial reconstruction secondary to trauma, as this can be a challenging problem for the plastic surgeon. The purpose of this case report is to demonstrate the reliability of acellular dermal matrix grafts in lower extremity fascial reconstructions. Methods. We present a patient who underwent tensor fascia lata reconstruction with ADM following a large fascial defect. The patient previously underwent a lateral thigh fasciotomy for compartment syndrome and developed a large fascial hernia of the thigh. Results. The defect was repaired using an ADM graft, which resulted in excellent aesthetic and functional outcomes. Conclusion. In selected patients, the use of acellular dermal matrix grafts for lower extremity fascial reconstructions produces adequate soft tissue coverage and optimal aesthetic and functional results.
defect reconstruction have been published. The biomechanical properties of ADM have been studied and demonstrated that the tensile strength of ADM (or maximal load to failure) was superior to synthetic and autologous tissue. This supports our use of ADM in this clinical scenario where the deforming forces across the defect are high.

**Case Report**

**Technique.** The thigh hernia defect was identified and outlined preoperatively and measured (16-cm in length by 7-cm in diameter [Figure 1]). The previous fasciotomy scar was excised in a full-thickness fashion extending down to the tensor fascia lata hernia defect. The fascial edges were undermined circumferentially and the adhesions to the underlying muscle were divided. A 20-cm x 16-cm sheet of medium-thickness ADM was used to reconstruct the fascial defect in the underlay fashion, with the dermal side facing downward (Figures 2 and 3). The dermal matrix was placed under moderate tension and sutured to the fascial edges using 2-0 polydioxanone (PDS) suture. The free edges of the fascia were tacked down to the ADM to minimize exposed areas of the graft, while ensuring the underlying muscle was not incorporated into the sutures. Closed suction drains were placed, and the subcutaneous fascia and skin were closed primarily with 3-0 polyglactin and 4-0 poliglecaprone sutures. A compression bandage was placed circumferentially around the thigh in order to minimize seroma formation (Figure 4). The patient was also placed in a knee immobilizer for approximately 2 weeks to minimize strain on the newly reconstructed fascia. The drains were removed on postoperative day 3, and the patient was placed on a graduated lower extremity exercise regimen after 3 weeks. The patient was satisfied with the functional and aesthetic results, and had returned to an active, physical lifestyle at follow-up 9 months after the procedure (Figure 5).

**Discussion**

AlloDerm is an acellular cadaveric allograft without the dermal components or the outer layers of the epidermis. The native extracellular matrix structure and basement membrane is composed of collagen, elastin, laminin, hyaluronan, proteoglycans, fibronectin, and a vascular framework, which results in a tissue conductive scaffolding. As a result, there is less risk of rejection of the graft, and it also provides a rich environment for fibrovascular ingrowth and deposition. ADM has many applications as a native tissue replacement due to its lack of antigenicity, rapid tissue ingrowth and remodeling, revascularization, and resistance to infection.
Eppeley’s histological analysis of ADM in a rabbit model revealed that the tissue response started very early after implantation and lasted up to 28 days. When analyzed 7 days after implantation, scattered capillaries had surrounded the graft with minimum neovascularization. Twenty-eight days after implantation, nearly complete vascularization of mature blood vessels to the graft was reported, and there was minimal inflammatory tissue near the graft. Infections, wound dehiscence, or complications related to the implantation sites were not encountered. Further animal studies involving lymphangiogenesis in the rat model using an ADM composite graft by Wong et al showed that ADM supports infiltration and development of a lymphatic network. The authors noted that there was an 8-fold increase in both host cells and myofibroblasts within the first 2 weeks, and a 4-fold increase in the endothelial cells within the first week. This has provided the basis for future development of prefabricated lymphovascular composite flaps. Sinha et al published the only report on the use of ADM in the reconstruction of a fascial defect in an extremity. They examined outcomes of radial forearm free flap donor site coverage in 52 patients. They noted no major recipient site complications and only 5 donor site complications. The present case has shown the optimal outcome for a patient undergoing lower extremity fascial reconstruction. Although this report involves one patient, we believe this is a useful technique that should be considered in other patients with similar defects.

Conclusion
This case report demonstrates the durability and usefulness of acellular dermal matrix grafts in lower extremity fascial defects after 9 months. This augments the variety of clinical applications of ADM in reconstructive procedures.

References