Utilization of Ovine Collagen Extracellular Matrix in Surgical Excision of Recurrent Keloids

Christopher Mancuso, MHS,* Megan Hemmrich,* Joseph K Francis, MD**

*Osteopathic Medical Student, College of Osteopathic Medicine, Nova Southeastern University, Fort Lauderdale, FL
**Department of Dermatology, University of Florida, Gainesville, FL

Disclosures: None
Correspondence: Christopher Mancuso, MHS, 3301 College Ave., Fort Lauderdale, FL 33314; cjmancuso@gmail.com

Abstract
Keloid scarring is a chronic, disfiguring condition that is diagnosed based on clinical presentation and history. While there is a large body of research on keloids, and treatments have been well established, recurrence rates remain high and variable. The goal of this case report is to demonstrate the use of xenografts in the reconstruction of keloid excisions on the ear.

Introduction
Keloid scarring is characterized as overproduction of collagen caused by excessive fibroblast proliferation in response to dermal injury.1 It is a chronic, disfiguring condition associated with lower quality of life.2 Keloids are distinguished from hypertrophic scars in that they are not confined to the boundaries of the wound and do not spontaneously regress over time.1 While the pathogenesis of keloids and hypertrophic scars is unclear, it is believed that the problem stems from an alteration in the wound-healing process and, due to the high prevalence in African and Asian populations, may have a genetic component.1 One of the greatest challenges in treating keloids is the high rate of recurrence.

Keloids are distinguished from hypertrophic scars in that they are not confined to the boundaries of the wound and do not spontaneously regress over time.1 While the pathogenesis of keloids and hypertrophic scars is unclear, it is believed that the problem stems from an alteration in the wound-healing process and, due to the high prevalence in African and Asian populations, may have a genetic component.1 One of the greatest challenges in treating keloids is the high rate of recurrence.

In normal wound healing, there is a bidirectional communication between cells and their microenvironment, called dynamic reciprocity.2 Through the DR process, it has been predicted that excessive extracellular matrix degradation leads to a prolonged inflammatory phase in healing and deprives cells of signals and growth factor-beta (TGF-b), vascular endothelial growth factor (VEGF) and connective-tissue growth factor (CTGF).1 In the normal healing of a wound, TGF-b activity decreases as would healing is completed, but in keloids TGF-b is overproduced.1 Clinically, keloids are described as raised lesions that arise from the dermis up to one year following minor injuries or inflammation.1 Diagnosis of keloids is based on clinical presentation and history. Treatment options include one or a combination of the following: intralesional injections, topical solutions, pressure therapy, cryotherapy, laser therapy, radiation and surgery.1 It has been proposed that a combination of intralesional corticosteroid injections with surgical excision be considered as a first-line therapy for earlobe keloids.1

Case Report
A 35-year-old female presented with a chief complaint of nodules on her earlobes bilaterally (Figure 1). She was otherwise healthy, with no allergies or illnesses, and did not take any medications. The lesions appeared two years after the patient pierced her ears and had been removed twice surgically, but they recurred both times. Pathologic examination of excised tissue revealed an inflamed keloid scar. The recurrent keloids had been present for several months, and the patient reported inflammation, pain, and intense pruritus that came and went. The intense pruritus was relieved with triamcinolone acetonide (Kenalog) injections and surgical removal of the keloids.

Because of prior recurrences, it was decided to treat using a combination of intralesional corticosteroid injections and surgical excision. From March 8, 2016, to July 28, 2016, the lesions were injected monthly with triamcinolone acetonide 40 mg/cc on five separate occasions. On August 10, 2016, the keloid on the right inferior posterior helix measured 8.0 cm x 4.0 cm and was excised (Figure 2). On September 13, 2016, the keloid on the left crus of the helix measured 2.4 cm x 3.4 cm and was excised. An ovine collagen extracellular matrix (CECM) (Endoforum dermal template) was used with 5-0 fast absorbing gut (running) to achieve epidermal closure. The patient was sent home with dressings and instructions for moist wound care. At three-month follow-up, the patient reported no pain, pruritus or thickening of the surgical scar.

Discussion
Ovine collagen extracellular matrices (CECM) are xenografts, which are acellular matrices of collagen from nonhuman sources that are used in surgical reconstruction.2 When treating keloids, it is crucial to continue monitoring patients in order to detect recurrences and treat them as soon as possible. Keloids are commonly treated with intralesional triamcinolone acetonide, surgical excision or both, but ovine CECM dressings are not commonly used in their reconstruction.1

While there is a large body of research on keloids, and treatments have been well established, the recurrence rates remain high and variable. The recurrence rates for intralesional triamcinolone acetonide injections alone range from 50% to 100%.3 For surgical excision alone, the recurrence rates have been reported to be 45% to 100%.3 Treatment of keloids using a combination of intralesional corticosteroids and surgical excision has been found to have a recurrence rate from 9% to 50%.3

Some studies have investigated the use of ovine CECM in chronic wounds and support the idea that these dressings may improve would healing.4,5 These ovine CECM dressings may be beneficial to keloid wounds because they retain the three-dimensional ECM architecture.4 This quality may create a favorable environment for the wound to heal with less disruption to the tissue and greater promotion of proper wound healing.

Wound healing is a process consisting of three stages: inflammation, proliferation and remodeling. Fibroblasts are responsible for making extracellular matrix, which acts as a scaffold for tissue repair. It has been proposed that keloid scar formation results when there is a prolonged inflammatory stage that creates increased fibroblast activity, greater protein deposition and overproduction of TGF-b.1 In wound healing, there is a bidirectional communication between cells and their microenvironment, called dynamic reciprocity (DR).7 Through the DR process, it has been predicted that excessive extracellular matrix degradation leads to a prolonged inflammatory phase in healing and deprives cells of signals and treatment options.
attachment sites for differentiation, proliferation and migration. It is theorized that this disruption in DR may promote keloid formation.

**Conclusion**

Xenografts, namely ovine CECM, shorten the healing time for wounds by supporting protein degradation and remodeling of surrounding tissue. This can be extremely beneficial for healing and may be helpful in preventing keloid recurrence. Compared to secondary intention and allografts, xenografts require less healing by the body and do not require harvesting tissue from patients who may develop another keloid. Ovine CECM dressings are also relatively inexpensive when compared to other options. In summary, we propose that by using ovine CECM dressings in combination with standard surgical excision and intralesional triamcinolone acetonide, keloid recurrence can be mitigated.

**References**


