

Original Article

Novel use of an acellular dermal matrix allograft to treat a chronic scalp wound with bone exposure: a case study

John L Roussalis

John L Roussalis MD Inc, Casper, Wyoming, USA

Received July 17, 2014; Accepted September 8, 2014; Epub October 26, 2014; Published October 30, 2014

Abstract: Objective: To report the novel use of acellular dermal matrix allograft to treat a chronic scalp wound with exposed frontal bone. Methods: Case report detailing the steps taken to treat lichen simplex chronicus not responding to standard treatment. Results: The wound fully closed within ten weeks of treatment with dermis allograft. Conclusions: Acellular dermal matrix was able to close a chronic scalp wound after conventional treatments failed.

Keywords: Lichen simplex chronicus, neurodermatitis, wound, acellular dermal matrix, DermACELL

Introduction

Chronic wounds can be very complicated and difficult to treat depending upon the underlying etiology as well as the patient's underlying medical conditions. The deeper these wounds become, the more vital structures can be exposed and the more difficult it can be to repair these wounds. Exposure of bone, nerve, and tendon often requires flap repair, which can lead to large donor site defects. Current treatments for chronic wounds include wound dressing, hyperbaric oxygen therapy, negative pressure therapy, and surgical treatment.

Lichen simplex chronicus, also known as neurodermatitis, is a chronic skin disease that both resists conventional treatments [1] and often causes a chronic wound. It occurs frequently in patients [1] and can cause severe itching [2] which results in the lichen-like plaque growths. The effects of this chronic, itching wound include sleep disturbance, sexual dysfunction, and a lower overall quality of life [3]. Successful treatment of lichen simplex chronicus requires the repair of the damaged barrier layer of the wound [2]. A novel approach to treating this wound would be using an acellular dermal matrix (ADM). This decellularized dermal allograft provides a matrix through which the patient's own cells can incorporate into and subsequently heal the wound. It also forms a

protective barrier which could prove an important deterrent to further wound trauma caused by the patient's scratching. ADMs have a successful history in treating a variety of wounds including breast reconstruction [4], burn wound resurfacing [5], and chronic diabetic foot ulcers [6]. There are few papers published in the literature for successfully treating wounds caused by lichen simplex chronicus so we believe this novel approach could be an important treatment.

Case description

The patient, a 58-year old male, presented with a chronic scalp wound with exposed frontal bone due to lichen simplex chronicus. The patient also suffered from chronic pulmonary obstructive disease (COPD) and polycythemia comorbidities. The wound did not respond to standard treatments or steroids. Initial wound measurements were 9 x 5 cm with 3 x 2 cm of exposed calvarial bone (**Figure 1**).

The ulcer was thoroughly debrided and the external table of the skull was debrided down to the inner table. Meshed 10 x 6 cm DermACELL® (LifeNet Health, Virginia Beach, VA, USA) was placed and fixed using staples (**Figures 2, 3**). A non-adherent dressing and bolster were placed and changed seven days later (**Figure 4**). Dressings were changed at weekly visits. Good

ADM for chronic scalp wound



Figure 1. Patient presented with chronic scalp wound with exposed calvarial bone.

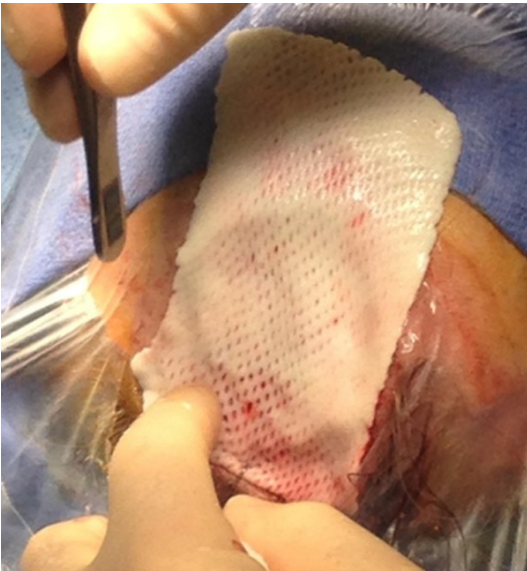


Figure 2. An acellular dermal matrix, DermACELL, was surgically applied.

granulation tissue was observed at 6 weeks post-operative (**Figure 5**). A non-meshed skin graft was placed at 8 weeks post-operative (**Figure 6**). The wound had completely healed by 10 weeks after the placement of DermACELL and 2 weeks after placing the non-meshed skin graft (**Figure 7**). The post-operative course was uneventful and without complications.

Discussion

The ADM was able to successfully close the treatment-resistant wound in 10 weeks with full granulation achieved in six weeks. Rapid wound closure is important in treating lichen simplex chronicus as the longer treatment

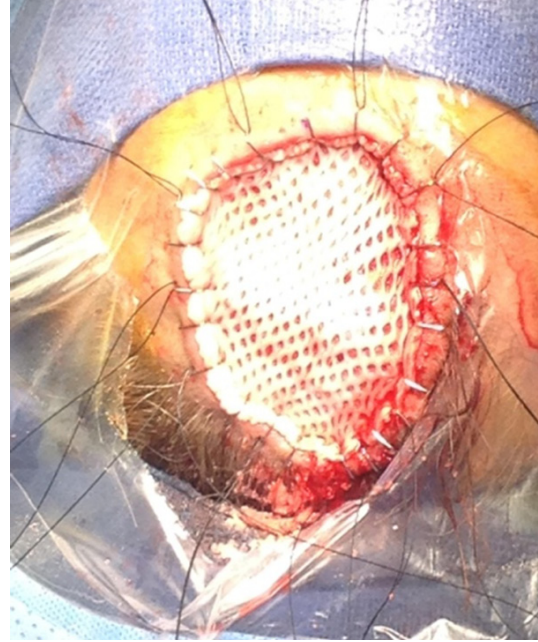


Figure 3. The acellular dermal matrix was then stapled into position.



Figure 4. There is no sign of infection at 1 week follow-up.

takes, the increased probability of self-trauma from the patient scratching the wound that either delays or halts the healing process. The ADM both repaired the wound while also providing the necessary protective barrier.

Due to the novelty of this treatment, we could not find any published literature on ADMs and lichen simplex chronicus to compare results. However, Yonehiro et al. [6] reported using DermACELL to treat full-thickness diabetic foot ulcers in 15 patients (18 wounds) with a complete wound closure rate of 58% at 10 weeks

ADM for chronic scalp wound



Figure 5. The wound is fully granulated by six weeks follow-up.

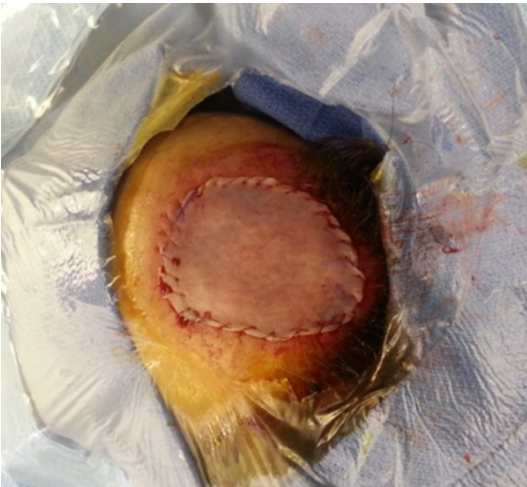


Figure 6. Non-meshed skin was grafted onto the nearly healed wound at 8 weeks follow-up.

post-operative. Although the different conditions make the comparison less than ideal, DermACELL was used to treat non-healing chronic wounds in both cases with similar healing times.

Gencoglan et al. [1] reported on using gabapentin to treat five patients with lichen simplex chronicus and four patients with prurigo nodularis. The patients had previously undergone classical treatments such as steroids and anti-



Figure 7. The conventional treatment-resistant wound was fully healed by 10 weeks follow-up.

histamines with little effect. Treatment time ranged from 3 to 10 months with a final complete remission rate of 66% (6/9 patients). The only side effect reported was mild sedation although more serious complications such as pancytopenia and dyskinesia are associated with gabapentin use. Our results were favorably comparable with a faster healing time (10 weeks vs. 3-10 months) and no complications. Although we only reported on a single patient, the particular ADM used undergoes a process [7] to provide terminal sterility and acellularity, ensuring a minimum of graft-related complications.

Although our results must be considered within the limitations of a single case study, the ADM did allow for full wound closure and provides support for further exploring ADM use in treating chronic soft tissue wounds, especially those resistant to conventional treatments.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. John L Roussalis, 1129 E 2nd St, Casper, WY 82601, USA. Tel: 307-234-4585; E-mail: jroussalis@yahoo.com

References

- [1] Genglocaan G, Inanir I and Gunduz K. Therapeutic hotline: Treatment of prurigo nodularis and lichen simplex chronicus with gabapentin. *Dermatol Ther* 2010; 23: 194-8.

ADM for chronic scalp wound

- [2] Lynch PJ. Lichen simplex chronicus (atopic/neurodermatitis) of the angiofacial region. *Dermatol Ther* 2004; 17: 8-19.
- [3] Ambika H, Vinod CS, Sushmita J. A case of neurodermatitis circumscripta of scalp presenting as patchy alopecia. *Int J Trichology* 2013; 5: 94-6.
- [4] Vashi C. Clinical Outcomes for breast cancer patients undergoing mastectomy and reconstruction with use of DermACELL[®], a new acellular dermal matrix. *Plast Surg Int* 2014; 201: 704323.
- [5] Chen SG, Tzeng YS and Wang CH. Treatment of severe burn with DermACELL[®], an acellular dermal matrix. *Int J Burn Trauma* 2012; 2: 105-9.
- [6] Yonehiro L, Burleson G and Sauer V. Use of a new acellular dermal matrix for treatment of non-healing wounds in the lower extremities of the diabetic patient. *Wounds* 2013; 25: 340-344.
- [7] United States Patents 6,743,574; 6,734,018