Resolution of Arterial Ulcer through Skin Grafting with Follicular Units

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ABSTRACT

Chronic ulcers significantly impact patients' quality of life and impose high costs on the healthcare system. A comprehensive therapeutic approach accounting for the diagnosis and wound characteristics is essential for each healing phase. We recommend applying graft techniques during epithelialization to accelerate repair, improve scar tissue quality, and address pain. The technique of autografting using punch follicular units obtained from the scalp is presented as an accepted strategy for repairing chronic wounds. This case study involves a 79-year-old patient with multiple comorbidities and a large arterial ulcer. After controlling the underlying condition and achieving an optimal wound bed, the autograft with follicular units resulted in complete healing within four months.

Keywords: Follicular unit, follicular unit stem cells, skin graft, wound healing, case report.

Resolución de úlcera arterial mediante injerto de piel con unidades foliculares: informe de caso

RESUMEN

Las úlceras crónicas impactan significativamente en la calidad de vida del paciente y generan elevados costos para el sistema de salud. Un enfoque terapéutico integral, considerando el diagnóstico y las características de la herida, es esencial para cada fase de cicatrización. Durante la epitelización se recomienda el uso de técnicas con injertos para acelerar la reparación, mejorar la calidad del tejido cicatrizal y abordar el dolor. La técnica de autoinjerto por *punch* de unidades foliculares, obtenidas del cuero cabelludo, se presenta como una estrategia aceptada para la reparación de heridas crónicas. Se ilustra el caso de un paciente de 79 años con múltiples comorbilidades y con una úlcera arterial de importante dimensión donde, luego de controlar la patología de base y lograr un lecho óptimo, el autoinjerto con unidades foliculares, derivó en la completa cicatrización al cabo de 4 meses.

Palabras clave: unidad folicular, células madre de unidades foliculares, trasplante de piel, cicatrización de heridas, informe de caso.

INTRODUCTION

Chronic ulcers, defined as those with more than six weeks of persistence, are a clear example of pathologies that require techniques to accelerate their resolution, as they are highly costly for the healthcare system and the patient's quality of life.[1-4] In 1964, Crawford described the benefits of using scalp skin as a donor area for extensive burns, highlighting the presence of hair follicles.[5] Currently, it is recognized that obtaining follicular units (FUs) from this region offers benefits related to pluripotent stem cells and the release of leptin, which stimulates healing.[6,7] This technique, supported

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by studies in pediatric patients and ulcers of the lower limbs, demonstrated better healing responses compared to conventional techniques.[8-10] A controlled study in chronic ulcers showed a significant difference in healing with scalp follicle grafts.[11] Such results underscore the efficacy of this technique as a valuable option in wound repair.[12,18] The clinical case highlights the complete resolution without complications of an arterial ulcer in a patient with multiple comorbidities, using FUs obtained from the scalp.

CLINICAL CASE

A 79-year-old male patient with a history of type II diabetes under treatment with gliclazide 60 mg and reduced mobility due to muscle weakness secondary to inclusion body myositis presented with critical ischemia in the posterior tibial region.

After the patient's initial evaluation, complementary methods (arterial Doppler ultrasound and subsequent CT angiography) led to linking the spontaneous appearance of the ulcer to severe peripheral artery disease. As a result, the patient was referred for peripheral vascular treatment and underwent an angioplasty with stent placement.

The ulcer, with a fibrinous bed, initially measured 5.4 cm in length and 6.5 cm in width on the left leg (Fig. 1) and showed poor progression before the intervention, reaching even larger dimensions (8 cm in length and 7 cm in width).

In the first three months following revascularization, a comprehensive approach and preparation of the fibrinous bed were carried out following the TIME framework, checking associated factors such as pain and edema, and an optimal granulating bed was achieved using enzymatic debridement for graft reception (Fig. 2A-B). The TIME acronym is a practical, dynamic clinical tool for preparing the wound bed to an ideal state that facilitates healing. Its letters refer to Tissue, Infection/Inflammation, Moisture, and Edge [14-17].

The patient ultimately underwent a grafting procedure using follicular units (FUs) obtained from the parieto-occipital area of the scalp. We grafted a total of 43 FUs covering the entire ulcer extension. A moist dressing was

Figure 1. Ulcer in the posterior tibial region of the left lower limb due to critical ischemia prior to revascularization.

applied using sterile petroleum jelly gauze and a multi-layer bandage. The scalp received a dry dressing using alcohol. We performed a first check-up after 72 hours to evaluate graft viability and any potential adverse effects. Given the positive evolution without complications, the patient continued with the usual tri-weekly follow-ups.

In the post-graft evolution, the wound showed signs of positive epithelialization both in the periphery and the wound bed, along with the appearance of skin islands emerging from the grafted FUs, with a distinct reduction in diameter, eventually leading to the final wound closure (Figs. 3A-B-C and Fig. 4).

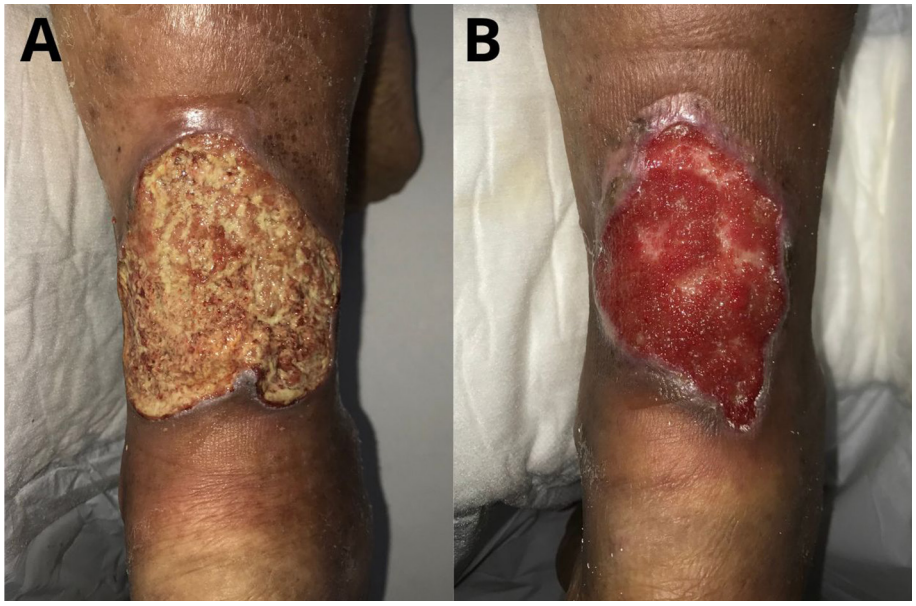

Figure 2. A. Fibrin-covered wound bed post-revascularization.. **B.** Granulating wound bed.

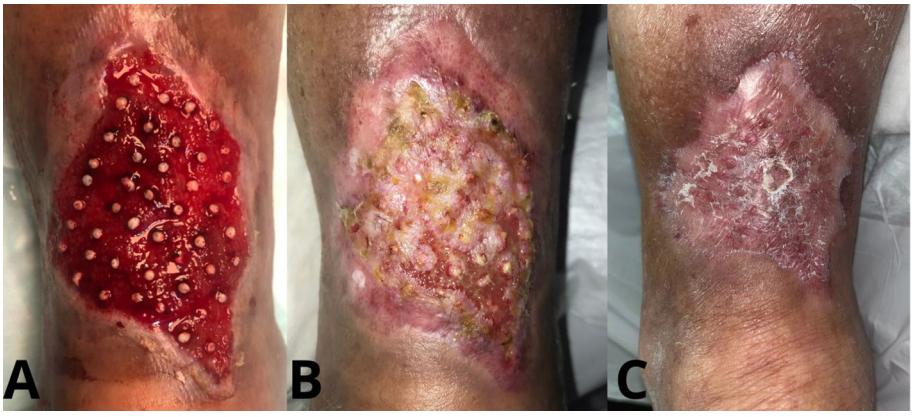

Figure 3. A. Grafted follicular units 72 hours post-graft. **B.** Progression 30 days after the graft. **C.** Complete healing at four months.

Figure 4. Healing of the donor area 72 hours post-graft.

DISCUSSION

The global wound healing issue is directly related to increased life expectancy, longevity, and high healthcare costs.

Addressing this pathology requires an integrated therapeutic approach that considers the etiological diagnosis and the characteristics of the wound bed. The technique of follicular unit (FU) grafts from the scalp has emerged as an effective strategy to accelerate re-epithelialization and improve the quality of scar tissue. The reported benefits, supported by studies and comparisons with conventional techniques, also demonstrate remarkable advantages in the donor area, with circular defects that heal quickly and minimal complications, which generates high acceptance among patients. This practice -- in addition to being minimally invasive -- with local anesthesia and the possibility of being performed in a procedure room offers a cost-effective solution that promotes access for patients with chronic wounds and comorbidities. Incorporating the FU punch autograft technique into the therapeutic arsenal presents a valuable contribution, providing superior repair outcomes with a positive economic impact on the healthcare system.

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