



Pellon Technique for Chronic Wounds in the Frontal Region: A Case Report and Literature Review

Técnica de Pellon em ferida crônica na região frontal: Um relato de caso e revisão da literatura

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Rev Bras Cir Plást 2024;39(4):s00451801847.

Abstract

Descriptors

- ▶ regenerative medicine
- ▶ wounds and injuries
- ▶ adipose tissue
- ▶ wound healing
- ▶ graft survival

Stem cells from adipose tissue can differentiate into fibroblasts, keratinocytes, and other cells; they can also secrete mediators with neoangiogenic and anti-inflammatory properties. Initially described for burn treatment, some authors suggested stem cells for treating complex, evolving wounds with 3 cm in length. After two fat grafting sessions, our patient presented granulation tissue in the frontal region. The properties of stem cells from adipose tissue allow their use in burn treatment and chronic wounds, as in our case, which presented bone exposure in a prime region with few adjacent donor areas and a high failure potential for skin flaps.

Resumo

Descritores

- ▶ medicina regenerativa
- ▶ ferimentos e lesões
- ▶ gordura subcutânea
- ▶ cicatrização
- ▶ aloenxertos

Células-tronco derivadas do tecido adiposo podem se diferenciar em fibroblastos, queratinócitos e outras células; eles também podem secretar mediadores com propriedades neoangiogênicas e anti-inflamatórias. Inicialmente descrita no tratamento de queimaduras, ao longo do tempo também começaram a ser empregadas no tratamento de feridas complexas. O presente caso relata o uso da gordura para o tratamento de uma ferida crônica com exposição óssea traumática na região frontal, com três anos de evolução e 3 cm de extensão. Após duas sessões de lipoenxertia, a paciente apresentava granulação do tecido da região frontal. As propriedades de células-tronco do tecido adiposo podem ser aproveitadas não apenas no tratamento das queimaduras, mas também em feridas crônicas, como o caso do presente trabalho, no qual a exposição óssea era em área nobre, com poucas áreas doadoras adjacentes e grande possibilidade de insucesso no caso de retalhos cutâneos.

Introduction

The properties of fat stem cells have been known for a long time. Further studies revealed that several growth factors participate in this function, including tumor necrosis factor-alpha (TNF- α), interleukin-6 (IL-6), transforming growth

factor-beta (TGF- β), adiponectin, resistin, leptin, angiotensinogen, vascular endothelial growth factor (VEGF), and plasminogen activator inhibitor-1 (PAI-1).¹ Stem cells from adipose tissue can differentiate into fibroblasts, keratinocytes, and other cells; they can also secrete mediators with neoangiogenic and anti-inflammatory properties.² Initially

received
April 2, 2024
accepted
November 16, 2024

DOI <https://doi.org/10.1055/s-0045-1801847>.
ISSN 2177-1235.

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Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

described for burn treatment,¹ some authors suggested their use in treating complex wounds. This case reports the use of fat to treat a chronic wound with traumatic bone exposure in the frontal region.

Objectives

The primary objective of this study was to report a case of treatment with fat grafting over the open area of a patient with an extensive chronic wound and exposed bone in the frontal region. The secondary objective was to conduct a brief literature review on this treatment type for complex wounds.

Case Report

VS, a female, 30-year-old, married, diabetic, homemaker patient, presented a trauma at the frontal region after hitting a wall 7 months ago due to an episode of hypoglycemia. She reported that there was no sign of injury at the time of the trauma and that, one week later, the entire frontal region presented blackened skin, initially in the left frontal area and then in the left hemiface, with a necrotic appearance. She also reported the blackened skin ulcerated and began to secrete an odorless serous fluid, with no bleeding, 2 weeks after the trauma. The patient reported initially receiving inpatient treatment for 6 days for a two-stage lesion debridement and antibiotic therapy (the last treatment occurred in November 2020). Since then, the lesion has been stable, with exposed frontal bone, no fever or purulent secretion, and she complains of local pain. She used collagenase ointment on the lesion. The patient had significant aesthetic complaints and loss of frontal motor skills, in addition to loss of self-esteem due to being unable to look at herself in the mirror anymore.

As comorbidities, the patient had insulin-dependent type 2 diabetes mellitus treated with metformin and NPH insulin and under current adequate control.

On physical examination, the patient presented fibrotic tissue throughout the extension of the frontal region, measuring 13 cm x 8 cm, from the eyebrow area to the upper and lateral hairline. In addition, there was a portion of the exposed cranial vault in the left frontal region, measuring 3 cm in diameter and presenting adherent fibrotic tissue with raised edges (► Fig. 1). There was a small bloody area in the right (middle third) frontal region, transversal, measuring 1 x 3 cm, with no inflammatory signs. The bone cortex was intact and had a yellowish appearance. The scar tissue in the right frontal region presented retraction, with right-sided eyebrow elevation (1 cm higher than the left eyebrow). There were no local secretions, inflammatory signs, or lack of mobility in the frontal region.

The patient underwent two fat grafting sessions using the Pellon technique (overlapping the raw area) with an average interval of 3 weeks between them. We injected 5 mL of fat in each session under local anesthesia with no fat centrifugation. We made small openings in the cortical bone until it bled to optimize the entry of mesenchymal fat cells into the bone. The patient received prophylactic antibiotics for 7 days



Fig. 1 Extensive wound in the frontal region with bone exposure

in all fat grafting sessions, and her diabetes was under control. From the first to the second procedure, we noted a progressive reduction in the bone exposure area size (► Fig. 2). Four weeks after the last fat grafting session, granulation tissue completely filled the area (► Fig. 3). Subsequently, we performed a full-thickness skin graft to cover the granulation tissue. The donor area for the graft was the inguinal region.

Discussion

The popularity of autologous fat grafting increased significantly in the late 1980s when an abundance of fat from liposuction procedures allowed surgeons to experiment with

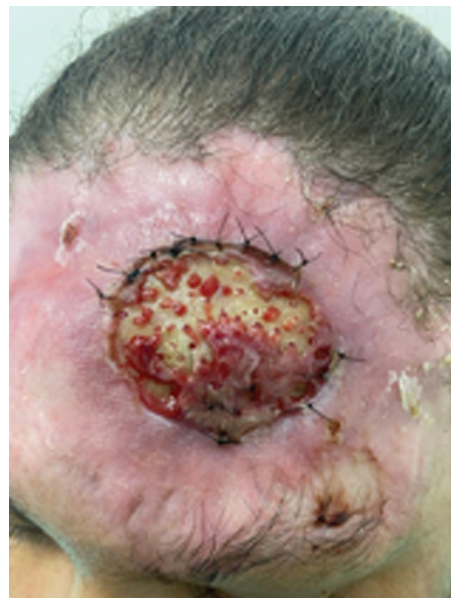


Fig. 2 Beginning of granulation tissue in the frontal region



Fig. 3 Completely granulated wound after two fat grafting sessions

its therapeutic potential.³ Adipocyte-derived stem cells were first isolated from liposuctioned tissue. Fat injection to further improve scars likely results in improvement by mesenchymal cells and numerous growth factors from liposuction coming from the skin and causing scar remodeling.² Patients with subacute (over 3 weeks) burns with apparent progression to scarring and those with hypertrophic scarring after healing from a burn or other injury, such as trauma or keloids of any origin, are also candidates for fat grafting treatment. Repeated injections (up to four injections total) occur at intervals of 7 to 10 days for wounds or 6 to 8 weeks for scars.

Fat grafting as an adjuvant treatment in acute and subacute burns aims to take advantage of the benefits of fat: several metabolic and regenerative properties, increasing vascularization and enhancing tissue regeneration.² These properties can treat burns and chronic wounds, as in our case report, in which the bone exposure was in a prime area with few adjacent donor areas and a high failure potential for skin flaps.

The gold standard treatment for wounds with exposed bone coverage with local or distant flaps. In our case report, the first option could be a microsurgical flap, such as a Chinese flap, given its thickness, which is adequate for frontal region covering. The disadvantages of this treatment are its higher morbidity and a higher chance of complications, especially considering the patient's obesity and diabetes. In this case, fat grafting was sufficient to assure bone exposure coverage with low morbidity, the need for less complex procedures, and lower costs for the public health system. A study with 20 wound cases in different locations observed qualitative aesthetic and functional improvement.⁴ Most importantly, pain reduction or complete resolution and scar elasticity increase were objectively assessable in all cases. Fat can also cover prime areas in other sites, including those with exposed bone and ligaments in the calcaneus.⁵

A recent study on fat grafting to treat facial wounds showed its benefits in local scars. Although there are multiple graft donor sites, no data currently favors one over the others. Facial fat grafting occurs after fat collection and processing.⁶ Several face areas can undergo autologous fat grafting treatment, including the glabella, frontal region, temporal fossa depressions, labiomental fold, lips, pre-jowl grooves, and earlobes. Lipofilling can successfully treat scars

in these areas with different degrees of volume deficit.⁶ Thus, fat grafting can treat prime areas with good outcomes, as in our study. An option to optimize fat grafting outcome is the use of vacuum pressure therapy.⁶ Grafted fat mobilization against the wound surface under negative pressure seems to transform into an autologous biological matrix with large amounts of mesenchymal cells and adipocytes.⁶ The wound requires debridement and an adequate bed for fat placement, as in our case report.

The most common method of fat graft harvesting is based on the Coleman technique,⁷ which collects liposuction samples from the donor site and processes them before injection into the recipient site. The standard technique is called lipotransfer, but there are several variations. A recent systematic review including 10 articles³ observed that most studies used a lipotransfer technique, and one administered unprocessed liposuction material with no centrifugation. In the latter study, 88% of the wounds healed completely, and 12% healed partially within 4 months. The mean wound healing time was 68 days (range, 40-107), with an average reduction in wound surface area of 90%.⁸ In our study, we collected abdominal fat using the conventional lipotransfer per the Coleman technique, with no centrifugation, and the bone exposure area showed complete granulation after two fat grafting sessions.

Other relevant issues for discussion, with a probable positive impact on wound evolution and granulation tissue formation, are the adequate control of the patient's underlying disease (diabetes), the use of antibiotics, and wound debridement before fat graft placement.

Author's Contribution

OTD: data analysis, interpretation, or both, study conception and design, conceptualization, investigation, methodology; RFRM: project administration, resources, software, validation; AAP: final manuscript approval, funding acquisition, supervision, visualization, writing – review and editing.

Number of Ethics Committee

This study was approved by the Ethics Committee under No. 68070723.3.0000.5411.

Clinical Trials

None.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interests

The authors have no conflict of interests to declare.

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