VACUUM-ASSISTED CLOSURE FOR TREATING MAGNETIC RESONANCE BURN: A CASE REPORT

PRESSÃO NEGATIVA VACUUM ASSISTED CLOSURE NO TRATAMENTO DE QUEIMADURA POR RESSONÂNCIA MAGNÉTICA: RELATO DE CASO

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ABSTRACT

Introduction: Negative pressure therapy (NPT) or subatmospheric pressure therapy is an active treatment of the wound caused by a burn, with of an intelligent system that regulates the distribution of vacuum pressure throughout the injured area, facilitating the formation of scar tissue absent from local infection in a short time. **Case report:** GMM, 45 years old, white, female, obese, was a burn victim of l and ll grade evolving to lll degree, in the posterior region of the right arm, during the magnetic resonance (MRI) examination of skull and pelvis. **Comments:** The NPT must compose the therapeutic arsenal of surgeons for the treatment of wounds caused by burns, as it represents a quick and comfortable option to conventional methods of treatment. The correct understanding of the functioning of MRI by radiology professionals, in order to better deal with aspects related to safety is very important to avoid adverse effects in patients.

Keywords*:* Burns. Wound Healing. Therapeutics

RESUMO

Introdução: A terapia por pressão negativa, ou terapia por pressão subatmosférica, configura-se como tratamento ativo da ferida causada por queimadura, com sistema inteligente que regula a distribuição da pressão a vácuo igualmente por toda a área lesionada. Dessa forma, torna-se mais fácil a formação de tecido de cicatrização ausente de infecção local em um curto intervalo. **Relato de caso:** GMM, 45 anos, branca, gênero feminino, obesa, foi vítima de queimadura de 1º e 2º graus, evoluindo para 3º grau, na região posterior do braço direito durante realização de ressonância magnética de crânio e pelve. **Comentários:** A terapia por pressão negativa deve compor o arsenal terapêutico dos cirurgiões para tratamento de feridas oriundas de queimaduras, pois representa uma opção rápida e confortável aos métodos convencionais de tratamento. Além disso, é importante que haja o entendimento correto do funcionamento da ressonância magnética por parte dos profissionais da radiologia, de modo a lidar melhor com aspectos relacionados à segurança, a fim de evitar efeitos adversos nos pacientes.

Palavras-chave: Queimaduras; Cicatrização; Terapêutica

INTRODUCTION

Burns are traumatic injuries caused by energy from thermal, chemical, electrical, or radioactive agents that act on the internal and external lining tissues of the human body. The injuries may destroy the skin and deeper tissues, triggering systemic responses proportional to their extent and depth[1].

Local treatment in partial-thickness burns aims to promote rapid wound healing, while in full-thickness burns, it aims to minimize infection prior to surgery. Dressings are designed to absorb wound exudate, prevent bacterial colonization, and provide physical protection and pain relief[2,3].

Negative pressure wound therapy (or subatmospheric pressure therapy) is an active treatment for burn injuries that uses an intelligent system to regulate the vacuum pressure distribution equally on the wound surface. The usage of vacuum-assisted closure dressing in III-degree burns stimulates the formation of granulation tissue free of local infection within a short time[4].

This study reported the case of a patient who initially sustained a I-degree burn (Figure 1A), which progressed to a III-degree burn (Figure 1D) in the posterior region of the right arm during crani-

al and pelvic magnetic resonance imaging. The burn occurred due to high levels of radiofrequency electromagnetic waves and increased heat deposition in the skin.

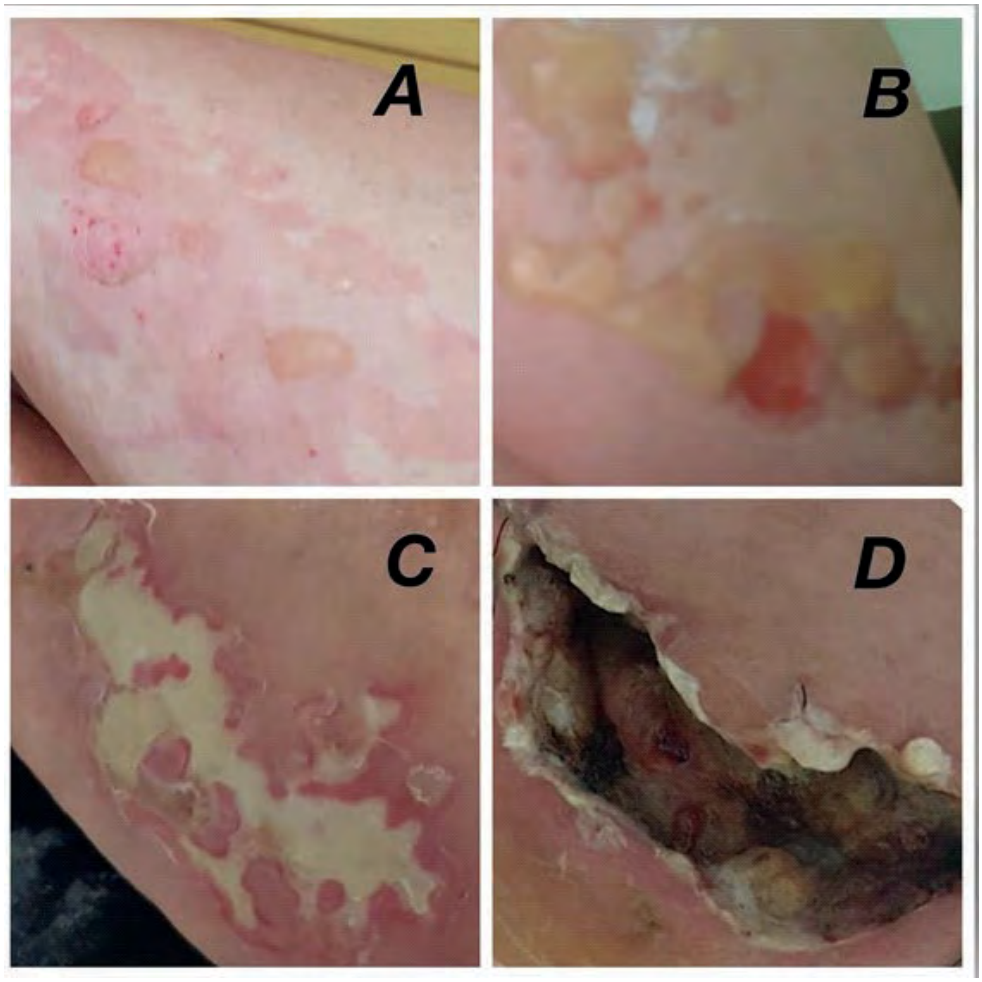

Figure 1. Burn injury on the posterior region of the right arm. A and B: I- and II-degree burns with erythema and blistering; C: Superficial II-degree burn; D: III-degree burn with dry necrosis.

CASE REPORT

GMM, a 45-year-old, white, female, with obesity, sustained I- and II-degree burns (Figures 1A, 1B, and 1C) on the posterior region of the right arm during cranial and pelvic magnetic resonance imaging. Hours after the incident, the attending anesthesiologist advised the patient to apply ice compresses and use topical Bepantol® (dexpanthenol 50 mg). The number of burn blisters increased, and topical silver sulfadiazine was recommended.

After five days, with no improvement in wound healing, the patient visited a non-specialized public hospital for burn treatment; Dermacerium® (0.4% cerium nitrate and 1% silver sulfadiazine) was prescribed to be used two to three times daily after bathing.

The patient went to a specialized burn treatment center, where she was diagnosed with a III-degree lesion with associated inflammatory process (Figures 1D and 2A). Standard dressing was applied, and after three days, surgical debridement of the wound was performed under anesthesia (Figure 2A); the patient was discharged on the following day.

Six days after surgery, the plastic surgeon initiated treatment of the injury with negative pressure wound therapy, connected to a vacuum system set at 100 mmHg, using a 300 mL reservoir and Granu-Foam Silver® (silver-impregnated dressing) with the vacuum-assisted closure device.

The patient demonstrated rapid formation of granulation tissue (Figure 2B), with no evidence of local infection, and progressive improvement of the lesion. New procedures, such as autografting or flap advancement, were dismissed. Dressing changes were performed twice a week, totaling six sessions. Two more vacuum-assisted closure dressing changes were prescribed until complete wound closure and subsequent patient discharge.

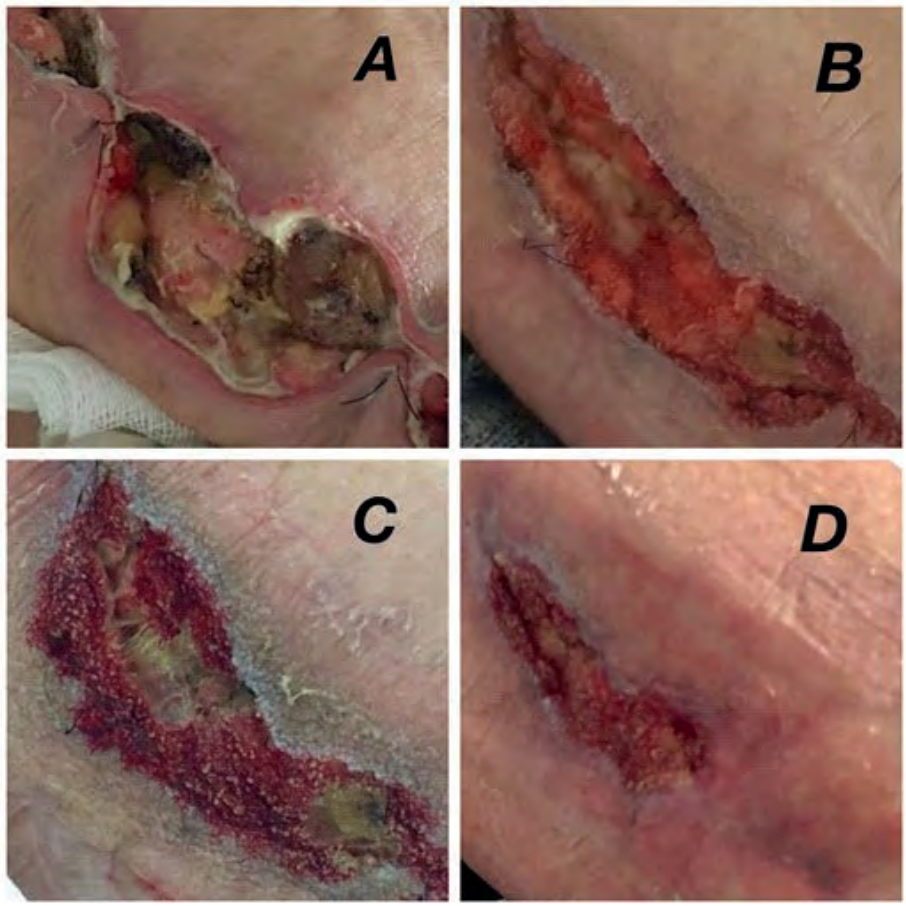

Figure 2. A: Injury after surgical debridement; B to D: Wound healing progression with granulation tissue and gradual contraction.

COMMENTARIES

Burns represent a major public health problem, as they result in lasting or permanent damage, loss or reduction of functional capacity, impairment of daily activities, and physical, aesthetic, and psychological sequelae[5].

In this report, the patient initially presented an I-degree burn (Figure 1A) that progressed to a III-degree burn (Figures 1D, 2A) during a magnetic resonance imaging examination, in which she was exposed to a high rate of radiofrequency absorption, leading to the injury. In obese patients, several barriers limit and complicate the safe performance of this examination[6].

The specific absorption rate quantifies the radiofrequency energy deposited per unit of body mass and is expressed in watts per kilogram (W/kg). Excessive deposition of this energy in tissues results in temperature elevation. Specific absorption rate values should remain within safe limits, not exceeding a 1.0 °C increase in tissue temperature. Moreover, an accurate measurement of the weight of the patient avoids excessive heating and adverse effects, such as burns[7].

Surgical options for burn management include flap rotation, skin grafting, and topical use of bactericidal agents following debridement of devitalized tissue[8]. However, they require almost daily dressing changes, have a long duration, and often cause patient discomfort, pain, and complications in some cases.

The patient was treated with negative pressure wound therapy, which consisted of an interface material (foam or gauze) connected to a suction tube and an exudate reservoir, linked to a computerized device. The interface material is placed in direct contact with the wound, removing exudate via the application of subatmospheric pressure. This process enhances tissue perfusion, approximates wound edges, and stimulates the formation of granulation tissue, promoting wound healing[4,9].

Negative pressure wound therapy should be considered part of the therapeutic arsenal of surgeons for managing burn injuries, as it provides a faster and more comfortable alternative to conventional methods[8]. Although magnetic resonance im-

aging does not involve ionizing radiation in image acquisition, it carries inherent risks and associated effects. Therefore, a proper understanding of magnetic resonance imaging mechanisms by radiology professionals is essential to ensure patient safety.

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