

Use of collagen and aloe vera in ischemic wound treatment: study case

USO DE COBERTURA COM COLÁGENO E ALOE VERA NO TRATAMENTO DE FERIDA ISQUÊMICA: ESTUDO DE CASO

EL USO DE COLÁGENO Y ALOE VERA EN EL TRATAMIENTO DE LA HERIDA ISQUÉMICA: ESTUDIO DE CASO

Simone Helena dos Santos Oliveira¹, Maria Julia Guimarães Oliveira Soares², Pascalle de Sousa Rocha³

ABSTRACT

The present study is a clinical case report of a patient with diabetes and hypertension, with an ischemic wound, treated with a non-conventional *Aloe vera* and collagen plastering. This study is part of an experimental research project, coordinated by professors and nurses that work together to discover new ways for wound treatment. This case was chosen among many patients. Data was collected through anamneses and physical examination of the patient's condition, the wound, and pictures were taken. The plastering was applied every day, and by the end of ten weeks, total healing was obtained. There was no discomfort or any other implication as a result of using the compound. In conclusion, the compound was well accepted and efficient in this particular case.

KEY WORDS

Wound healing.
Therapeutics.
Aloe.
Collagen.
Chronic disease.
Wounds and injuries

RESUMO

O presente estudo relata o caso clínico de um paciente diabético e hipertenso, portador de ferida isquêmica, tratado com cobertura não convencional, à base de *Aloe vera* e colágeno. Faz parte de um projeto de pesquisa experimental, coordenado por professores e enfermeiros que atuam em projetos para o desenvolvimento de novas tecnologias para o tratamento de feridas. O caso em tela foi selecionado dentre os dois demais pacientes acompanhados. A coleta de dados foi efetuada através da anamnese e exame físico do paciente, utilizando-se um instrumento com dados relativos às condições do paciente e da lesão, bem como através do registro fotográfico da lesão. Os curativos foram realizados diariamente e, ao final de aproximadamente dez semanas, observou-se a total cicatrização da lesão. Não foram observados desconfortos ou complicações decorrentes do uso do produto, concluindo-se que o mesmo apresentou boa tolerabilidade e eficácia terapêutica para este caso em particular.

DESCRIPTORIOS

Cicatrização de feridas.
Terapêutica.
Aloe.
Colágeno.
Doença crônica.
Ferimentos e lesões.

RESUMEN

Este estudio reporta el caso clínico de un paciente hipertenso, diabético, con una herida isquémica tratada con apósitos no convencionales de *Aloe vera* y colágeno, y forma parte de un proyecto de investigación experimental coordinado por profesores y enfermeros que trabajan en proyectos de desarrollo de nuevas tecnologías para el tratamiento de heridas. El caso de referencia fue elegido entre muchos pacientes en seguimiento. Los datos fueron obtenidos por la anamnesis y el examen físico del paciente, utilizándose un instrumento con datos relativos a las condiciones del paciente y de la lesión, así como un registro fotográfico de la lesión. Las curaciones se realizaron diariamente, al cabo de aproximadamente diez semanas se obtuvo la curación total. No se observó incomodidad o cualquier otra complicación derivada de la utilización del producto, por lo que se concluye en que el tratamiento demostró una buena tolerabilidad y eficacia terapéutica para este caso particular.

DESCRIPTORES

Cicatrización de heridas.
Terapéutica.
Aloe.
Colágeno.
Enfermedad crónica.
Heridas y traumatismos.

¹ PhD in Nursing in Health Promotion, Federal University of Ceará. Professor at the Health Technical School at the Federal University of Paraíba. João Pessoa, PB, Brazil. simonehso@hotmail.com ² PhD in Nursing, Federal University of Ceará. Professor at the Federal University of Paraíba, Medical-Surgical Nursing and Administration Department. João Pessoa, PB, Brazil. mmjulieg@yahoo.com.br ³ Master student in Education, Universidade Lusófona do Porto, Portugal. Professor at the Faculdade Integrada de Patos. Patos, PB, Brazil. pascallerocha@hotmail.com

INTRODUCTION

Chronic wounds can be defined as those that do not spontaneously heal within three months and which frequently develop into an infectious situation. They can be considered complex wounds, especially when associated with systemic pathologies that impede the healing process⁽¹⁾.

Leg ulcers are among chronic wounds. These are very frequently observed in medical practice and require extensive financial resources for their management. Leg ulcers are characterized by limited or irregular loss of dermis or epidermis and can reach the subcutaneous and underlying tissues. It affects the extremities of inferior limbs and its causes are commonly related to problems in the arterial or venous vascular system⁽²⁾.

The most common cases of leg ulcers occur between the ages of 30 and 80. They occur due to functional alterations that cause not only gradual reduction of renewal of the epidermis (30% to 50%) but also a diminishing of gradual skin repair and injuries and collagen deposits⁽³⁾.

It is estimated that from 80% to 85% of cases of leg ulcers are caused by chronic venous insufficiency⁽²⁾ and 5% to 20% accrue from ischemia due to arterial insufficiency, usually due to the progression of atherosclerosis. Clinical disorders, which usually accompany this condition, are diabetes mellitus (DM) and systemic arterial hypertension (SAH)⁽⁴⁾.

Feet are particularly vulnerable to circulatory and neurological damage and the least injury might cause ulcers and infections. These are more common and develop more rapidly in the presence of DM⁽⁵⁾. Simply controlling glucose levels, though essential, does not necessarily ensure these lesions will heal. They often develop into necrosis and infectious situations that may even lead to amputation⁽¹⁾.

Ulcers are usually located in the instep of a foot and are small (1.5cm²), though healing is reached in 60% to 80% of the patients⁽⁶⁻⁷⁾. The average time these lesions take to heal with medical treatment is ten weeks, with chance of relapse between 13% and 44% after the first year and 60% after two years⁽⁷⁻⁸⁾.

Given its chronic nature and probability of relapse over shorter or longer periods of time, these ulcers can have psychosocial repercussions for patients as they require changes in lifestyle, prolong the time individuals need to be away from family life, and alter individual's self-image, which affects individuals at different levels of intensity, and limits daily activities. For health care facilities, it increases expenses with supplies and specialized care.

Considering these implications, high-tech dressings have been developed and applied to enable better means of

healing, and their use is associated with critical and continuous assessments and to a therapy based in a holistic perspective⁽⁹⁾. From this perspective, experimental studies based on medicinal herbs and other elements that act on the healing process are being developed and include research addressing the use of *Aloe vera* and collagen.

Aloe vera has been used in traditional medicine to cure several ailments such as skin diseases, injuries caused by irradiation, eye diseases, intestinal disorders and viral diseases. It presents healing, anti-inflammatory, and skin protection, in addition to bactericidal and laxative properties and detoxifying agents. *Aloe* is frequently used on skin lesions due, mainly, to its emollient and soothing power. In addition to the vitamins C, E, complex B and folic acid, it contains minerals, essential amino acids and polysaccharides that stimulate tissue growth and cell regeneration⁽¹⁰⁾.

The application of a rectal *Aloe*-based ointment to treat hemorrhoids and anal fissures showed effective results, which according to patients, presented no side effects. Its use has been recommended as an additional therapy to treat these diseases, not only due to its effective action but

also because it is an easily produced, cheap and easily accessible product⁽¹¹⁾. Its use in the treatment of psoriasis, acne and dermatitis improved lesions in 47.7% and healed lesions in 45.5% of the studied patients⁽¹⁰⁾.

Collagen is the most abundant protein in animals. The biomaterials created from collagen are alternative therapies with several applications in the medical and dentistry fields, since they present great biocompatibility and the ability to promote wound healing. In the biomedical field, it has been used to repair abdominal walls, tendons, ligaments, and wounds, among other issues⁽¹²⁻¹³⁾.

Studies evaluating the application of new biomaterials and several medical-hospital products are relevant for the treatment of wounds because they seek ways to expedite the healing process, minimize the discomfort of patients, facilitate the care delivered by the nursing and multiprofessional teams and reduce hospitalization and healthcare costs.

From that perspective, this study reports the clinical case of a diabetic and hypertensive patient, who carries an ischemic wound, treated with non-conventional *Aloe vera* and collagen-based dressing.

METHOD

This case report is part of an experimental research project entitled: *Assessment of the Therapeutic Efficacy of VERHAGAZE^(a)*, coordinated by professors from the

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^(a) MBM Farmacêutica Ltda.

Departments of Chemistry, Medical-Surgical Nursing and Administration, and the Health Technical School at the Paraíba Federal University, carried out jointly with nurses from the Lauro Wanderley University Hospital, who work with projects addressing new technologies to treat wounds.

The implementation of this product in human beings was initiated after the project was approved by CEP (approved on March 9, 2006, Nº 0002-06) and authorized by the National Health Surveillance Agency (ANVISA). It was carried out in the outpatient unit of a public hospital in João Pessoa, PB, Brazil.

The dressing was composed of sterile gauze for topical use, with extract of *Aloe vera* in gel (1.5ml), collagen (2.0g), glycerin (5.3ml) and paraben preservatives (0.1g) included in its composition.

Patients were selected according to the following criteria: older than 21 years of age; consenting to participate in the study through a free and informed consent form (Resolution nº 196/96 of the National Health Council⁽¹⁴⁾), and systematically attending the health service to change the dressings. Patients were first informed of the study's objectives, their right to withdraw at any time, and their confidentiality was ensured. The studied case was selected among the remaining follow-up patients.

Data collection was carried out on a daily basis through the application of an instrument containing the following variables: identification data (age, gender, occupation, admission, specialty, diagnosis); conditions inherent to the patient (smoking, alcoholism, nutritional conditions, mobility, history of current disease, previous treatments, medication); assessment of lesion (type, location, microbial content, exudate, edges, adjacent skin, pain, measurement) with a blank space for additional notes if necessary.

Physical assessment and anamnesis were first collected, then the therapeutic course was chosen according to this assessment. The aspects previously described were considered in evaluating the lesions. Pain was evaluated according to the patients' reports, the intensity of which was classified as low, moderate or intense, and as continuous, intermittent, nocturnal, when walking, when one is touched or at rest.

Other items such as sensitivity to the formula components, increased pain and lesion's dimensions, bleeding, infection and development of necrosis or increased area of necrosis were aspects systematically observed as potential adverse reactions to the product. These items were evaluated based on the observation of the lesion's characteristics and symptoms reported by patients. All observations

were recorded daily in the instrument after the dressing was applied. During this procedure, weekly photographic records were taken to permit visualization and follow-up of the case by the members of the research group during monthly meetings. Due to the difficulty in standardizing a linear measurement of the lesion among professionals who applied the dressings, the researchers decided to follow the development of the studied case, that is, the reduction of the lesion's dimensions, through photographic records, since this is one way to evaluate wounds.

The lesion was cleaned with warm saline solution at 0.9% using a 20cc syringe and a 40x12 needle to irrigate the area, aiming to achieve 8 to 15 psi. The perilesional area was cleaned and dried with gauze and then the dressing was applied on the moist wound, which was covered with a dry gauze, wrapping the foot with a crepe bandage, fixed with tape.

CASE REPORT

D.C.M, 52 years old, male, driver, resident in Santa Rita, PB, Brazil, is a diabetic and hypertensive patient taking Furosemide 40mg twice a day and hidroclorotiazida 25mg twice a day, sought out the outpatient clinic and reported a traumatic injury that had not healed for four months. The patient did not report any previous injury with a difficult healing process. The physical assessment indicated a good general condition, consciousness, lucid, active, well-nourished, normal colored, walking unaided, with a lesion on the left foot's instep; wound bed with granulation tissue and tendon exposed; a small amount of odorless sero-hematic exudation; slightly swollen and well-defined edges adhered to the bed and small areas with fibrin; adjacent skin with slightly ischemic areas, cold to palpation; regular and filiform posterior tibial pulse; preserved peripheral perfusion; with edema in the affected limb. Intermittent pain, intense to the touch (during irrigation with saline at 0.9%) and moderate when walking (changes upon admission on June 12, 2006).

The first assessment was on June 12, 2006, which showed that the injury was caused by a mechanical trauma culminating in an ischemic ulcer (Figure 1). The adopted treatment was cleaning the lesion with jets of saline solution at 0.9% followed by the application of the dressing (Figure 2). A similar procedure was used in the following dressings. In addition to care directly related to the affected area such as rest, hygiene, protection against new trauma, recommendations were given concerning the need to follow the prescribed diet, and systematic use of medication to control glucose levels and high blood pressure as fundamental elements for treatment success.



Figure 1 - Left foot instep. First assessment (June 12, 2006)

On June 26, the bed wound presented granulation tissue covering the tendons, with only one tendon with small exposed area; yellow secretion in small quantity and odorless; edges with fibrin in contraction and epithelialization; the patient reported slight pain during the lesion cleansing. To the patient's and the group's satisfaction, only 16 days after the dressing was applied, satisfactory development was observed. The patient was asked whether he had followed the recommendations concerning care of the affected area and control of the underlying conditions; he answered yes. Recommendations were reinforced and doubts were clarified whenever necessary.

On July 17, the lesion presented granulation tissue totally covering the wound bed; slight serous exudate, regular edges in progressive contraction, shiny perilesion without cutaneous maceration. At this point, the patient no longer reported any pain. The fact the product kept the lesion moistened and did not cause cutaneous maceration, and also kept the perilesional skin shiny caught the attention of the researchers because it demonstrated the product's moisturizing action.



Figure 3 - Assessment on August 14, 2006



Figure 2 - First application of Aloe vera and collagen-based dressing (June 12, 2006)

On July 31, the presence of epithelial tissue covering much of the wound bed, forming a yellow crust on the edges and absent exudation, was observed. The patient did not report any pain. On August 7, the newly formed epithelium was covering almost the whole wound surface and a yellow crust covered the edges. However, it did not interfere in the healing process, and re-epithelization and diminished extension of wound was observed. On August 14, the granulation tissue was almost imperceptible due to the formation of clear pink epithelium. The crust's autolytic debridement gradually progressed, without causing discomfort to the patient (Figure 3).

The treatment with the product finally ceased on August 22; it lasted two months and 11 days (Figure 4). The formation of a scar with an area that corresponded to approximately $\frac{1}{4}$ of the lesion area at the beginning of the treatment was observed, evidencing a quite satisfactory contraction process and newly formed tissue. Although the healing process was complete, recommendations concerning care for the scar to prevent new trauma and the importance of self-care related to SAH and DM was reinforced in order to minimize vascular complications that might lead to the emergence of new lesions.



Figure 4 - Scar on August 22, 2006

Progressive improvements were observed during the treatment considering that appropriate moistening was maintained from the beginning to the end of the treatment. Neither maceration on the edges or on adjacent skin was observed. The wound diminished in size, with edge contraction, and progressive formation of granulation tissue and epithelial granulation at each assessment were evidenced. The lesion completely healed after approximately ten weeks of treatment, evidencing the efficacy of the dressing in regard to tissue repair over the period indicated by the literature⁽¹⁵⁻¹⁶⁾ in patients with appropriate follow-up.

No complication was observed during the application of the product. On the contrary, the intense pain manifested during the irrigation in the cleansing process progressively lessened until it completely ceased, even before healing was complete. The product was efficient in the treatment of the studied case and did not cause any complication or discomfort to the patient. It is important to note that the success of the treatment is also a result of the patient's compliance with recommendations concerning the underlying conditions (SAH and DM) and care of the injury.

FINAL CONSIDERATIONS

This study showed the experimental results of the application of a non-conventional *Aloe vera* and collagen-based dressing on an ischemic lesion in a patient with systemic arterial pressure and diabetes mellitus. The complex healing process in patients with these conditions requires special care related to glucose control, blood pressure levels, nutrition and rest, and direct care of the lesion, involv-

ing the choice of dressings that facilitates an ideal environment to promote lesion epithelization. Hence, this study led the group of researchers to reflect on the importance of treating a patient with a lesion in a holistic way and also of seeking alternative treatments through studies investigating responses to new dressings.

Although the application of this product presented successful results, this study's findings are not sufficient to confirm its efficacy, nor even to make generalizations. Only the analysis of an experimental study with a larger sample can provide further explanations of the use of this product on this type and other types of lesions, as well as its effects on the healing process and potential discomfort, sensitivity and adverse reactions of patients, though no complication or discomfort was identified in the studied case.

Despite the study's relative limitation due to the difficulty in standardizing the procedure of taking linear measurements of the lesion, the photographic record was a satisfactory resource to evaluate the development of the lesion in response to the product's application, showing full healing within the expected period of treatment of a patient with appropriate follow-up by qualified professionals.

Contributing to the cure of lesions through the testing of *Aloe vera* and collagen reaffirms the significant role of nursing in the development of new alternatives for the treatment of wounds, and moreover, it strengthens the gratifying feeling of delivering integral nursing care, contributing to the self-esteem of patients with lesions. Humanized and quality nursing care is undoubtedly a factor of great relevance to be considered since it positively influences the personal and social life of these patients.

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