

Photobiomodulation in tissue repair of pressure injury in the gluteal region: experience report

RESUMO | Objetivo: Avaliar a evolução clínica no reparo da lesão por pressão em região glútea à direita, por meio da fotobiomodulação e terapia fotodinâmica. Método: Trata-se de um estudo descritivo analítico experimental, através do relato de relato de experiência, desenvolvido no período de 26/01/2019 a 11/06/2019. Resultados: O tratamento teve início no dia 26/01/2019, lesão medindo 9,0 cm de comprimento, 5,0 cm de largura e 3,5 cm de profundidade, com a seguinte conduta nas primeiras 16 sessões: Terapia Fotodinâmica e cobertura primária de espuma impregnada com Polihexametileno de Biguanida, e secundária sempre que necessário. Após, foram realizadas sessões de laser pontual no leito da lesão e região perilesional, mantendo como cobertura primária gaze impregnada com Polihexametileno de Biguanida, e trocas realizadas sempre que necessário até o término do tratamento. Conclusão: Conclui-se que houve melhora no processo de cicatrização da lesão tratada com fotobiomodulação e terapia fotodinâmica, porém, é importante que o profissional esteja habilitado para atuar com essa prática.

Descritores: Laser de baixa potência; Terapia fotodinâmica; Lesão por pressão.

ABSTRACT | Evaluate the clinical evolution in the repair of pressure injury in the right gluteal region, through photobiomodulation and photodynamic therapy. Method: This is an experimental analytical descriptive study, through the report of an experience report, developed from 01/26/2019 to 06/11/2019. Results: The treatment began on 01/26/2019, with a lesion measuring 9.0 cm in length, 5.0 cm in width and 3.5 cm in depth, with the following conduct in the first 16 sessions: Photodynamic Therapy and primary coverage of foam impregnated with Polyhexamethylene Biguanide and would second whenever necessary. Afterwards, punctual laser sessions were carried out in the wound bed and perilesional region, keeping gauze impregnated with Polyhexamethylene Biguanide as primary coverage, and exchanges were carried out whenever necessary until the end of the treatment. Conclusion: It is concluded that there was an improvement in the healing process of the lesion treated with photobiomodulation and photodynamic therapy, however, it is important that the professional is qualified to work with this practice.

Keywords: Breastfeeding; Nursing; Weaning; Maternal and Child Nursing;

RESUMEN | Objetivo: Evaluar la evolución clínica en la reparación de la lesión por presión en la región glútea derecha, mediante fotobiomodulación y terapia fotodinámica. Método: Se trata de un estudio descriptivo analítico experimental, a través del reporte de un relato de experiencia, desarrollado del 26/01/2019 al 06/11/2019. Resultados: El tratamiento se inició el 26/01/2019, con una lesión de 9,0 cm de largo, 5,0 cm de ancho y 3,5 cm de profundidad, con la siguiente conducta en las primeras 16 sesiones: Terapia Fotodinámica y cobertura primaria de espuma impregnada con Polihexametilen biguanida y segundo cuando sea necesario. Posteriormente se realizaron sesiones puntuales de láser en el lecho de la herida y región perilesional, manteniendo una gasa impregnada con Polihexametilen Biguanida como cobertura primaria, y se realizaron intercambios cuando fue necesario hasta el final del tratamiento. Conclusión: Se concluye que hubo una mejora en el proceso de curación de la lesión tratada con fotobiomodulación y terapia fotodinámica, sin embargo, es importante que el profesional esté calificado para trabajar con esta práctica.

Palabras claves: : Láser de baja potencia; Terapia fotodinámica; Lesión por presión.

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Recebido em: 17/06/2021
Aprovado em: 23/07/2021

INTRODUCTION

A form of non-invasive treatment to help close wounds in Pressure Injury (PI), which has been increasing interest in the medical and related fields, is Low Intensity Laser Therapy (LILT), Photobiomodulation (PBM) or simply, Laser Therapy. This new therapeutic feature is currently being used, in addition to its efficient anti-inflammatory, analgesic action.⁽¹⁾
The use of lasers began in Europe

between the 60s and 70s, where significant results were analyzed during the wound healing process. Although some studies prove the efficacy of using low-intensity lasers in injuries, it is important to emphasize that there is an instability in studies referring to the lack of protocols for the procedure. ⁽²⁾

LILT has a specific wavelength, corresponding to the peak of absorption of the photosensitizer (PS). Its high-fluency monochromatic light emission capability combined with focusing precision allows it to treat small lesions with minimal damage to the surrounding tissue, in a short period of time. Generating an increase in the propagation of repair cells, in addition to collagen renewal and helping in the tissue repair process. But, for this tissue repair to occur, it is important that the infection in the lesion is controlled. ⁽³⁾

Photodynamic Therapy (PDT) can be highlighted as an essential therapy for antimicrobial procedures. PDT is a light-activated chemical reaction used for selective tissue destruction and requires an PS agent in the target tissue, a light source and oxygen. ^(4,5)

Methylene Blue (MB) is a PS that provides an excellent result for the clinical application of PDT due to its maximum absorption length being around 660 nm, having good penetration into the skin, action against bacteria, flexibility and low toxicity. ⁽⁶⁾

There are many wound care products on the market today, which makes choosing the right treatment a difficult and challenging task. In this sense, some precepts must be considered as factors related to the wound and adjacent skin: etiology, size, depth, anatomical location, exudate volume, risk or presence of infection, adjacent skin conditions; nutritional conditions, underlying diseases, among others. ⁽⁷⁾

This advance in knowledge about wound care has also contributed so that health professionals involved in this care could review concepts and



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practices, and recognize that injury is just one more aspect within a whole, which is the human being. ⁽⁸⁾

Conventional treatments often end up prolonging the healing time of these types of injuries, which lead to high treatment costs, in addition, the quality of life of patients affected by injuries is extremely compromised by pain, difficulty in walking, chronic infectious process, long-term use of medications and psychological condition. ⁽⁹⁾

While PBM is a painless technique that consists of donating light energy to the injured tissue. This therapy has been used in several areas of health and its action is to accelerate tissue healing, modulate inflammation, promote

analgesia and recurrent complications throughout the tissue repair process. ^(8,9)

Due to these specific actions, PBM has been characterized as a powerful anti-inflammatory, whose advantages over conventional drugs are numerous, mainly due to the absence of side effects, local action, low cost and great acceptance by patients. PBM can be combined with any other treatment method. The number of sessions varies according to the type and size of the lesion. ⁽⁸⁾

Photodynamic therapy, on the other hand, has some benefits in pressure injuries, which may favor the prognosis, reducing the microbial load, consequently producing an improvement and accelerating tissue repair, providing the patient with a better quality of life. ⁽¹⁰⁾

Wound healing consists of a perfect and coordinated cascade of cellular and molecular events that interact for tissue reconstruction to occur. ⁽¹¹⁾ After an injury, a sequence of these biological events begins in order to promote the repair of the injury, a process characterized as healing. ⁽¹²⁾

Healing is formed by three phases: inflammatory phase, proliferative phase and remodeling phase. This event is a dynamic process that involves biochemical and physiological phenomena that behave harmoniously in order to ensure tissue restoration. ⁽⁹⁾

The actions of PDT and PBM, as supporting therapies to the protocol of accelerating tissue healing, are very important, as they prevent the aggravation of the lesion, colonization and infection by bacteria. This report was based on the following guiding question: "What is the clinical evolution in the repair of pressure lesions in the gluteal region, through PDT and PBM?". Given the above, the present study aims to assess the clinical evolution of pressure injury repair in the gluteal region, through PDT and PPBM, through an experience report.

METHOD

This is an experimental analytical descriptive study, of the experience report type, developed from 01/26/2019 to 06/11/2019 that reports the treatment of PI in a patient who was hospitalized twice.

His first hospitalization took place on 12/05/2018, being hospitalized for twenty-nine days, thirteen days in the Intensive Care Unit (ICU), and his second hospital stay was only four days. Only after hospital discharge, the patient's family members made contact, looking for a specialized service for Home Care.

As this is an experience report, it is not necessary to send the research project to a Research Ethics Committee as it is the report of an experience, an assistance provided. In order to respect ethical standards in scientific research and publication, the person responsible for the patient signed the Informed Consent Term authorizing the dissemination of the report in the academic environment through publications and presentations at scientific events, as well as the use of lesion images and healing process. Respect for the patient and their family is emphasized, as well as the confidentiality of any information that goes against anonymity.

The collection of the patient's history and physical examination were carried out to measure the lesion in centimeters and photographic record, after which the necessary interventions were carried out.

C.S.S. Jr. male, 61 years old, with PI in the gluteal region on the right, former smoker, with chronic kidney disease, not on dialysis, hypertensive, pale ++/4+, emaciated 46 kg, lesion with signs of infection, with sloughing adhered and moderate oozing. Lesions measuring 9.0 cm long X 5,0 cm wide X 3,5 cm deep. The measurement was performed with the aid of a millimeter measuring tape, measuring it in its

Figure 1. Result acquired after 16 sessions with PDT. Initial assessment and reassessment. Sorocaba, SP, Brazil, 2019.



Source: Personal collection, 2019.

Figure 2. Result acquired at the end of the treatment. Sorocaba, SP, Brazil, 2019



Source: Personal collection, 2019.

greatest length and width. To measure the depth, an 8 gauge urethral probe was used with the aid of a millimeter measuring tape. The measurements were noted, photographed, and later analyzed with the one from the last session. The patient was hospitalized for the first time between 12/05/2018 and 01/04/2019, and between 12/06/2018

and 12/19/2018 he needed to be intubated; and, for the second time, he was hospitalized between 01/18/2019 to 01/22/2019. He was discharged from hospital with PI in the right gluteal region.

The equipment used was the DMC Therapy XT low power 100 mW-660 nm laser device.

After evaluation, treatment with PDT was started twice a week, uninterrupted, totaling sixteen interventions. Then, the treatment was continued once a week with photobiomodulation and high-tech dressings until the end.

Experience Report

The proposed treatment was Photobiomodulation and high-tech coverage.

In the first sixteen sessions, the procedures were performed twice a week, with the following approaches: Washing the lesion with a solution of Polyhexamethylene Biguanide (PHMB) and leaving it to act for 15 minutes. Subsequently, washing with saline solution (SS) at 0,9%, removing all PHMB residue and drying with sterile gauze. To perform PDT, we used a commercial solution of 0,01% MB as photosensitizer, an amount sufficient to cover the extension of the lesion. To protect the perilesional region, barrier cream was chosen, as a primary covering of foam impregnated with PHMB, and as a secondary covering, sterile gauze, being changed whenever necessary by the patient's wife, who was guided and trained by the nurse.

The first four PDT sessions were performed with energy density per point at 9 Joules(J)/cm². And the seven subsequent sessions with energy density per point at 6J/cm², as shown in Figure 1.

After the first sixteen sessions, the interventions started to happen once a week, maintaining the same conduct as before, but the PBM was performed with energy density per point at 2 J/cm² in the bed of the lesion and in the perilesional region 4 J/cm² infrared, as shown in Figure 2.

It is visible that these adjuvant treatments (PDT/PBM) help in the healing process of the chronic lesion, noting the reduction in the size of the lesion, reduction of infection and pain, re-epithelialization, reduction in cost and

time of treatment. However, it is very important that nurses are trained to perform this practice. (13)

DISCUSSION

Analyzing the effectiveness of the application of LILT in the healing of pressure injuries, in addition to several pathologies that can be studied with this therapy, it is necessary that nursing is qualified and improves knowledge in PBM. (13)

The Federal Council of Nursing (Cofen) highlights the important role of nursing in the treatment of wounds, and scientific improvement in this area is essential to develop empowerment in this technology. (14)

Cofen Opinion No. 13/2018 (14) points out that the Technical Chamber did not find obstacles in the use of laser therapy with autonomy by the Nurse, after being properly trained to perform the practice.

It is known that PI prolongs hospitalization and increases the risk of developing other complications such as infections, impairing the individual's good evolution and increasing financial costs. (15)

PBM is a technique capable of accelerating the repair process of traumatized biological tissues. The mechanisms that involve the biostimulation process occur at the molecular level. Laser light penetrates into the tissue where it is absorbed by certain chromophores, resulting in increased cell metabolism, increasing epithelial cell motility, the amount of granulation tissue, and may decrease the synthesis of inflammatory mediators. (5,16)

The patient in the present study was submitted to interventions with Laser Therapy and obtained a reduction in the total area of the wound, a result similar to a study, where one of the lesions submitted to treatment obtained 50% healing after ten applications. (7)

In another case study, the PI in the

lumbosacral region showed complete healing, after the thirtieth intervention, it is possible to observe the presence of an extensive area covered by scar tissue, however this had been totally repaired in the twenty-second intervention, being the area necrosis removed from the site in the tenth intervention. (17)

It is possible to find in some studies the effectiveness of the use of LILT in the healing of PPL. The dosimetry technique varies according to the characteristics of the wounds, taking into account the aspect of the bed and, mainly, its dimension.

The healthcare professional must know the theoretical foundation of laser therapy, in addition to the laser functionalities, such as: emission modes (continuous or pulsed), pulse duration, wavelength and energy density. Using the correct parameters, it is possible to carry out an effective treatment and obtain maximum therapeutic benefits. (18)

In this study, the patient achieved rapid healing results after a long period of installation of the PI, which caused him a lot of inconvenience and restricted his activities of daily living. We recommend that other studies continue to be analyzed, with a larger number of people and with other methods, so that the subject of laser therapy and PI can be better understood and determine the benefits of this therapy in terms of pressure injury healing.

CONCLUSION

Given the improvement in the wound healing process, LILT therapy has shown many benefits. Thus, from this experience report, it was found that this technique provides a healing effect, favoring tissue restoration, and is an anti-inflammatory agent, reducing the pain and swelling characteristic of the skin lesion.

With regard to the role of nursing, it