REVISTA ENFERMAGEM ATUAL IN DERME

LOW-LEVEL LASER IN STAGE 3 PRESSURE ULCER HEALING: EXPERIENCE REPORT

LÁSER DE BAJA INTENSIDAD EN LA CICATRIZACIÓN DE HERIDAS POR PRESIÓN ESTADIO 3: REPORTE DE EXPERIENCIA

LASER DE BAIXA INTENSIDADE NA CICATRIZAÇÃO DE LESÃO POR PRESSÃO ESTÁGIO 3: RELATO DE EXPERIÊNCIA

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ABSTRACT
Objective: To report the experiences of a specialist nurse in conducting a clinical case of an elderly patient with stage 3 pressure ulcer (PU) undergoing low-level laser therapy. **Method:** This is an experience report of a specialist nurse who provided care to a patient at home, between February and April 2021. The specialist used the Therapy EC (DMC) device with red (660nm) and infrared (808nm) wavelengths, with application of 17 points on the edges of the lesion with 1J/cm² red and infrared laser, and six points inside the lesion. **Results:** The patient, aged 94 years, had multiple comorbidities, was hospitalized in an intensive care unit (ICU), due to pulmonary edema and use of mechanical ventilation, developing a PU. Assistance was performed with dressing changes and application of laser therapy every 48 hours. On the 5th application of the laser, there was a significant improvement in secretion and perilesional erythema. In the period of two months of laser and dressings, the complete healing of the lesion was obtained. **Final Considerations:** The nurse used low-level laser therapy, which proved to be effective in the treatment and healing of PU, contributing to the acceleration of the healing process, reducing the cost and time of patient treatment.
Keywords: Low-Level Light Therapy; Lasers; Pressure Ulcer; Wound Healing; Nursing Care.

REUMEM
Objetivo: Relatar las experiencias de una enfermera especialista en la conducción de un caso clínico de un paciente adulto mayor con lesión por presión (LPP) estadio 3 en tratamiento con láser de baja intensidad. Método: Se trata de un relato de experiencia de una enfermera especialista que brindó atención a un paciente en su domicilio, entre febrero y abril de 2021. Utilizó el dispositivo Therapy EC (DMC) con longitudes de onda roja (660nm) e infrarroja (808nm) y con aplicación de 17 puntos en los bordes de la lesión con láser rojo e infrarrojo de 1J/cm², y seis puntos en el interior de la lesión. Resultados: El paciente, de 94 años de edad, con múltiples comorbilidades, fue hospitalizado en una unidad de cuidados intensivos (UCI), por edema pulmonar y uso de ventilación mecánica, desarrollando un LPP. Se realizó asistencia con cambio de apósitos y aplicación de láserterapia cada 48 horas, en la 5ª aplicación del láser se observó mejoría significativa de la secreción y eritema perilesional. En el lapso de dos meses de láser y apósitos se obtuvo la cicatrización completa de la lesión. Consideraciones Finales: El enfermero utilizó terapia con láser de baja intensidad, que demostró ser eficaz en el tratamiento y cicatrización de la LPP, contribuyendo para la aceleración del proceso de cicatrización, reduciendo el costo y el tiempo del tratamiento del paciente.
Palabras clave: Terapia por Luz de Baja Intensidad; Rayos Láser; Úlcera por Presión; Cicatrización de Heridas; Atención de Enfermería.

RESUMO
Objetivo: Relatar a experiências de uma enfermeira especialista na condução de um caso clínico de uma paciente idosa com lesão por pressão (LPP) estágio 3, submetida a terapia de laser de baixa intensidade. **Método:** Trata-se de um relato de experiência de uma enfermeira especialista que prestou assistência a uma paciente no domicílio, entre fevereiro a abril de 2021. Utilizou o aparelho *Therapy EC (DMC)* com comprimento de onda vermelho (660nm) e infravermelho (808nm) e com aplicação de 17 pontos nas bordas da lesão com 1J/cm² laser vermelho e infravermelho, e seis pontos no interior da lesão. **Resultados:** A paciente, idosa de 94 anos, tinha múltiplas comorbidades, esteve internada em uma unidade de terapia intensiva (UTI), por edema pulmonar e uso de ventilação mecânica desenvolvendo uma LPP. A assistência foi realizada com trocas de curativos e aplicação de laserterapia a cada 48h, na 5ª aplicação do laser observou-se melhora importante na secreção e no eritema perilesional. No período de dois meses de laser e curativos obteve-se a cicatrização completa da lesão. **Considerações Finais:** A enfermeira utilizou laserterapia de baixa potência mostrando-se essa efetiva no tratamento e na cicatrização da LPP, contribuindo com a aceleração do processo cicatricial, reduzindo o custo e o tempo do tratamento da paciente.
Palavras-Chave: Terapia com Luz de Baixa Intensidade; Lasers; Lesão por Pressão; Cicatrização; Cuidados de Enfermagem.

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INTRODUCTION

Pressure ulcers are skin and/or underlying injuries caused by long-term or extensive pressure mainly in the site of bone contact provoking local ischemia and other ensuing factors[1-2]. According to the National Pressure Ulcer Advisory Panel (NPUAP), the pressure ulcers has four stages in relation to tissue damages[2,3]. In stage 1, the skin is intact but presents non-blanchable erythema[1]. In the next stages (2, 3 and 4) there is loss of skin integrity but different in relation to ulcer depth[1]. In the second stage, the dermis is exposed, in the third, the total skin thickness is lost and the underlying adipose tissue becomes visible and in the fourth and last, there is full loss of the skin thickness and exposure of tendons, bones, ligaments, muscles, fascia, among others[1]. Other pressure ulcers occur such as unstageable, deep tissue, in the mucosa and those caused by the use of medical devices[1].

Low-level therapeutic laser is applied through low-potency beam light[4,5]. In dermatology, studies indicate benefits as growth of cellular proliferation, analgesia, non-inflammatory action and promotion of angiogenesis[4,5]. It was implemented to help wound healing based in technological advances and essential role of nursing in providing ethical and qualified care of wounds[4]. Therefore, laser therapy is a promising therapy to treat pressure ulcers and help tissue recovery.

The present study aims to report the experiences of a skilled nurse while conducting a clinical case of an older patient with stage-3 pressure ulcers submitted to low-intensity laser therapy.

METHOD

Case report of a skilled nurse providing home care to an older patient, diabetic, hypertense with heart and lung problems who developed extensive pressure ulcer during brief hospitalization in a large private institution in Rio Grande do Sul. She needed hospitalization at intensive care unit (ICU) with mechanic ventilation and developed grade 3 ulcer pressure. Due to worsening of the ulcer at home after hospital discharge, sought a skilled nurse for specialized care. After the first visit, instrumental debridement was required because of intense necrosis at the wound bed and later low-level laser therapy (LLLT) with Therapy EC (DMC), red wavelength *(*660nm) and infrared (808nm) in 1cm distant 17 spots at the ulcer margins with red and infrared laser and in six spots in deep ulcer. Laser therapy and dressings were applied for nearly two hours. The patient lied in lateral recumbency through the entire procedure.

Care was provided from February 2 through April 2021 with two-months home follow-up by a nurse, with 30 sessions of laser therapy.

Photos were authorized and consent given by the patient and its family for the present case report. Pictures were essential for evaluation, follow-up and comparison of the ulcer stages, which allowed the follow-up of healing until full tissue recovery.

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RESULTS

Female, caucasian patient, retired, 94 years-old, home-cared by her son and daughter-in-law with private-insured previous hospitalization at a large hospital in Rio Grande do Sul, needing intensive care and mechanic ventilation from January 9 through January 10, 2021.

Previous history of systemic arterial hypertension, diabetes mellitus, atrial fibrillation, hypothyroidism and chronic renal disorder.

Continuous use of eliquis, enalapril, atenolol, metformin, chlortalidone, amiodarone, purana, quetiapine and mirtazapine with hospital discharge on January 14, 2021.

At home, reported intensive pain in sacral area with local erythema in the first 10 days with progressive worsening. Due to necessity of care, an evaluation by a skilled nurse was requested to treat the ulcer.

On February 2, 2021 the first evaluation occurred with diagnosis of stage 3 pressure ulcer, 10 cm length, five cm width and three cm deep, excessive secretion and maceration necrosis adhered to the wound bed.

Instrumental debridement was performed in the first evaluation with removal of the full necrosis and later, a laser therapy session during more than 4 hours and 30 minutes.

The healing process was evaluated visually during dressing procedure at home documented with pictures without any instrument.

Antimicrobial silver-based hydrofiber was utilized as primary dressing changed at each 48 hours and secondary dressing gauze and transparent film.

Figure 1 - First day of treatment – sacral area

Source: Personal archive

Laser therapy sessions were conducted at each 48 hours, in the 5th session an important improvement of secretion and periwound erythema was detected.

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Figure 2 - Fifth day of treatment – sacral area

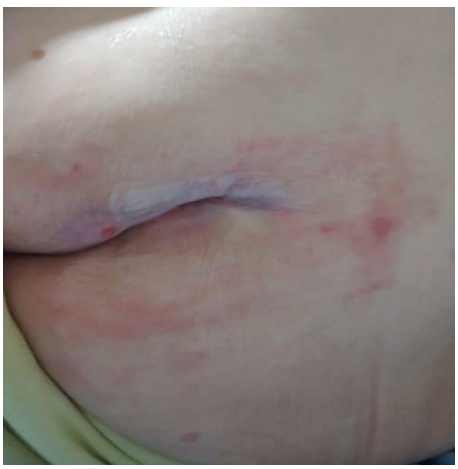
Source: Personal archive

Figure 3 - Fifteenth day of treatment – sacral area

Source: Personal archive

After two-months laser therapy, full healing of the ulcer.

Figure 4 – After 60 days of treatment – sacral area



Source: Personal archive

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DISCUSSION

High prevalence of pressure ulcer in 29.5% of hospitalized patients was found including critical patients among the most affected by this complication (33%)[6]. Also, several additional factors contribute to raise the levels of morbimortality and damage of the quality-of-life of these patients as high costs associated with conventional treatment, great susceptibility to infections and extension of hospital stay and necessity of nursing care[6]. It is therefore highlighted the importance of early and proper treatment of this condition to minimize risks and further complications[6].

In practice, LLLT has effects on healing through modulation of the inflammatory process, encouraging tissue repair and reduction of degrading metalloproteinases of the matrix collagen, allowing improved tissue arrangement and promotion of neovascularization of the ischemic tissue with its angiogenic effect and homeostasis[7,8]. Its use should be defined by the professional together with the patient matched to the case and clinical characteristics, as well as parameters, methods of application, dosage at each application and interval of repetitions and future studies to improve the practice[7,8]. Based in the case, the positive effects of LLLT were proven, contributing significantly to improve the secretion and periwound erythema initially identified and extension of the injured area, eventually leading to full healing after 2-months therapy.

However, the current scientific evidences are barely enough to determine the specific parameters of application of LLLT to treat pressure ulcers and ensuring its efficacy; new studies are required with significant sample of patients and better methodological quality to fill this gap[7,8].

CONCLUSION

The present case report aimed to describe the experiences of a skilled nurse in conducting a clinical case of an older patient with stage-3 pressure ulcer submitted to low-level laser therapy, which has been shown as a promising treatment; it contributed to the evaluation of the desired outcomes, quality-of-life and comfort through speeding up the healing process, reducing hospital costs and time of treatment of patients with extensive injuries.

However, despite the results, more studies about LLLT as treatment for pressure lesions to ensure its efficacy are necessary.

REFERENCES

1. Escola de Enfermagem de Ribeirão Preto da Universidade de São Paulo. Feridas Crônicas. Manejo da Lesão por Pressão [Internet]. São Paulo: USP; 2019 [cited 2021 jul 16]. Available from: http://eerp.usp.br/feridascronicas/recurso_educacional_lp_4.html
2. Dressing Materials for the Treatment of Pressure Ulcers in Patients in Long-Term Care Facilities: A Review of the Comparative Clinical Effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2013 Nov 18 [cited 2021 Jul 18]. Available from: https://pubmed.ncbi.nlm.nih.gov/24716257/

3. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers/ injuries: clinical practice guideline. In: Haesler E, editor. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel. Pan Pacific Pressure Injury Alliance; 2019 [cited 2021 Jul 18]. Available from: https://www.biosanas.com.br/uploads/outros/artigos_cientificos/127/956e02196892d7140b9bb3cdf116d13b.pdf

4. Lima NEP; et al. Laserterapia de baixa intensidade no tratamento de feridas e a atuação da enfermagem. Revista de Enfermagem da UFPI [Internet]. 2018 [cited 2021 jul 16];77(1);50-56. Available from: https://www.ojs.ufpi.br/index.php/reufpi/article/view/6223/pdf

5. Silva EN; et al. Capítulo 3: Vantagens e desvantagens da aplicabilidade do laser de baixa intensidade no reparo tecidual. In: Farias HPS. Pesquisa em saúde e enfermagem: inovação à ciência. Rio de Janeiro: Epitaya, 2020 [cited 2022 jan 14]. p. 33-40. Available from: https://portal.epitaya.com.br/index.php/ebooks/article/view/17

6. Machado RS, Viana S, Sbruzzi G. Low-level laser therapy in the treatment of pressure ulcers: systematic review. Lasers Med Sci. 2017 May [cited 2022 jan 09];32(4):937-944. Available from: https://pubmed.ncbi.nlm.nih.gov/28116536/ doi: 10.1007/s10103-017-2150-9.

7. Petz FFC, Félix JVC, Roehrs H, Pott FS, Stocco JGD, Marcos RL, Meier MJ. Effect of Photobiomodulation on Repairing Pressure Ulcers in Adult and Elderly Patients: A Systematic Review. Photochem Photobiol. 2020 Jan [cited 2022 jan 09];96(1):191-199. Available from: https://onlinelibrary.wiley.com/doi/10.1111/php.13162 doi: 10.1111/php.13162.

8. Mosca RC, Ong AA, Albasha O, Bass K, Arany P. Photobiomodulation Therapy for Wound Care: A Potent, Noninvasive, Photoceutical Approach. Adv Skin Wound Care. 2019 Apr [cited 2022 jan 09];32(4):157-167. Available from: https://journals.lww.com/aswcjournal/Fulltext/2019/04000/Photobiomodulation_Therapy_for_Wound_Care__A.3.aspx doi: 10.1097/01.asw.0000553600.97572.d2.

Authorship criteria

The designation of authorship must be based on the deliberations of the ICMJE, which considers an author to be one who: 1. substantially contributes to the conception and/or planning of the study; 2. in obtaining, analyzing and/or interpreting data; 3. as well as the writing and/or critical review and final approval of the published version.

Alldren Silva de Sousa: Participation: 1, 2, 3
Giovanna da Rosa Soares: Participation: 1, 2, 3
Raphaela de Matos Borges: Participation: 1, 2, 3
Fernanda Wichrowski Barreto: Participation: 1, 2, 3
Rita Catalina Aquino Caregnato: Participation: 1, 2, 3
Support and Acknowledgements: There is no support. no thanks.

Submission: 03-06-2022
Approved: 26-08-2022