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CASE PRESENTATION

Photobiomodulation in the management of inferior alveolar nerve injuries: a case report

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ABSTRACT

Introduction: trigeminal nerve injuries are caused by various dental procedures, bringing about diverse complications, which necessitate thorough clinical evaluation and therapeutic management.
Objective: describe the role of low-power laser photobiomodulation therapy in the treatment of post-extraction paresthesia of impacted third molars.
Case presentation: a 30-year-old female patient presented with partial loss of sensation in the right lip and hemi-face after surgical removal of third molars. The condition was confirmed via thermal and tactile tests, with no relevant medical history noted, leading to the initiation of photodynamic therapy and laser photobiomodulation with an infrared TERAPY EC laser, applied externally and intraorally along affected neural tracts. The protocol consisted of 4 J sessions for 40 seconds, three times per week for three months. At the end of treatment, significant improvements in sensitivity were observed, evidencing the laser's effectiveness in post-surgical neurosensory recovery.
Conclusions: photobiomodulation therapy with laser in patients with post-extraction third molar paresthesia contributed substantially to stimulating, treating, and alleviating pain by enabling the drainage of inflammatory-modulating substances.

Keywords: Photochemotherapy; Trigeminal Nerve; Low-Level Light Therapy; Trigeminal Nerve Injuries.

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INTRODUCTION

Dental anesthesia is a regularly used means in dental practice to desensitize a specific area by blocking the nerves responsible for transmitting sensory stimuli. It is also an invaluable resource to promote a state of calm and anxiety control that could be triggered in the patient in case of a painful stimulus during dental treatment.[1,2] Although it is one of the fundamental pillars for performing common dental procedures, it can lead to the occurrence of injuries to the trigeminal nerve, mainly its inferior alveolar, mental, and lingual branches.[3,4,5]

It is important to identify and differentiate among the most common sensory conditions that can arise as a consequence of trigeminal nerve injury, noting that the most common symptoms include lack of sensation, numbness, neuralgia, and increased sensitivity, which can impede daily activities such as speaking, eating, kissing, shaving, applying makeup, brushing teeth, and drinking.[6] Some nerve injuries caused by dental procedures can produce severe symptoms such as depression, suicidal thoughts, self-harm behaviors, drooling, and difficulty controlling food. For diagnosis, factors such as age, sex, type of nerve affected, time since injury, reason for consultation, and type of dental center should be considered. Some patients develop neuropathic pain, which rarely resolves spontaneously, thus requiring appropriate treatment.[7,8,9,10]

Given the above, appropriate treatment measures should be taken to treat and alleviate abnormal and missing neural sensation. In this regard, according to nerve injury classifications, there are many methods to treat nerve injuries, including medications, electrical stimulation, acupuncture, physical therapy, and low-power laser photobiomodulation therapy (LLLT).[11] There is currently robust scientific evidence that LLLT can stimulate and treat nerve injuries without thermal effects to relieve pain, promote tissue repair, and be anti-inflammatory, by triggering an increase in beta-endorphin production, neurotransmission, and blood flow, thereby enabling drainage of substances from inflammation and its consequent regulation, and it also contributes to accelerated tissue repair, bone regeneration, and restoration of neural function, inducing a therapeutic cascade and a photo-chemical regulation capable of activating the body's immune system.[12,13,14]

There is a hypothesis that laser radiation stimulates re-innervation of the tissue by penetrating the axons or adjacent Schwann cells to stimulate the metabolism of the damaged neurosensory tissue and the production of proteins associated with growth of adjacent intact nerves.[15,16] With this in mind, the present study was developed, whose objective was to describe the role of low-power laser photobiomodulation therapy in the treatment of post-extraction paresthesia of impacted third molars.

CASE REPORT

Clinical Case Presentation

A female patient, 30 years old, presented to the dental clinic reporting partial loss of sensation in the lower lip and throughout the right mandibular hemibody. The clinical picture manifested as a sequela of surgery for the extraction of third molars performed seven days prior to the consultation.

During the initial clinical examination, sensory tests were performed using thermal and tactile stimuli (Fig. 1). A curing-light lamp was used as a localized heat source and a segment of dental floss was employed to assess superficial sensory response. The results confirmed partial

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diminution of sensation in the aforementioned area, compatible with a paresthetic neurosensory injury.

Fig. 1 Performance of thermal and sensory tests.

A complete medical history was then taken, which did not reveal personal or familial medical antecedents that could predispose to peripheral neuropathies or postoperative complications.

With the aim of promoting neurosensory regeneration, a protocol of photobiomodulation therapy using infrared laser was implemented. First, the facial area to be treated was antiseptically prepared, and the anatomical points corresponding to the trajectory of the inferior alveolar nerve (Fig. 2), mental nerve, and incisive branches were externally marked, all of which could be affected during the surgical intervention.

Fig. 2 Facial cleansing with micellar water and marking on the face prior to laser application.

Laser application was performed with the TERAPY EC device, using a single-dose of 4 Joules per point for 40 seconds (Fig. 1). This protocol was replicated intraorally in the areas corresponding to the trajectory of the injured nerves, following the same dosing conditions and exposure time.

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Fig. 3 Development of photobiomodulation by means of a single 4 J infrared laser dose for 40 seconds.

Treatment was carried out with a frequency of three sessions per week over a period of three months. Throughout this time, progressive improvements in the patient's sensory perception were documented, evidenced both by responses to stimuli and by the patient's subjective recovery reports. At the end of the protocol, a significant recovery of sensitivity in the affected areas was observed, suggesting a favorable response to photodynamic therapy as an adjuvant in the management of postoperative paresthesias.

DISCUSSION

The present clinical case study aims to present the benefits of managing nerve injuries, with paresthesia being the most common manifestation, through photobiomodulation therapy using low-level laser therapy (LLLT).

There is strong scientific evidence showing that one of the most common complications after minor surgeries such as the extraction of third molars, associated with anesthetic technique failure or due to the close proximity of these teeth to the nerves in the area, can provoke injuries to the aforementioned nerves.[5,15]

Over time, various therapeutic alternatives have been explored to treat nerve injuries derived from odontogenic procedures. These include prescribing medications such as analgesics, anticonvulsants, and antidepressants to control neuropathic pain; transcutaneous electrical nerve stimulation (TENS), which helps reduce pain perception; acupuncture, which promotes endorphin release and improves circulation; physical therapy, which contributes to functional recovery through exercises and mobilization techniques; and microneurosurgery, indicated in complex cases to directly repair the damaged nerve through high-precision interventions. The choice of the most appropriate treatment should be based on the type of injury, the affected nerve, and the individual characteristics of each patient.[11,16]

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However, several authors have recently detailed significant results in managing nerve injuries, mainly of the inferior alveolar nerve, with the use of LLT therapy.[17,18] Likewise, this study agrees with those findings in that the application of photodynamic therapy constitutes a valuable tool for nerve regeneration and subsequent relief of paresthesia experienced as a common consequence after third molar extraction.[19]

It is worth highlighting the importance of ongoing low-power laser application for a minimum of three months to achieve excellent results, and preferably these applications should begin as soon as possible after detection of paresthesia.[10]

CONCLUSIONS

The management of paresthesia with the application of low-power laser demonstrated good results, especially when therapy was performed soon after the nerve lesion was detected.

BIBLIOGRAPHIC REFERENCES

1. Malamed Stanley F. *Manual de Anestesia Local*. 6a ed, Elsevier. Barcelona, España[Internet]; 2013 [Citado: 03/11/2024]. Disponible en: https://www.anestesia.org.ar/assets/downloads/articles/277/230-Manual%20de%20Anestesia%20Local%20-%20Malamed%206%20ed.pdf

2. García-Blanco M, Gualtieri AF, Lovaglio-Rivas AC, Ruffini JM, Puia SA. Lesiones del nervio trigémino. Experiencia de Trigeminal nerve injuries. Four years' experience at a single Argentine referral center and a literature review. Acta Odontol Latinoam[Internet]. 2021[Citado: 03/11/2024]; 34 (3): 263–70. Disponible en: https://doi.org/10.54589/aol.34/3/263

3. Joachim M, Tabib R, Laviv A, Pikovsky A, et al. Trigeminal Neuropathy After Mandibular Fractures: Epidemiology and Neurophysiologic Diagnosis. J Craniofac Surg[Internet]. 2019[Citado: 03/11/2024]; 30(4): 1113–1117. Disponible en: https://doi.org/10.1097/scs.0000000000005215

4. Kaleem A, Amailuk P, Hatoum H, Tursun R. The Trigeminal Nerve Injury. Oral Maxillofac SurgClin North Am[Internet]. 2020[Citado: 03/11/2024]; 32(4): 675–687. Disponible en: https://doi.org/10.1016/j.coms.2020.07.005

5. Agbaje JO, Van de Casteele E, Hiel M, Verbaanderd C, et al. Neuropathy of Trigemina lNerve Branches After Oral and Maxillofacial Treatment. J Maxillofac Oral Surg[Internet]. 2016[Citado: 03/11/2024];15(3): 321–327. Disponible en: https://doi.org/10.1007/s12663-015-0843-9

6. Renton T, Dawood A, Shah A, Searson L, et al. Post-implant neuropathy of the trigeminal nerve. A case series. Br Dent J[Internet]. 2012[Citado: 03/11/2024];212(11):E17. Disponible en: https://doi.org/10.1038/sj.bdj.2012.497

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S1): e6937

7. Tay AB, Zuniga JR. Clinical characteristics of trigeminal nerve injury referrals to a university centre. Int J Oral Maxillofac Surg[Internet]. 2007[Citado: 03/11/2024]; 36(10): 922–927. Disponible en: https://doi.org/10.1016/j.ijom.2007.03.012

8. Seddon HJ. THREE TYPES OF NERVE INJURY. Brain[Internet]. 1943[Citado: 03/11/2024]; 66(4): 237–88. Disponible en: https://doi.org/10.1093/brain/66.4.237

9. Ma Y, Yang M, Chen X, Qu W, Qu X, He P. The effectiveness of photobiomodulation therapy on inferior alveolar nerve injury: A systematic review and META-analysis. PLoSOne[Internet]. 2023 Aug[Citado: 03/11/2024] ;18(8): e0287833. Disponible en: https://doi.org/10.1371/journal.pone.0287833

10. Al-Sabbagh M, Okeson JP, Khalaf MW, Bhavsar I. Persistent pain and neurosensory disturbance after dental implant surgery: pathophysiology, etiology, and diagnosis**.** Dent Clin North Am[Internet]. 2015[Citado: 03/11/2024]; 59 (1): 131–42. Disponible en: https://doi.org/10.1016/j.cden.2014.08.004

11. Patel N, Ali S, Yates JM. Quality of life following injury to the inferior dental or lingual nerve – a cross-sectional mixed-methods study. Cirugía Bucal[Internet].2018[Citado: 03/11/2024]; 11(1): 9–16. Disponible en: https://doi.org/10.1111/ors.12259

12. Pol R, Gallesio G, Riso M, Ruggiero T, Scarano A, Mortellaro C, et al. Effects of Superpulsed, Low-Level Laser Therapy on Neurosensory Recovery of the Inferior Alveolar Nerve. J Craneofac Surg[Internet]. 2016[Citado: 03/11/2024]; 27 (5): 1215–9. Disponible en: https://doi.org/10.1097/scs.0000000000002757

13. Sharifi R, Fekrazad R, Taheri MM, Kasaeian A, Babaei A. Effect of photobiomodulation on recovery from neurosensory disturbances after sagittal split ramus osteotomy: a triple-blind randomised controlled trial. Br J Oral Maxilofac Surg[Internet]. 2020[Citado: 03/11/2024]; 58(5):535-41. Disponible en: https://doi.org/10.1016/j.bjoms.2020.02.005

14. Chaves ME, Araújo AR, Piancastelli AC, Pinotti M. Efectos de la fototerapia de baja potencia en la cicatrización de heridas: LÁSER x LED. An Bras Dermatol[Internet]. 2014[Citado: 03/11/2024]; 89(4): 616–23. Disponible en: https://doi.org/10.1590/abd1806-4841.20142519

15. Ma Y, Yang M, Chen X, Qu W, Qu X, He P. The effectiveness of photobiomodulation therapy on inferior alveolar nerve injury: A systematic review and META-analysis. PLoS One[Internet]. 2023 Aug[Citado: 03/11/2024];18(8): e0287833. Disponible en: https://doi.org/10.1371/journal.pone.0287833

16. de Oliveira RF, da Silva AC, Simões A, Youssef MN, de Freitas PM. Laser Therapy in the Treatment of Paresthesia: A Retrospective Study of 125 Clinical Cases. *Photomedicine and laser surgery*[Internet]*. 2015*[Citado: 03/11/2024]*; 33*(8): 415–423. Disponible en: https://doi.org/10.1089/pho.2015.3888

17. de Pedro M, López-Pintor RM, de la Hoz-Aizpurua JL, Casañas E, Hernández G. Efficacy of Low-Level Laser Therapy for the Therapeutic Management of Neuropathic Orofacial Pain: A Systematic Review. *J Oral Facial Pain Headache*[Internet]. 2020[Citado: 03/11/2024]; 34(1): 13–30. Disponible en: https://doi.org/10.11607/ofph.2310

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S1): e6937

18. Falaki F, Nejat AH, Dalirsani Z. The Effect of Low-level Laser Therapy on Trigeminal Neuralgia: A Review of Literature. *J Dent Res Dent Clin Dent Prospects*[Internet]. 2014[Citado: 03/11/2024]; 8(1): 1-5. Disponible en: https://doi.org/10.5681/joddd.2014.001

19.Ibarra AMC, Biasotto-Gonzalez DA, Kohatsu EYI, de Oliveira SSI, Bussadori SK, Tanganeli JPC. Photobiomodulation on trigeminal neuralgia: systematic review. *Lasers Med Sci*. 2021[Citado: 03/11/2024]; 36(4): 715-722. Disponible en: https://doi.org/10.1007/s10103-020-03198-6