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Case Report

Dentistry Section

Therapeutic Impact of 980 nm Diode Low-level Laser Therapy on Neurosensory Recovery following Mandibular Third Molar Removal: A Case Report

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ABSTRACT

Paraesthesia due to nerve injury is a common complication following the extraction of impacted mandibular third molars, often affecting the Inferior Alveolar Nerve (IAN). Low-Level Laser Therapy (LLLT) has shown promising results in promoting neurosensory recovery in such cases. This case report presents the management of postoperative nerve paraesthesia in a 24-year-old female patient using 980 nm diode laser therapy. The treatment was delivered in contact mode at 0.5 W, applying three joules per point for 30 seconds at each irradiation site. Sensory function was assessed using the Visual Analogue Scale (VAS), in-prick, and brush stroke tests (conducted at each visit for comparative assessment). Initially, the patient recorded a VAS score of 10. By the fourth session, the score decreased to eight. After ten sessions, complete recovery was noted in the chin, gingiva, and oral mucosa (VAS=0), with partial improvement in the lower lip (VAS=8) and mandibular left central incisor (VAS=6). Full recovery was observed after 20 sessions. This report suggests that LLLT is a safe, non-invasive, and effective modality for enhancing nerve regeneration and managing paraesthesia following third molar surgery.

Keywords: Facial nerve injuries, Nerve regeneration, Oral surgical procedures, Peripheral nerve injuries, Sensory disorders

CASE REPORT

A 24-year-old female patient reported to the Department of Periodontology and Implantology with the chief complaint of persistent numbness (paraesthesia) in the lower left lip, chin, and gingival region one week after the surgical extraction of an impacted mandibular left third molar (tooth 38).

Clinical examination revealed that the paraesthesia extended from the left mandibular first molar (36) to the central incisor (31), involving the gingival tissues, lower left lip, and left chin region which was tested and confirmed using a 10-cm VAS [1], pin prick test (sharp dental probe), and brush stroke test (microbrush), compared with the contralateral unaffected side. The patient described a complete loss of sensation in these regions. Based on these findings, the case was diagnosed as IAN paraesthesia following third molar extraction.

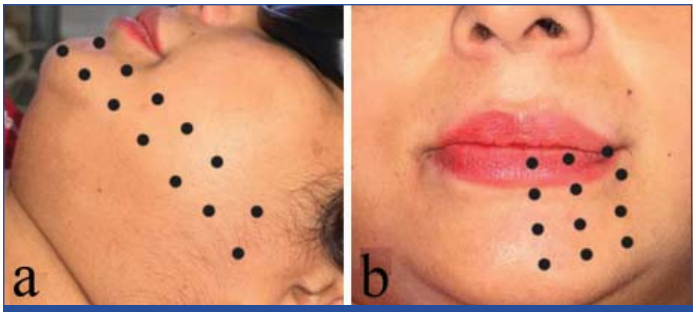
Treatment Plan

LLLT was initiated as a stand-alone treatment modality because the patient reported no functional improvement following initial pharmacological measures and specifically requested a non-pharmacological management approach. The protocol included two sessions per week for the first two months, followed by once-weekly sessions if improvement was noted(protocol adapted from Fernandes-Neto JA et al., [2].

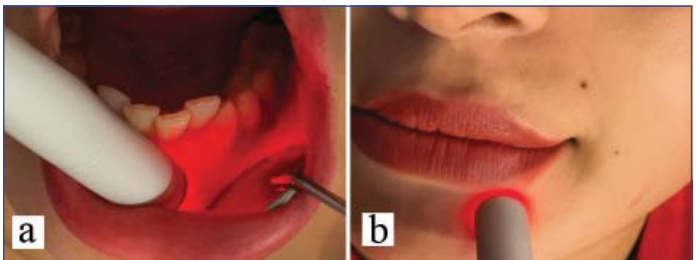
The laser used was a Doctor Smile® (Lambda SpA, Vicenza, Italy) 980 nm diode laser, applied in continuous contact mode at 0.5 W, delivering 3 J per point for 30 seconds at each site. Each session lasted approximately 15-20 minutes. The treatment area was disinfected with povidone-iodine before each application.

Irradiation was performed perpendicular to the tissues, targeting the following anatomical points: the retromolar area, lingual ridge (along the IAN pathway), extraoral trajectory of the IAN, vestibular sulcus (following the mental nerve), labial mucosa, and chin region, maintaining ~1 cm spacing between points [2].

The laser was applied at multiple anatomical points during each session as seen in [Table/Fig-1,2].



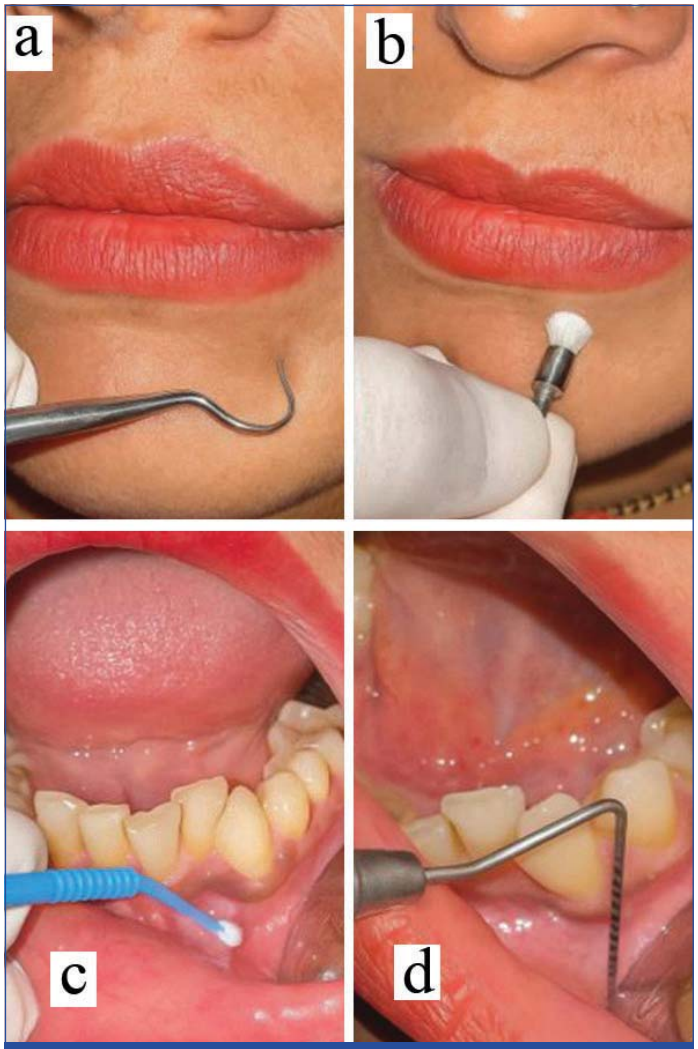
[Table/Fig-1]: Graphic representation of extra oral sites to be treated with laser biostimulation. a) Extra oral pathway of Inferior Alveolar Nerve (IAN) on the left-side to be treated with low level laser therapy; b) Lip and chin area where paraesthesia was present, marked as points to be treated with low level laser therapy.



[Table/Fig-2]: Intraoral and extraoral application of 980-nm diode laser therapy. a) Intraoral application targeting the lingual mucosa and alveolar ridge; b) Extraoral transcutaneous laser irradiation directed at the mental foramen region. **(Note the characteristic red light emitted during active PBM).**

Sensory Recovery

VAS scoring [1], pin prick test, and brush stroke test [1], were performed before and after every treatment session. Results were recorded site-specifically for the chin, gingiva, oral mucosa, lower lip, and mandibular left central incisor [Table/Fig-3].



[Table/Fig-3]: Extraoral and intraoral tests done to detect sensation: a) Extraoral pin prick test done with a sharp explorer; b) Micro brush used to detect sensation extraorally; c) Intraoral applicator tip used check sensation intraorally; d) Areas with no sensation measured with a blunt periodontal probe.

No improvement was observed until the third session. By the fourth session, slight sensory recovery was seen in the chin, gingiva, and mucosa, with the lower lip remaining unaffected. By the tenth session, full recovery had occurred in the chin, mucosa, and gingiva, with partial improvement in the lower lip and mandibular left central incisor. At the fourteenth session, only a small 1.5 mm paraesthetic area remained on the lip. Complete recovery at all sites was achieved after the twentieth session, with all neurosensory tests returning to normal [Table/Fig 4].

The patient was reviewed at one-week and one-month follow-up appointments, where complete neurosensory recovery was confirmed. No residual paraesthesia was observed, and the patient expressed high satisfaction with the treatment outcome.

DISCUSSION

Nerve injury following mandibular third molar extraction is a common complication, particularly involving the IAN [3]. Paraesthesia, though often temporary, may significantly affect speech, mastication, facial expression, and psychosocial well-being. Recovery periods vary widely, from several months to even years [4]. Conventional management approaches, including vitamin B complex supplementation and physiotherapy, may provide partial symptomatic relief; however, recovery is often prolonged and inconsistent. Recent randomised trials suggest that Photobiomodulation (PBM) therapy offers more predictable neurosensory improvement compared to such conventional methods [4,5].

The LLLT, also referred to as PBM, is a non-invasive therapeutic option that promotes axonal repair and reduces inflammation. The effect is mediated through absorption of light by mitochondrial chromophores, which enhances cellular metabolism, promotes axonal sprouting, and modulates inflammatory mediators [6].

Session	Findings (VAS+clinical tests)
Baseline (Before 1st session)	VAS=10 at all sites; Pin prick and brush stroke negative
2nd -3rd sessions	No improvement (VAS unchanged)
4th session	Chin, gingiva, mucosa improved (VAS=8); lower lip unchanged (VAS=10)
6th session	Chin, gingiva, mucosa significantly improved (VAS=2); lower lip insensate (VAS=10)
10th session	Chin, gingiva, mucosa normal (VAS=0); central incisor partial recovery (VAS=6); lower lip partial recovery (VAS=8)
14th session	Central incisor fully recovered (VAS=0); small paraesthetic area (1.5 mm) on lower lip persisted (VAS=5)
16th session	Further improvement in the lower lip (VAS=2); positive tactile responses
20th session	Full recovery at all sites (VAS=0); Pin prick and brush stroke normal

[Table/Fig-4]: Sensory recovery findings at different treatment sessions.
VAS: Visual analogue scale. Pin prick test done with a dental probe; Brush stroke test done with a microbrush.
*Only representative sessions were highlighted to demonstrate the progression pattern of neuro-sensory recovery while avoiding redundancy, as full session-by-session scoring did not provide additional interpretive value.

In this case, a 980 nm diode laser was used. The patient demonstrated slight improvement in the chin, mucosa, and gingiva by the fourth session, with progressive recovery in subsequent visits, and completes neurosensory restoration at the twentieth session.

Findings from previous studies support this outcome. Khullar SM et al., and Pol R et al., demonstrated significant neurosensory improvement in IAN injuries using LLLT, as measured by VAS and mechanoreceptor testing [7,8]. de Oliveira RF et al., and Antony PG et al., reported recovery rates of 90-100% when LLLT was started early after injury [9,10]. More recent studies, including Qi W et al., and Girão Evangelista Í et al., also support the role of PBM in accelerating nerve repair, regardless of whether therapy was initiated immediately or several weeks after injury [4,11].

Recent evidence further strengthens this position. A 2022 systematic review further concluded that LLLT (PBM) is a safe and effective adjunct for orofacial nerve injuries, supporting its role in neurosensory recovery [12]. Ma Y et al., (2023) demonstrated in a meta-analysis that PBM therapy significantly improves sensory outcomes in IAN injuries [13]. Nasiri M et al., (2025) confirmed that PBM enhances neurosensory recovery after orthognathic surgery [14]. Another recent trial using adjunctive Nd:YAG PBM showed improved recovery in patients with lower lip paraesthesia [15]. These findings suggest that LLLT may be a robust non-invasive strategy for nerve regeneration across different aetiologies.

Overall, the present case reinforces the evidence that LLLT at 980 nm can serve as a safe, effective, and stand-alone treatment modality for paraesthesia following mandibular third molar surgery, especially in patients preferring non-invasive alternatives.

CONCLUSION(S)

In conclusion, early initiation of LLLT at 980 nm demonstrated favourable outcomes in the management of IAN paraesthesia following mandibular third molar extraction. The patient achieved complete neurosensory recovery within 20 treatment sessions, confirmed by VAS scoring, pin prick, and brush stroke testing.

This case highlights that LLLT is a safe, effective, and non-invasive modality capable of accelerating nerve regeneration and improving quality of life in patients with post-extraction paraesthesia. However, larger clinical studies with standardised protocols are required to validate and generalise these findings.

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