

Photobiomodulation as an adjunctive treatment for complications of a surgical orofacial harmonization: case report

Fotobiomodulación como tratamiento adyuvante de las complicaciones de una armonización orofacial quirúrgica: reporte de caso

Fotobiomodulação como tratamento adjuvante das complicações de uma harmonização orofacial cirúrgica: relato de caso

 José Rafael Fermín Ureña¹,
 Omar Andrés Zamorano Castro²,
 Ángel Terrero-Pérez¹,
 Renato Yasutaka Faria Yaedú^{1,3},
 Eduardo Sant'Ana^{1,2},
 Mariela Peralta-Mamani^{2,3}

¹ University of São Paulo, Bauru School of Dentistry. Bauru, SP, Brazil.

² Faculdade do Centro Oeste Paulista. Piratininga, SP, Brazil.

³ University of São Paulo, Hospital for Rehabilitation of Craniofacial Anomalies. Bauru, SP, Brazil.

ABSTRACT

Face *lifting* and cervicoplasty are aesthetic surgical procedures that may be associated with postoperative complications requiring timely management. This case report describes a 46-year-old woman who developed an extensive postoperative hematoma, edema, and subsequent sensory disturbance following face *lifting* and cervicoplasty. On postoperative day five, her physiotherapist identified a subcutaneous accumulation of blood in the cervical region. Management included surgical reintervention to drain the hematoma, antibiotic therapy, physiotherapy, and low-level laser photobiomodulation (PBM). The PBM protocol was effective in rapidly resolving the extensive hematoma and edema. During follow-up, the patient reported paresthesia in the chin region. An additional PBM protocol was applied, and the paresthesia resolved completely after only two sessions. PBM may be an effective adjunctive tool for managing complications related to orofacial aesthetic procedures, such as extensive hematomas, edema, and paresthesia, contributing to the patient's functional and aesthetic recovery.

Keywords: cervicoplasty; photobiomodulation; low-level light therapy; ambulatory surgery; adverse event.

Received: 2025, Oct 31

Accepted: 2026, Aug 10

Online: 2026, Sep 19



Open access article

© The authors

Cite as:

Fermín JR, Zamorano OA, Terrero-Pérez A, et al. Photobiomodulation as an adjunctive treatment for complications of a surgical orofacial harmonization: case report. Rev Estomatol Heredia. 2026;36(3):e7257. doi:10.20453/reh.v36i3.7257

RESUMEN

El *lifting* facial y la cervicoplastia son procedimientos quirúrgicos estéticos que pueden asociarse con complicaciones posoperatorias que requieren un manejo oportuno. Este reporte de caso describe a una paciente de 46 años que desarrolló un hematoma posoperatorio extenso, edema y una posterior alteración sensitiva tras someterse a un *lifting* facial y cervicoplastia. Al quinto día postoperatorio, su fisioterapeuta identificó una acumulación subcutánea de sangre en la región cervical. El manejo incluyó reintervención quirúrgica para drenaje del hematoma, terapia antibiótica, fisioterapia y fotobiomodulación (FBM) con láser de baja potencia. El protocolo de FBM demostró ser eficaz en la rápida resolución de hematoma y edema extensos. Durante el seguimiento, la paciente refirió parestesia en la región mentoniana, para la cual se aplicó un protocolo adicional de FBM, obteniéndose la reversión completa de la parestesia en solo dos sesiones. Se concluye que la FBM constituye una herramienta complementaria eficaz para el manejo de complicaciones relacionadas con la armonización orofacial, como hematomas extensos, edema y parestesias, contribuyendo significativamente a la recuperación funcional y estética del paciente.

Palabras clave: cervicoplastia; fotobiomodulación; terapia con luz de baja intensidad; cirugía ambulatoria; evento adverso.

RESUMO

O *lifting* facial e a cervicoplastia são procedimentos cirúrgicos estéticos que podem estar associados a complicações pós-operatórias que exigem manejo oportuno. Este relato de caso descreve uma paciente de 46 anos que desenvolveu um hematoma pós-operatório extenso, edema e, posteriormente, alteração da sensibilidade após se submeter a *lifting* facial e cervicoplastia. No quinto dia de pós-operatório, sua fisioterapeuta identificou um acúmulo subcutâneo de sangue na região cervical. O manejo incluiu reintervenção cirúrgica para drenagem do hematoma, antibioticoterapia, fisioterapia e fotobiomodulação (FBM) com laser de baixa potência. O protocolo de FBM mostrou-se eficaz na rápida resolução do hematoma extenso e do edema. Durante o acompanhamento, a paciente relatou parestesia na região mentoniana, para a qual foi aplicado um protocolo adicional de FBM, com reversão completa da parestesia em apenas duas sessões. Conclui-se que a FBM constitui uma ferramenta complementar eficaz para o manejo de complicações relacionadas à harmonização orofacial, como hematomas extensos, edema e parestesias, contribuindo significativamente para a recuperação funcional e estética da paciente.

Palavras-chave: cervicoplastia; fotobiomodulação; terapia com luz de baixa intensidade; cirurgia ambulatorial; evento adverso.

INTRODUCTION

Orofacial harmonization (OFH) has been described in the dental literature as an approach aimed at improving facial aesthetics and function through different therapeutic strategies (1,2). Within the broader field of facial aesthetics, surgical procedures such as facelift and cervicoplasty are performed to improve facial and cervical contours and address age-related changes in soft tissues.

The growing demand for facial aesthetic procedures is closely related to changes in social perceptions of beauty and the effects of aging on facial appearance (2). Aging is a natural and multifactorial process, driven by

both intrinsic and extrinsic mechanisms, that leads to progressive skin deterioration. Key signs include soft tissue sagging, ptosis, UV-induced skin degeneration, and bone remodeling (3).

It is essential to recognize that both the scalp and face are composed of organized layers of tissues and anatomical structures. The scalp is described as a five-layered system represented by the acronym SCALP: Skin, Connective tissue, Aponeurosis, Loose connective tissue, and Periosteum. Similarly, the face is anatomically organized into layers including skin, subcutaneous tissue, the superficial musculoaponeurotic system (SMAS), deep fat compartments, and bone. Knowledge of this layered anatomy is critical in facial aesthetic surgical proce-

dures, as it directly influences technique selection and treatment safety (4-7).

Recent advances in orofacial aesthetic surgery highlight a growing patient preference for surgical procedures, aiming for more predictable and long-lasting aesthetic outcomes. In general, more invasive techniques tend to provide superior facial rejuvenation and harmony. In 2023 alone, 96,061 facelifts and 42,153 neck lifts were performed in the United States, reflecting the high demand for these interventions (6).

As with any surgical procedure, OFH is not exempt from complications. Although relatively infrequent (ranging from 6% to 14.2%), common postoperative issues include hematomas, inflammation, and asymmetries. A thorough understanding of the anatomy is therefore essential, as these regions contain numerous critical structures whose injury can lead to serious complications (7-9).

The implementation of low-level laser therapy (LLLT), also known as photobiomodulation (PBM), has shown promising results in postoperative management, promoting faster and more comfortable recovery. PBM contributes to enhanced tissue healing, reduction of postoperative pain and edema, and modulation of the inflammatory process through the application of red or near-infrared light directly on treated areas (10).

Considering the benefits of PBM, this study aims to report, through a clinical case presentation, the postoperative complications observed following facelift and cervicoplasty procedures, as well as to describe the use

of PBM in managing these complications. Informed consent was also obtained from the patient for the publication of the clinical data and the corresponding images.

CASE REPORT

A 46-year-old woman presented to an oral and maxillofacial surgery service in Bauru, São Paulo, Brazil, for evaluation of a postoperative cervicofacial hematoma. Five days earlier, she had undergone a facelift and cervicoplasty for aesthetic purposes at another institution. According to the patient, she subsequently attended a scheduled physical therapy session for postoperative lymphatic drainage and taping. During that session, the physical therapist observed progressive cervical swelling and findings suggestive of a subcutaneous blood collection and referred her for prompt surgical evaluation. At presentation, the patient had extensive ecchymosis and swelling involving the mandibular and cervical regions. The clinical findings prompted surgical re-exploration, during which the accumulated blood and clots were removed. She was classified as American Society of Anesthesiologists (ASA) Physical Status I and had no significant medical history.

Clinical examination revealed progressive swelling with marked edema involving the cervical and submandibular regions, predominantly affecting cervical levels II and III, consistent with a large expanding subcutaneous hematoma. The overlying skin showed extensive ecchymosis. The patient reported pain and localized warmth over the surgical site; however, there were no signs of airway compromise or systemic involvement.



Figure 1. Extraoral photographs and surgical reintervention. (A) Postoperative day 2. (B) Postoperative day 5. (C-F) Surgical procedure for drainage of blood clots.

Based on the clinical findings, the oral and maxillofacial surgeon performed surgical re-exploration through the existing submental and left retroauricular incisions. The procedure aimed to evacuate the retained hematoma, relieve tissue pressure, and reduce the risk of postoperative infection and delayed wound healing. A large stage II (gelatinous) hematoma, measuring approximately 15 × 10 cm, was evacuated (Figure 1).

Following surgery, the patient was prescribed amoxicillin (500 mg) combined with clavulanic acid (125 mg) every 12 hours for 7 days and etoricoxib (90 mg) once

daily for 2 days to control postoperative inflammation and pain. Manual lymphatic drainage was suspended when the physical therapist suspected a cervical blood collection. It was resumed three days after surgical re-exploration to address persistent postoperative edema and was performed three times per week for three weeks.

Given to the extensive hematoma and persistent edema (Figure 2), adjunctive PBM therapy was initiated to accelerate hematoma resorption, modulate inflammation, and promote tissue repair (Figure 3A).



Figure 2. Initial photographs showing edema and hematomas.

PBM was performed using a diode laser device (Therapy EC®, DMC Equipamentos Ltda.; São Carlos, SP, Brazil) operating in continuous-wave mode, with an output power of 100 mW and a spot size of 0.0984 cm². To accelerate hematoma resorption, irradiation was performed using a wavelength of 660 nm, an energy density of 66.7 J/cm², an irradiation time of 60 seconds, and an energy dose of 6 J per point, 84 points. To reduce postoperative edema and stimulate lymphatic drainage, PBM was additionally applied over the bilateral submandibular lymph nodes using an 808 nm wavelength, an energy

density of 33.3 J/cm², an irradiation time of 30 seconds, and an energy dose of 3 J per point, 34 points. Thus, 118 points were irradiated in that session.

Within 48 hours after the first PBM session, a marked reduction in edema was observed, accompanied by a color transition of the hematoma from dark purple to green-yellow, consistent with progressive hematoma resorption (Figure 3B). Complete resolution of the hematoma was observed after seven days.



Figure 3. PBM application points and 2-day follow-up. (A) Yellow dots indicate PBM application points for edema control. Blue dots indicate points applied to improve hematoma resolution.

At the 3-week postoperative follow-up, the surgical sutures were removed, and soft tissue healing was considered satisfactory. Despite the favorable healing, the patient reported paresthesia in the mental region. Thus, neurosensory examination included bilateral light-touch testing using a cotton swab over the cervical, submandibular, and mental regions, which confirmed paresthesia of the mental nerve. Facial nerve motor function was assessed by evaluating facial symmetry and lower lip movement, revealing no evidence of motor impairment.

Therefore, a new PBM protocol was initiated using the same diode laser device operating in continuous-wave mode (808 nm wavelength, 100 mW, 33.3 J/cm²,

30 seconds, and 3 J per point, 10 points), targeting an area measuring approximately 8 × 3 cm. One week after PBM, the patient reported a marked improvement in sensation (Figure 4A), and complete sensory recovery was achieved after two PBM sessions (Figure 4B).

At the 8-month follow-up, the patient remained asymptomatic, with complete resolution of the sensory deficit and no evidence of cutaneous hyperpigmentation, hypertrophic scarring, or other postoperative complications. The surgical scars healed uneventfully with satisfactory esthetic outcomes, and the patient reported satisfaction with the treatment outcomes (Figure 4C).



Figure 4. (A-B) Area of paresthesia and 7-day follow-up. (C) Extraoral photographs taken at the 8-month follow-up.

DISCUSSION

Facelift and cervicoplasty are surgical procedures aimed at restoring facial and cervical contours through soft-tissue repositioning, correction of platysma laxity, and removal of redundant skin. Although several surgical techniques have been described, all share the common objective of improving facial and neck rejuvenation

through soft tissue repositioning while preserving function and achieving predictable esthetic outcomes. Because these procedures involve extensive dissection within a complex anatomical region, postoperative complications remain an important clinical concern despite continuous refinements in surgical techniques (9, 11, 12). The present report describes the multidisciplinary management of a patient who developed an extensive

postoperative hematoma associated with edema and paresthesia in the mental region following facelift and cervicoplasty. The physiotherapist identified the cervical swelling, referred the patient for surgical evaluation, and provided manual lymphatic drainage. The oral and maxillofacial surgeon performed the surgical re-exploration and hematoma evacuation, while the stomatologist administered adjunctive PBM to manage the hematoma, edema, and subsequent paresthesia.

The cervicofacial region presents a complex multilayered anatomy in which the SMAS, platysma muscle, cervical fat compartments, retaining ligaments, submandibular glands, and the great auricular nerve are closely related (4, 5). Consequently, meticulous anatomical knowledge and precise surgical technique are essential to minimize complications. Although postoperative complications after facelift and cervicoplasty are relatively uncommon, hematoma remains the most frequent complication, with reported incidences ranging from 0.2% to 8%; however, fewer than 2% of cases require surgical evacuation (6, 8, 9). Minor hematomas may be managed conservatively or by needle aspiration, whereas expanding hematomas require prompt surgical evacuation because they may compromise the airway, increase the risk of skin flap necrosis, and negatively affect aesthetic outcomes (6). Its development is influenced by several factors, including intraoperative bleeding, inadequate hemostasis, postoperative hypertension, coagulation disorders, deep neck dissection, and the creation of dead space between dissected tissue planes (6-9). Therefore, early diagnosis and timely surgical intervention are essential to prevent infection, skin necrosis, prolonged inflammation, and unfavorable esthetic outcomes.

In the present case, the patient developed progressive cervical swelling associated with extensive ecchymosis and a large subcutaneous hematoma on the fifth postoperative day. Early recognition of the complication by the physical therapist during routine manual lymphatic drainage enabled immediate referral for surgical evaluation. The favorable clinical evolution observed in this patient resulted from a multidisciplinary management strategy consisting of prompt surgical re-exploration with hematoma evacuation, antibiotic therapy, manual lymphatic drainage, and adjunctive PBM. Therefore, the clinical outcome cannot be attributed to PBM alone but rather to the combination of complementary therapeutic interventions performed at the appropriate time.

Within this multidisciplinary approach, PBM was incorporated as an adjunctive therapy to support postoperative recovery. PBM has demonstrated favorable biological effects by modulating the inflammatory response through photon absorption by mitochondrial chromophores, which increases adenosine triphosphate (ATP) production, enhances cellular metabolism and tissue repair, and reduces postoperative pain and

edema (10, 13). Clinical studies also suggest that PBM may accelerate the degradation of extravasated hemoglobin, potentially contributing to faster resolution of ecchymosis and hematoma (14, 15). In a randomized controlled trial involving rhinoplasty patients, PBM significantly reduced postoperative ecchymosis without treatment-related complications, supporting its potential role as a safe adjunctive modality in facial aesthetic surgery (15). In the present case, rapid reduction of edema and progressive resolution of the hematoma were observed following comprehensive multidisciplinary management. Although these findings are consistent with the biological effects reported in the literature, the specific contribution of PBM cannot be isolated from the concurrent surgical drainage, pharmacological treatment, and physical therapy.

Although the available evidence in facial aesthetic surgery remains limited, current clinical studies consistently support PBM as a safe adjunctive intervention capable of reducing postoperative ecchymosis while encouraging further standardization of treatment protocols.

PBM was also applied to manage the patient's persistent mental nerve sensory disturbance. Peripheral neurosensory impairment following cervicofacial surgery may result from direct surgical manipulation, tissue traction, postoperative edema, or transient neural compression. Experimental and clinical evidence suggests that PBM may facilitate peripheral nerve recovery by modulating perineural inflammation, enhancing mitochondrial ATP production, stimulating neurotrophic and growth factors, promoting axonal regeneration and remyelination, and improving nerve function (13, 16, 17). However, standardized treatment protocols have not yet been established because of the considerable heterogeneity in laser parameters and treatment schedules reported in the literature (13). In the present case, PBM was initiated during the early postoperative period, when the sensory disturbance was likely transient and potentially associated with postoperative edema or neurapraxia. Consequently, the rapid recovery observed after two PBM sessions may have been influenced not only by the adjunctive PBM therapy but also by the natural course of early nerve recovery.

This report has several limitations. First, the patient underwent the initial surgical procedure at another institution, preventing complete characterization of the original surgical technique and intraoperative findings. Second, because the patient resided in another city, long-term follow-up assessments were limited. Although bilateral light-touch testing with a cotton swab was performed to assess neurosensory recovery, no standardized quantitative neurosensory scale or objective edema measurement was available during follow-up. Finally, this report describes a single clinical case. Consequently, although the favorable

clinical evolution is encouraging, it is not possible to determine the independent contribution of PBM within the multidisciplinary treatment strategy or to generalize these findings to other patients.

Overall, this case highlights the importance of early recognition and prompt management of postoperative hematoma following facelift and cervicoplasty. It also illustrates the potential role of PBM as an adjunctive therapy within a multidisciplinary treatment approach aimed at reducing postoperative morbidity. Further prospective controlled studies are required to clarify the specific contribution of PBM and to establish stan-

dardized treatment protocols for postoperative complications following surgical OFH.

CONCLUSIONS

In this case, favorable resolution of postoperative hematoma, edema, and sensory disturbance was observed during multidisciplinary management that included adjunctive PBM. Given the concurrent therapeutic interventions and the single-case design, the independent effect of PBM cannot be established.

Conflicts of interest:

The authors declare no conflicts of interest.

Funding:

This study received no specific funding. One of the authors (MPM) held a personal fellowship from the Coordination for the Improvement of Higher Education Personnel (CAPES, Brazil), which was not awarded specifically for this study.

Authorship contribution:

JRFU: methodology, investigation, surgical procedure, writing – original draft, writing – review & editing. **OAZC:** formal analysis, investigation, writing – original draft, writing – review & editing. **ATP:** conceptualization, resources, photobiomodulation, supervision, writing – original draft, writing – review & editing. **RYFY:** supervision, clinical management, writing – original draft. **ESA:** methodology, resources, surgical procedure, writing – original draft, writing – review & editing. **MPM:** conceptualization, methodology, project administration, photobiomodulation, clinical management, writing – original draft, writing – review & editing.

Ethics approval:

This case report was conducted in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from the patient for the publication of the clinical data and corresponding images.

Statement on the use of Artificial Intelligence tools:

ChatGPT (OpenAI) was used to improve the clarity and grammatical correctness of the English text. The authors reviewed and edited the resulting content and assume full responsibility for the integrity and accuracy of the manuscript.

Acknowledgments:

This study was supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brazil (CAPES). CAPES/Brazil scholarship holder – Grant nº 88887.967267/2024-00.

Correspondence:

Mariela Peralta-Mamani

✉ marielaperalta@alumni.usp.br

REFERENCES

1. Rojtkop AJ. La importancia del conocimiento de la anatomía facial en armonización facial. *Rev Ateneo Argent Odontol* [Internet]. 2023;68(1):54-7. Available from: <https://www.ateneo-odontologia.org.ar/articulos/lxviii01/articulo07.pdf>
2. Castilla M. Armonización orofacial. *Rev Estomatol Herediana*. 2022;32(3):207-8. doi:10.20453/reh.v32i3.4277
3. Pessa JE. An algorithm of facial aging: verification of Lambros's theory by three-dimensional stereolithography, with reference to the pathogenesis of midfacial aging, scleral show, and the lateral suborbital trough deformity. *Plast Reconstr Surg*. 2000;106(2):479-88. doi:10.1097/00006534-200008000-00035

4. Hashem AM, Couto RA, Duraes EFR, et al. Facelift part I: history, anatomy, and clinical assessment. *Aesthet Surg J*. 2020;40(1). doi:[10.1093/asj/sjy326](https://doi.org/10.1093/asj/sjy326)
5. Cotofana S, Schenck TL, Trevidic P, et al. Midface: Clinical anatomy and regional approaches with injectable fillers. *Plast Reconstr Surg*. 2015;136(5 Suppl):219S-34S. doi:[10.1097/PRS.0000000000001837](https://doi.org/10.1097/PRS.0000000000001837)
6. Stewart CM, Bassiri-Tehrani B, Jones HE, et al. Evidence of hematoma prevention after facelift. *Aesthet Surg J*. 2024;44(2):134-43. doi:[10.1093/asj/sjad247](https://doi.org/10.1093/asj/sjad247)
7. Ramanadham SR, Mapula S, Costa C, et al. Evolution of hypertension management in face lifting in 1089 patients: optimizing safety and outcomes. *Plast Reconstr Surg*. 2015;135(4):1037-43. doi:[10.1097/PRS.0000000000001131](https://doi.org/10.1097/PRS.0000000000001131)
8. Rees TD, Barone CM, Valauri FA, et al. Hematomas requiring surgical evacuation following face lift surgery. *Plast Reconstr Surg*. 1994;93(6):1185-90. doi:[10.1097/00006534-199405000-00012](https://doi.org/10.1097/00006534-199405000-00012)
9. Montrief T, Bornstein K, Ramzy M, et al. Plastic surgery complications: a review for emergency clinicians. *West J Emerg Med*. 2020;21(6):179-89. doi:[10.5811/westjem.2020.6.46415](https://doi.org/10.5811/westjem.2020.6.46415)
10. DeFreitas LF, Hamblin MR. Proposed mechanisms of photobiomodulation or low-level light therapy. *IEEE J Sel Top Quantum Electron*. 2016;22(3):7000417. doi:[10.1109/JSTQE.2016.2561201](https://doi.org/10.1109/JSTQE.2016.2561201)
11. Useche JU. [Cervicoplasty with dynamic suspension of platysma]. *Acta Otorrinolaringol Cir Cabeza Cuello*. 2016;44(1):56-60. doi:[10.37076/acorl.v44i1.45](https://doi.org/10.37076/acorl.v44i1.45) Spanish.
12. Guyuron B, Sadek EY, Ahmadian R. A 26-year experience with vest-over-pants technique platysmorrhaphy. *Plast Reconstr Surg*. 2010;126(3):1027-34. doi:[10.1097/prs.0b013e3181e3b6a1](https://doi.org/10.1097/prs.0b013e3181e3b6a1)
13. Bauer-González A, Bartolomé-Lechuga J, Sanz-Alonso J, et al. Efficacy of photobiomodulation on neurosensory recovery in patients with inferior alveolar nerve injury due to third molar extraction and implant surgery: a systematic review. *J Oral Maxillofac Res*. 2025;16(3):e2. doi:[10.5037/jomr.2025.16302](https://doi.org/10.5037/jomr.2025.16302)
14. Dekeyser B, Wellens M, Talaber I. Use of Nd:YAG laser in bruise resolution caused by an injectable dermal filler procedure. *Clin Case Rep*. 2022;10(3):e05402. doi:[10.1002/ccr3.5402](https://doi.org/10.1002/ccr3.5402)
15. Karimi S, Sadeghi M, Amali A, et al. Effect of photobiomodulation on ecchymosis after rhinoplasty: a randomized single-blind controlled trial. *Aesthetic Plast Surg*. 2020;44(5):1685-91. doi:[10.1007/s00266-020-01760-9](https://doi.org/10.1007/s00266-020-01760-9)
16. Ravera S, Colombo E, Pasquale C, et al. Mitochondrial bioenergetic, photobiomodulation and trigeminal branches nerve damage, what's the connection? A review. *Int J Mol Sci*. 2021;22(9):4347. doi:[10.3390/ijms22094347](https://doi.org/10.3390/ijms22094347)
17. De la Torre F, Alfaro C. Parestesia postquirúrgica: terapia con láser de baja potencia. Reporte de 2 casos. *Rev Estomatol Herediana*. 2016;26(2):92-101. doi:[10.20453/reh.v26i2.2871](https://doi.org/10.20453/reh.v26i2.2871)