pISSN 0898-5901 | eISSN 1884-7269
Indexed in Scopus

Volume 32 - N. 2

Oral pyogenic granuloma removal by diode laser surgery: a case report

Jiahui Niu,[1] Yupu Li,[1] Zhijiao Guo,[1] Carlo Fornaini[1,2]

[1]Stomatology Department, Shijiazhuang 2nd Hospital, Shijiazhuang, China; [2]Department of Surgery, Medicine, Dentistry and Morphological Sciences with Transplant Surgery, Oncology, and Regenerative Medicine Relevance, University of Modena and Reggio Emilia, Modena, Italy

ABSTRACT

Pyogenic granuloma (PG) is an oral cavity soft tissue tumor of unknown etiology. It has been hypothesized that a probable origin is related to an exacerbated response of the connective tissue to trauma, local irritation, or hormonal imbalances. The standard treatment for oral PG includes the elimination of etiological factors as well as the conservative surgical removal of the lesion. Several different surgical approaches have been proposed for this purpose, such as cryosurgery, cauterization with silver nitrate, sclerotherapy, injection of absolute ethanol, sodium tetradecyl sulfate, and corticosteroids. Recently, several studies have proposed diode laser as the gold standard surgical treatment, underlining the advantages of its utilization. The aim of this case report was to describe the removal of a PG lesion localized in the lower incisor gingiva by the use of an infrared diode laser.

Key words: pyogenic granuloma; oral surgery; diode laser.

Corresponding author:
Carlo Fornaini, Department of Surgery, Medicine, Dentistry and Morphological Sciences with Transplant Surgery, Oncology and Regenerative Medicine Relevance, University of Modena and Reggio Emilia, Modena, Italy.
E-mail: carlo@fornainident.it

Received: 14 August 2025.
Accepted: 1 October 2025.

Laser Therapy

Licensee PAGEPress, Italy
Laser Therapy 2025; 32:427
doi:10.4081/ltj.2025.427

Introduction

Pyogenic granuloma (PG) is an oral cavity soft tissue tumor of unknown etiology. It has been hypothesized that a probable origin is related to an exacerbated response of the connective tissue to trauma, local irritation, or hormonal imbalances.[1]
PG, or granuloma pyogenicum, is a benign, soft, usually solitary, non-neoplastic vascular proliferation of the skin and oral cavity. It has been related to a number of different terms, such as granuloma pediculatum benignum, pregnancy tumor, vascular epulis, and Crocker and Hartzell's disease; this last name was given by Crocker in 1903, while the term PG was stated by Hartzell in 1904.[2]
This lesion type never contains pus, rendering the term "PG" a misnomer, as it was previously thought to signify an infection by pyogenic microorganisms.[2]
It manifests within the range of 4.5 to 93 years, with a predominant incidence in the second and fifth decades and a higher prevalence in females.[3]
Clinically, it manifests as a small, soft, pinkish tissue mass with a pedunculated or sessile base, ranging from a few millimeters to a few centimeters in size, which is typically painless, but it may sometimes bleed. The most common site is keratinized gingiva, with a higher incidence in the maxilla than the mandible and a greater occurrence in the anterior rather than the posterior region, followed by lips, tongue, buccal mucosa and hard palate, muco-buccal fold, and frenum.[4,5]
Histologically, Regezi *et al.* observed prominent proliferation in hyperplastic granulation tissue, suggesting a strong angiogenic response,[6] and Saravana described a lesion characterized by circumscribed exophytic to polypoid proliferation of capillary-sized blood vessels arranged in a lobular pattern.[7]
When PG is chronic, the characteristic vascular content may be associated with trabeculae and bone formation, which may transform into peripheral ossifying fibroma.[8]
The differential diagnosis of PG, including fibroma, peripheral odontogenic fibroma, hemangioma, angiomatosis, angiosarcoma, non-Hodgkin's lymphoma, conventional granulation tissue, hyperplastic gingival inflammation, peripheral giant cell granuloma, peripheral ossifying fibroma, and Kaposi's sarcoma, in most cases is possible only by microscopic observation.[9]
The standard treatment for oral PG includes the elimination of etiological factors as well as the conservative surgical removal of the lesion. Several different surgical approaches have been proposed for this purpose, such as cryosurgery,[10] cauterization with silver nitrate, sclerotherapy, injection of absolute ethanol, sodium tetradecyl sulfate, and corticosteroids.[11]
Recently, several studies have proposed diode laser as the gold standard surgical treatment, underlining the advantages of its utilization.[12,13]
The aim of this case report was to describe the removal of a PG lesion localized in the lower incisor gingiva by the use of an infrared diode laser.

Case Report

A 53-year-old male presented to our clinic with a great neo-formation in the gingival margin of the lower incisors. He reported that the lesion had first appeared several months prior and had progressively increased in size, eventually causing difficulties with both eating and speaking.
At clinical observation, a soft tissue mass, around 10×10 mm large, attached to the marginal gingiva in the zone of lower incisors was observed.
Upon probe insertion, light bleeding was noticed, probably due to the poor oral hygiene, the great amount of calculus attached to the incisors, and the crowding of the frontal teeth (Figure 1).
The patient reported being a non-smoker and stated the absence of any systemic diseases, as well as of drugs and food allergies and intolerances.
A tentative diagnosis of PG was made, pending confirmation through histological examination. It was also decided to remove the lesion, which appeared to be attached to the gum only for a small portion, with the aim of improv-

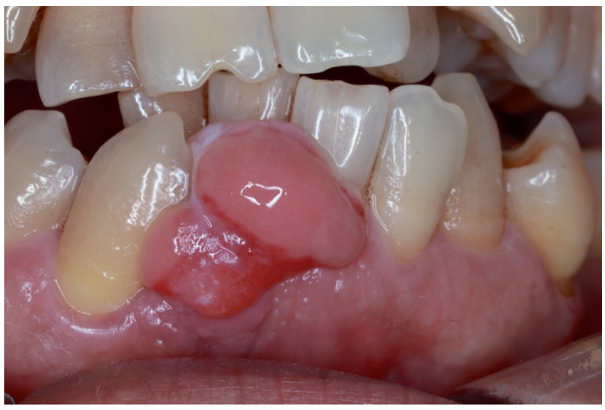

Figure 1. Aspect of the lesion.

ing the oral health and enabling effective toothbrushing without bleeding or pain (Figure 2).
It was decided to perform the procedure using an infrared diode laser. The patient was instructed about all the aspects of the surgery and subsequently signed the informed consent form. He had undergone a full-mouth scaling to remove the calculus, and he was also trained on oral hygiene maintenance.
The anesthesia of the area was obtained by the injection of half vial of an articaine/epinephrine injection (Articaine, Anhui Yisheng Technology Co., LTD, China). The low dosage of anesthetic administered was due to the effective pain control provided by the diode laser, as well as the need to preserve good vascularization in the area, thereby facilitating optimal absorption of the laser energy into the bloodstream.
The appliance used was the Pilot Diode Laser (Pilot, West Jordan, Utah, USA), emitting at a wavelength of 810 nm. The laser parameters were as follows: output power of 3 W in continuous wave mode, with a 320 µm diameter optical fiber operating in contact mode.
The intervention duration was 196 sec, from the starting of the irradiation to the complete removal of the lesion, and during the operation the patient reported the absence of any pain and discomfort.
No sutures were placed (Figures 3-5), and antibiotics and painkillers were not prescribed. The patient was instructed to avoid brushing the treated area for one week and reported that the follow-up period was free of pain and discomfort.
One week post-treatment, complete healing was observed (Figure 6), and after six months, excellent periodontal health was noted, attributed in part to the patient's diligent oral hygiene (Figure 7).
The histological examination confirmed the diagnosis of PG (Figure 8).

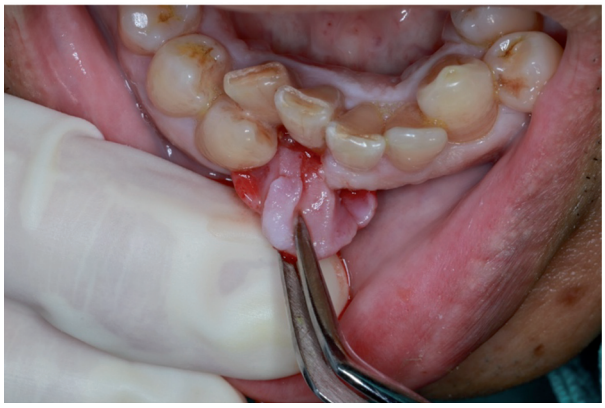

Figure 2. Vision of the lesion's attachment through probing.

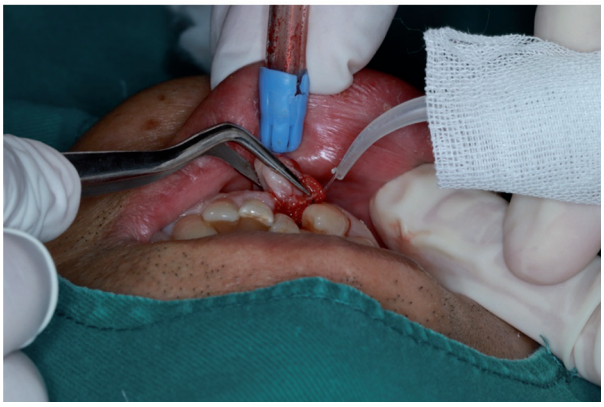

Figure 3. Good bleeding control during intervention.

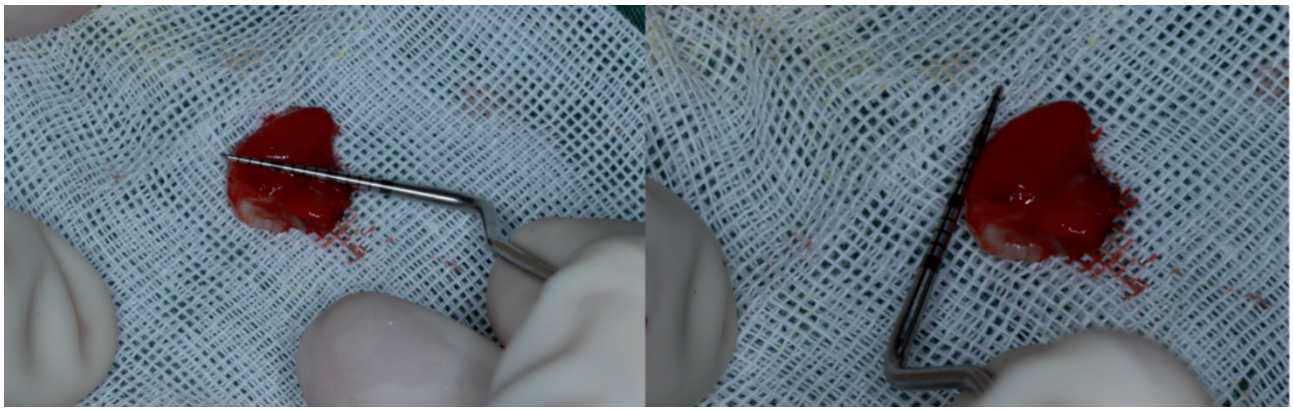

Figure 4. Dimension of the removed lesion.

Figure 5. Post-operative vision.

Discussion

The standard treatment of oral PG is conservative surgical removal and elimination of etiological factors. Oral prophylaxis and elimination of local irritant factors are recommended, in addition to simultaneous resection of the lesion. It is essential to continuously implement complete dental evaluation involving preventive measures consisting of elimination of local irritant factors (dental biofilm, dental calculus, overcontoured restorations, *etc.*) and meticulous oral hygiene care (brushing after eating [at least twice a day], using toothpaste on a soft-bristled toothbrush, and daily flossing).[14]

During conventional scalpel blade surgery, PG may bleed

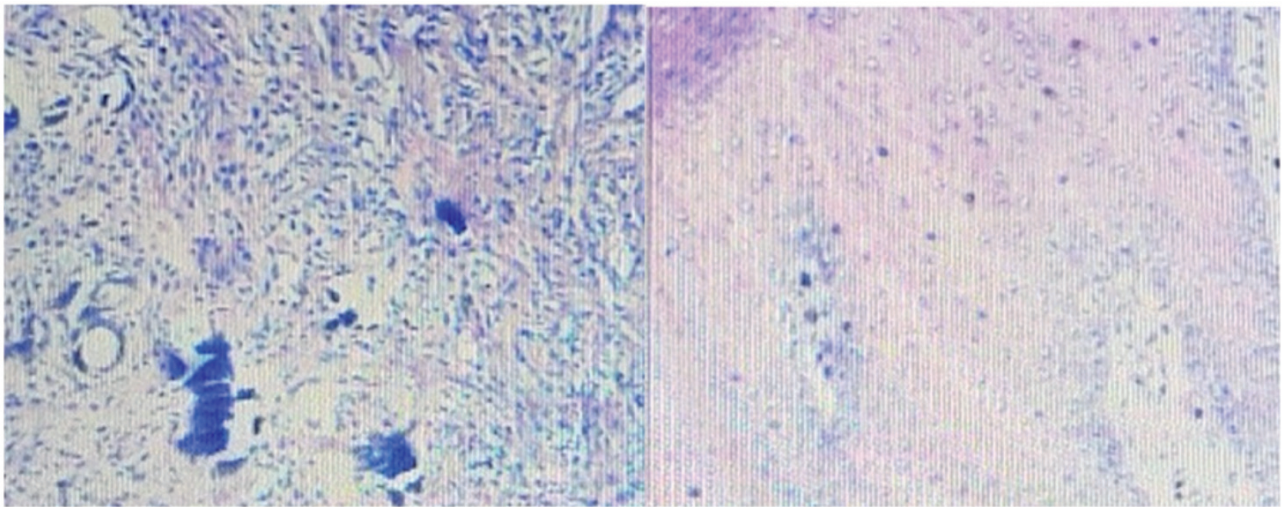

Figure 6. Histological examination.

Figure 7. One-week follow-up: complete healing process.

Figure 8. Six-month follow-up: good periodontal health.

easily and abundantly due to its high vascularity. This may restrict the surgeon's visibility, increase the operation time, and increase the chance of edema, hematoma, and postoperative pain.[12,13]

Many advantages of using the diode laser compared to the scalpel blade have been discussed in the literature. These include decreasing the need for local anesthesia; hemostatic properties causing less intraoperative bleeding and need for sutures; shorter operation and healing time; microbial inhibition and destruction, thus maintaining a sterile condition; and reduction of postoperative pain and complications.[15-17]

All these advantages were demonstrated in the management of the clinical case described above: only half a vial of anesthetic was required, complete hemostasis of the operative field was achieved, no sutures were necessary, the excision time was very brief, and the healing process was completed within a week without the need for antibiotics or painkillers, ensuring the patient's comfort throughout. Moreover, the follow-up confirmed the absence of recurrence and the sustained health of the periodontal tissues, which was also supported by the patient's diligent oral hygiene.

Conclusions

Considering the advantages described in this case report, infrared diode laser may be considered a good approach for PG surgical removal.

Conflict of interest

The authors have no conflict of interest to declare.

Ethics approval and consent to participate

No ethical committee approval was required for this case report by the Department, because this article does not contain any studies with human participants or animals. Informed consent was obtained from the patient included in this study.

Consent for publication

The patient provided informed consent for the publication of this case report and any accompanying images.

Availability of data and materials

All data underlying the findings are fully available.

References

1. Jafarzadeh H, Sanatkhani M, Mohtasham N. Oral pyogenic granuloma: a review. J Oral Sci 2006;48: 167-75.
2. Kamal R, Dahiya P, Puri A. Oral pyogenic granuloma: Various concepts of etiopathogenesis. J Oral Maxillofac Pathol 2012;16:79-82.
3. Sharma S, Chandra S, Gupta S, Srivastava S. Heterogeneous conceptualization of etiopathogenesis: Oral pyogenic granuloma. Natl J Maxillofac Surg 2019;10:3-7.
4. Phull T, Dadhwal H, Kaur R, et al. Oral Pyogenic Granuloma at Different Spots: A Series of Case Reports. J Pharm Bioallied Sci 2024;16:S999-1001.
5. Al-Shamiri HM, Alaizari NA, Al-Maweri SA, Tarakji B. Development of pyogenic granuloma and hemangioma after placement of dental implants: a review of literature. J Int Soc Prev Community Dent 2015;5:77-80.
6. Regezi JA, Sciubba JJ, Jordan RC. Oral Pathology: Clinical Pathologic Considerations. 4th ed. Philadelphia: WB Saunders; 2003, pp. 115-6.
7. Saravana GHL. Oral pyogenic granuloma: a review of 137 cases. Br J Oral Maxillofac Surg 2009;47:318-9.
8. Godinho GV, Silva CA, Noronha BR, et al. Peripheral ossifying fibroma evolved from pyogenic granuloma. Cureus 2022;14:e20904.
9. Reichart PA, Philipsen HP. Color Atlas of Dental Medicine Oral Pathology. Stuttgart: Thieme; 2000. p. 163.
10. Bugshan A, Patel H, Garber K, Meiller TF. Alternative therapeutic approach in the treatment of oral pyogenic granuloma. Case Rep Oncol 2015;8:493-7.
11. Wollina U, Langner D, Franca K, et al. Pyogenic granuloma - a common benign vascular tumor with variable clinical presentation: new findings and treatment options. Open Access Maced J Med Sci 2017; 5:423-6.
12. Pisano M, Sammartino P, Di Vittorio L, et al. Use of diode laser for surgical removal of pyogenic granuloma of the lower lip in a pediatric patient: a case report. Am Case Rep 2021;22:e929690.
13. Isola G, Matarese G, Cervino G, et al. Clinical efficacy and patient perceptions of pyogenic granuloma excision using diode laser versus conventional surgical techniques. J Craniofac Surg 2018;29:2160-3.
14. Lomelí Martínez SM, Bocanegra Morando D, Mercado González AE, Gómez Sandoval JR. Unusual clinical presentation of oral pyogenic granuloma with severe alveolar bone loss: A case report and review of literature. World J Clin Cases 2023;11:3907-14.
15. Sotoode SM, Azimi S, Taheri SA, et al. Diode laser in minor oral surgery: a case series of laser removal of different benign exophytic lesions. J Lasers Med Sci 2015;6:133-8.
16. Al-Mohaya MA, Al-Malik AM. Excision of oral pyogenic granuloma in a diabetic patient with 940nm diode laser. Saudi Med J 2016;37: 1395-400.
17. Akbulut N, Kursun ES, Tumer MK, et al. Is the 810-nm diode laser the best choice in oral soft tissue therapy? Eur J Dent 2013;7:207-11.