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

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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.

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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 μ m 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.

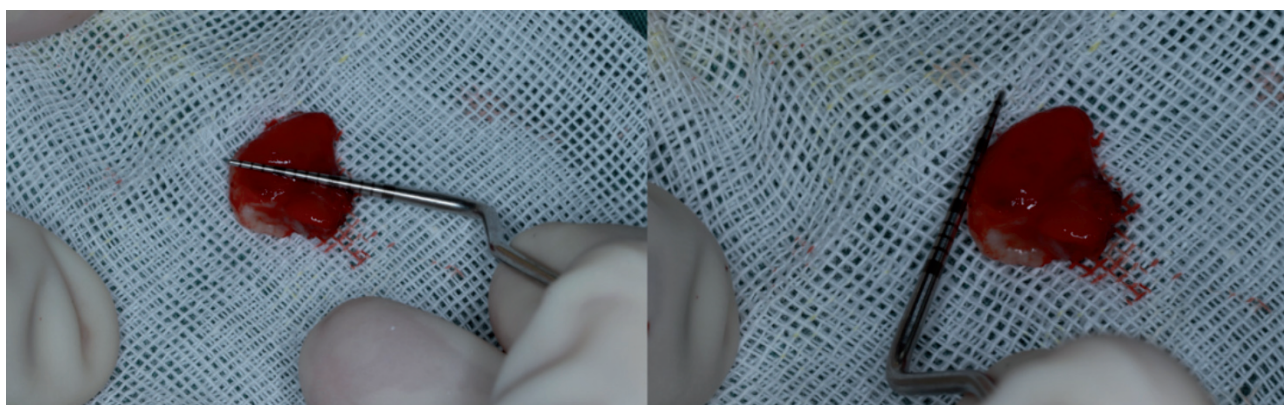


Figure 4. Dimension of the removed lesion.



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

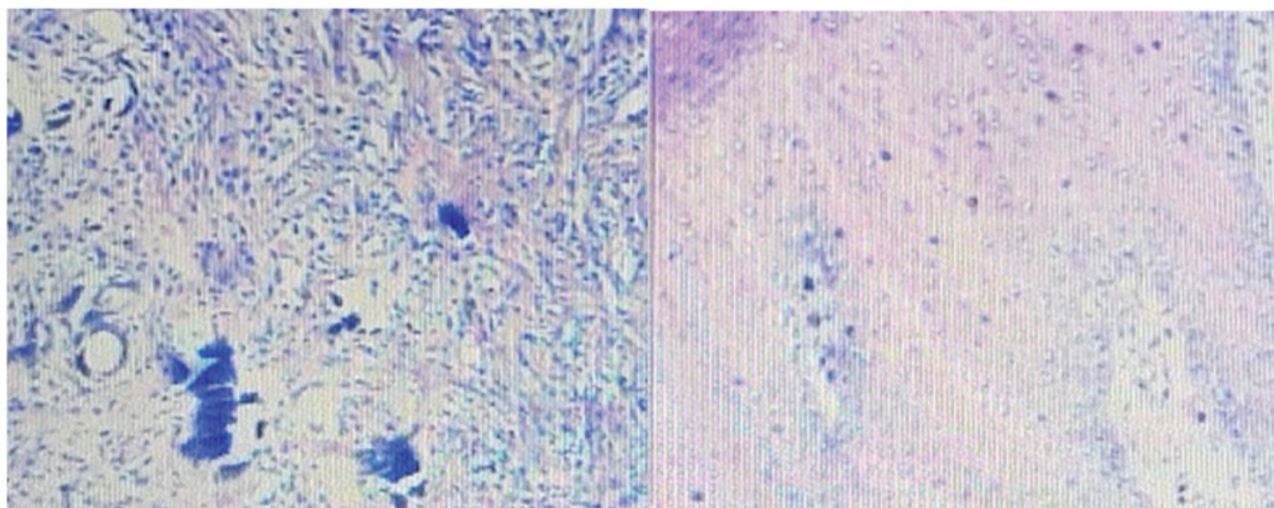


Figure 6. Histological examination.



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 post-operative 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.

Contributions: all authors certify that they have participated sufficiently in the work to take public responsibility for the content. All authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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.

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