

Surgical Treatment of Pyogenic Granuloma by 980 Diode Laser

Javad Sarabadani^a, Ali Kouhrokhi^b, Hanieh Jadidi^c, Nasim Chiniforush^{d*}

^a Oral and Maxillofacial Disease Research Center, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran; ^b School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran; ^c School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran; ^d Dental Implant Research Center of Dentistry, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran

*Corresponding author: Nasim Chiniforush DDS, PhD, Assistant Professor, Dental Implant Research Center of Dentistry, Tehran University of Medical Sciences, Tehran, Iran. Tel: +98-21 8894824; E-mail: n-chiniforush@farabi.tums.ac.ir

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Introduction: Pyogenic granuloma is a pseudo-tumor which has a great tendency to attached gingiva. Conservative surgery is a treatment choice for this lesion. Among different laser wavelengths used for oral surgery including CO₂, Nd:YAG, Erbium family and diode laser, diode can be the best option due to providing blood less area that make better view for surgeon to remove it completely. **Case Report:** A 14-year-old girl with a chief complaint of exophytic lesion in lower jaw was referred. The surgery was done by 980 diode laser with output power of 1 W in continuous mode. The lesion was sent to pathology laboratory for further investigation. The patient was advised to keep oral hygiene instructions. **Results:** After 1 weeks, complete healing was observed. **Conclusion:** Diode laser can be a treatment choice for this kind of lesions due to diminished infection and bacteremia following surgery, reduction of relapse and bone degeneration, less invasive technique and reduced chair time.

Keywords: Diode Laser; Pyogenic Granuloma; Surgical Treatment

Introduction

Pyogenic granuloma is a pseudo-tumor growth with a non-neoplastic nature which is common in oral cavity (1, 2). This lesion was first described by Hullihen (3). Then, it was then described as human botryomycosis by Dor and Poncet (1). Then, in 1904, it was called pyogenic granuloma by Hartzell (1, 3). Today, since it is not related to infection and no real granuloma is observed in its histopathology view, it is called lobular capillary hemangioma (3-5). Oral pyogenic granuloma has a great tendency to attached gingiva (75%), which is probably due to dental caries or external bodies in the gingival gyrus (2, 4, 6). The other common sites include tongue, lower lip, and chewing mucus (4, 5). It is more common in maxillary gingiva than in mandibular gingiva. Further, we observed less prevalence in posterior regions compared to frontal parts. The color of this lesion can vary between pink and purple given its age (5). Possibly, old lesions are pinker due to collagenicity. Its surface can be smooth or lobular, which is pedunculated in most cases. Notably, in some cases its rapid growth causes concern for the patient and clinician (5). This lesion is more common during the second decade of life and does not show any racial tendency (4). The lesion has a greater tendency to women, which can be due to hormonal changes during adolescence, pregnancy, and menopause (4). Clinically, pyogenic granuloma is very similar to

peripheral giant cell granuloma which develops in the gum, and with less probability Kaposi sarcoma, bacillary angiomatosis, and non-Hodgkin's lymphoma are used in differential diagnosis of this lesion (6). Treatment of this lesion is conservative surgery and the soft tissue from which the lesion originates should be removed. Considering gingival lesions of pyogenic granuloma, removal of the lesion should continue until periosteum and the adjacent tooth should be completely scaled. If the patient is pregnant, the treatment should be delayed because relapse of pyogenic granuloma during pregnancy is far more common (4). Laser diode is indeed soft tissue laser which is used for different soft tissue biopsies, gingivoplasty, gingivectomy, and reducing tuberosity soft tissue (7). Among the advantages of laser diode are reducing the patient and physician stress during the operation, fast wound healing, reduction of injections, no bleeding, minimum pain and swelling following surgery, and reducing therapeutic protocols before and after the operation (1, 7).

Case Report

A 14-year-old female patient referred to the private dental office with a complain of a peripheral exophytic lesion with a one-month course in the anterior mandibular premolar. Her chief complaint was rapid growth and bleeding after simulation.



Figure 1. Intra-oral view



Figure 2. Intra-oral view during procedure

In an intra-oral examination, a lesion with a soft texture, with a smooth surface which was redder than the surrounding mucus, was observed. The patient frequently stimulated this lesion by her hand. The dimensions of the lesion were 0.3*0.2*0.2 cm (Figure 1). The patient was requested to complete consent form for treatment with laser. Before initiation, by injecting anesthetic agent, the region of premolars, gum, and bone of that area were anesthetized. Thereafter, we employed an eye goggle for the patient. Laser diode (Wiser, Doctor Smile, Italy) was prepared with a wavelength of 980 nm with a power of 1 W and CW mode to incise the lesion. After testing the accuracy of the laser, we delineated the surroundings of the lesion by special signs, so that the cutting zone of the lesion would be specified. By initiating incising the lesion and reaching the desired depth, the lesion was removed with no suture and this followed by laser therapy (Figures 2, 3). After removal of the lesion, we sent the sample in formalin 10% for further investigation to pathology laboratory.



Figure 3. Intra-oral view immediately after surgery

Results

After 7-day follow-up, the patient was visited again and after intra-oral examination, we witnessed complete improvement of the lesion and no relapse was reported.

Histopathology showed that the mucus lined with healthy epithelial cells, however, in some points, ulcer was observed along with formation of fibrinoleukocyte membrane. Under this membrane, granulated tissue alongside infiltration of lymphoplasmocyte inflammatory cells and neutrophils as well as numerous vessels containing red blood cells were observed (Figures 4, 5).

Discussion

Pyogenic granuloma is an inflammatory lesion which develops in the skin and oral mucus (3). When developed in the mouth, it mostly appears in the gum, tongue, and lower jaw. Outside the mouth, it often develops in the trunk, face, and upper limbs. Among the reasons of the growth of this lesion are trauma, stimulation by an external body or dental caries, hormonal changes, drugs, and bone marrow transplantation (1, 4).

The main developmental etiology of pyogenic granuloma has still not been proven. Nevertheless, various lesions are also related to local stimulatory factor. Further, some have claimed that they are lesions related to hormonal female factors (8).

The dramatic rise in hormones during pregnancy increases the risk of response to stimulation. Recent studies have suggested that estrogen is involved in stimulating nerve growth factor (NGF), granulocyte-macrophage-colony stimulating factor (GM-CSF) and Transforming growth factor beta 1 (TGF- β 1), which helps in the formation of granulated tissue and wound healing (1). FLT4 is a tyrosine kinase receptor which is specifically related to angiogenesis in pyogenic granuloma (9).



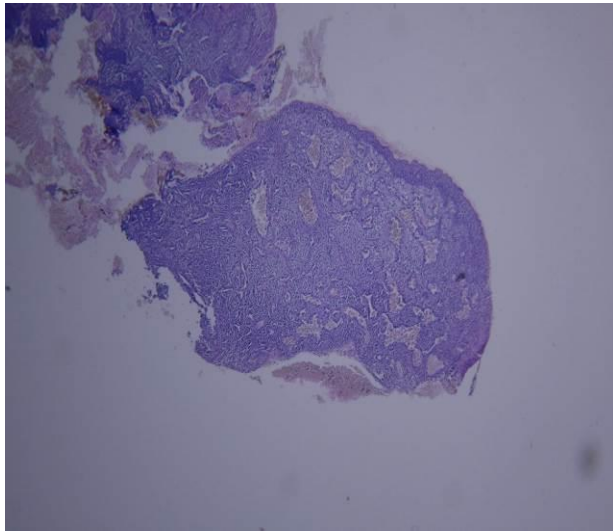


Figure 4. Histopathology view with magnification of 4×

Pyogenic granuloma might occur due to imbalance of reductive and enhancer factors of angiogenesis. The increase in the value of VEGF (vascular endothelial growth factor) and bFGF (basic fibroblast growth factor) as well as a reduction in angiotensin and thrombospondin can contribute to development of pyogenic granuloma (1, 9, 10).

This lesion creates some problems including bleeding, and due to its growth and swelling create some problems during chewing and talking. Nevertheless, some other patients refer for aesthetic problems (3).

In this patient, a lesion redder than the surrounding mucus was observed, and since she had a history of profuse bleeding, it suggested young age of the lesion and great vascularity. Furthermore, since the patient was a 14-year-old girl, the probability of the growth of this lesion due to hormonal changes was ruled out, and since the patient had reported frequent stimulation in her case history, stimulation can be regarded as the main factor of lesion growth.

Pyogenic granuloma is removed through excisional surgery (5). Recently, to remove oral lesions, laser has attracted a great deal of attention and many papers have reported it as successful. Laser has many advantages including reduction of pain and bleeding (3, 11, 12).

In dentistry, various lasers are used with each having their own advantages. They include Nd:YAG (neodymium-doped yttrium aluminium garnet), CO and Er:YAG (erbium-doped yttrium aluminium garnet) (3, 13).

Laser diode is mostly absorbed by pigmented tissues followed by the oral hard tissue (bone and teeth) to a lesser extent. For this reason, it can be used in proximity to teeth. This laser has the

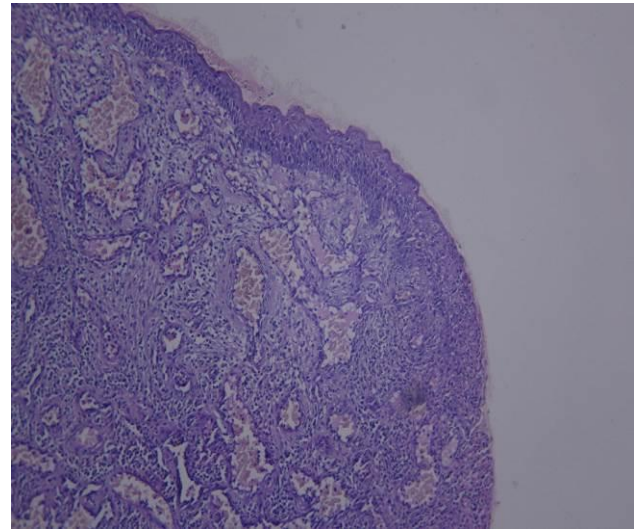


Figure 5. Histopathology view with magnification of 10×

ability of incising and vaporizing soft tissue (3, 4). Some papers have stated that laser diode has less thermal effect on carbonized depth and the excised tissue can be used for pathology (3).

Among the most important advantages of laser diode are reduction of bleeding and edema following surgery (3, 4, 12). Due to the high power of this laser in blood coagulation, this laser can also be used for patients with coagulation problems.

Laser diode is very small and creates a proper view for the surgeon, which can also be used for small lesions (4, 11, 12, 14). Usage of laser is less invasive than surgical blade and leaves less scar. Therefore, it can also be used in anterior regions with aesthetic importance (2-4, 11).

Laser also reduces the psychological burden of the patient and accelerates the surgery. As a result, the patient tolerates less stress (4, 12, 15).

Use of laser in surgery reduces the need for injection and suture, which can also sterilize the region of interest. This advantage causes diminished infection following surgery and bacteremia (3, 4, 11, 12, 15). Among other advantages of laser are reduction of relapse and bone degeneration (2).

In the first step, lymphoma lesion, and then Kaposi sarcoma, angiosarcoma, peripheral giant cell granuloma, peripheral fibroma, hemangioma, hemangioendothelioma are considered in differential diagnosis of pyogenic granuloma (1, 6, 16-20).

In this lesion, lymphoma was more probable in diagnosis, since this lesion had a fast growth and bleeding, which caused worry for the clinician. However, the histopathology report rejected this probability, and thus pyogenic granuloma was diagnosed.



In differential diagnosis of pyogenic granuloma from hemangioma, we should observe a granulated tissue consisting of the element of inflammatory cells in it. Further, we consider more probable larger number of eosinophilic histiocyte cells and further proliferation of endothelial cells in hemangioma (1).

Presence of capillary lobules in pyogenic granuloma has caused its differentiation from inflammatory polyp. Presence of atypical spindle-shaped cells alongside hyalinated globular pink cytoplasm in pyogenic granuloma caused differentiation from Kaposi sarcoma. Differentiation of pyogenic granuloma from angiosarcoma was due to presence of vascular channels, protruding nucleolus, and high mitotic activity in pyogenic granuloma (19).

Proliferation of fibrosis alongside mineralized components in peripheral ossifying fibroma causes its differentiation from pyogenic granuloma (18). Vascular ulcer consisting of joint cells in peripheral giant cell granuloma and dense nodular mass of fibrosis in peripheral fibroma have caused differentiation of these two lesions from pyogenic granuloma (16).

In hemangioendothelioma, due to presence of various morphological patterns, high similarity, and sparse lumen extent, it was differentiated from pyogenic granuloma (17).

Conclusion

Diode laser can be useful for oral soft tissue surgery due to its advantages over conventional procedures including reduced infection, the rapid healing, no need for suturing and its minimally invasive manner.

Conflict of Interest: 'None declared'.

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