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Diode Laser for Hemangioma Treatment: A Case Report

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ABSTRACT

Blood vessel defects or endothelial proliferation can cause vascular lesions. Capillary hemangiomas are produced in a connective tissue stroma by small capillaries surrounded by a layer of endothelial cells. Numerous procedures, including excisional surgery, sclerotherapy, and laser irradiation, are used to treat these conditions. This study presents a clinical case of surgical removal of a hemangioma in the buccal mucous membrane using a defocused irradiation mode of a diode laser. A 47-year-old woman with a purple lesion in the mucous membrane of the right cheek was referred to Jihad Dental Clinic. The Diode laser, with a wavelength of 980nm, was selected for treating the lesion in defocused mode at an output power of 2.5 W in continuous mode. In surgery, no bleeding was observed, which provided the surgeon with better vision and resulted in a minimally invasive procedure. Due to fewer postoperative complications, using laser diodes in the treatment of oral hemangioma as a conservative approach, and providing simple surgical procedures with minimal side effects, may be beneficial to both patients and doctors.

Keywords: Hemangioma; Lasers; Semiconductor; Vascular malformation.

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Introduction

To identify vascular lesions, a variety of words were used. Vascular defects are known as hemangiomas or vascular malformations according to Mulliken and Glowacki [1]. Hemangiomas and capillary defects damage the lips more often than arteriovenous malformations. Hemangiomas typically develop and grow rapidly during the neonatal period, whereas vascular malformations occur at birth and continue to grow at a rate proportional to the infant's growth. Histologically, hemangiomas exhibit more endothelial mitotic activity than malformations, which typically display ordinary mitotic activity [2]. Hemangiomas are classified into three groups—capillary, cavernous, and complex—according to the Enzinger and Weiss classification [3].

Capillary hemangiomas consist of small capillaries surrounded by a layer of endothelial cells in a stroma of connective tissue [4]. The higher percentage of hemangiomas is seen in the region of the head and neck, but only a small portion of the hemangiomas contribute to the oral cavity. On the tongue, lips, jugal mucous membrane, and gums, they are particularly common. Occasionally, they may be present in the maxillomandibular complex as intrabone lesions, which may occur at any age [2,5,6]. They occur as a reddish blue lesion that is flat or elevated and is usually solitary. Nevertheless, at least 10-20% of cases of hemangiomas usually require effective intervention because of their hemorrhage and ulceration [7]. Various procedures are used to address this issue, including X-ray therapy, sclerotherapy, embolization, excisional surgery, and laser treatment; however, medical recommendations for these treatments are insufficient [8].

According to Zheng et. Al, the best treatment option is laser therapy for vascular lesions [9]. The use of lasers is a modernization in clinical dentistry and research. A vast variety of dental lasers is commercially available, each having specific advantages. The diode laser is a semiconductor laser that typically comprises a combination of gallium arsenide and other elements, such as aluminum and indium, to convert electrical energy into light energy. The wavelength of a diode laser ranges between 800 and 980nm. Because diode lasers do not affect dental hard tissues, they can be safely used for surgical interventions, including cutting and coagulating gingivae and soft tissue curettage. This study aimed to report a clinical case of surgical removal of a hemangioma in the buccal mucosa using a defocused irradiation mode of a diode laser.

Case Report

A 47-year-old, generally healthy woman with a purple lesion in the mucous membrane of the right cheek was referred to Jihad Dental Clinic. In clinical examination, a 7-year peripheral exophytic lesion with fluctuant consolidation, purple surface, and trauma-induced superficial keratosis was observed. The differential diagnosis was hemangioma (Figure 1). After patient preparation (application of local anesthetic), the diode laser (Doctor Smile, Italy) with a wavelength of 980 nm was selected for managing the lesion, using a power of 2.5 W in continuous mode. The entire lesion was coagulated by the laser. No bleeding and pain was seen after treatment.

In the first follow-up, a week later, only an aphthous-like wound was observed, and the prominent lesion had recovered, making re-treatment unnecessary (Figure 2). The second postoperative examination was at the second week and significant improvement had been made; small scars remained on the patient's mouse. (Figure 3). The third follow-up was about three weeks after treatment, and the hemangioma had completely resolved. A diode laser with a 980nm wavelength was used again; fewer scars were observed, and the patient reported no complaints of pain (Figure 4).

Figure 1. The view of the lesion before treatment.

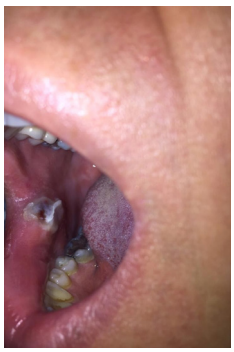

Figure 2. Follow-up session after a week.

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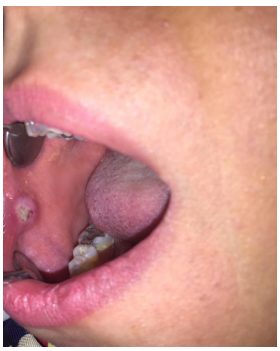

Figure 3. Follow-up session, 2 weeks after operation.

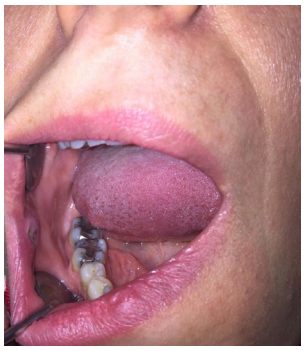

Figure 4. Third follow follow-up, three weeks after treatment.

Discussion

Vascular malformations, including those in the head and neck, can appear anywhere in the body. Hemangioma, a type of vascular malformation, is one of the most common tumors of the buccal mucosa [2]. Despite the various techniques introduced to treat this lesion, the size, location, and clinical condition of the lesion necessitate the selection of a suitable method [10]. There are several treatments available, but there are no established guidelines for their use. For the most minor cases, conventional surgery, electrosurgery, or cryosurgery can be used. Treatment with sclerosing agents, such as morrhuate sodium, or laser therapy for larger lesions is also recommended [11,12].

Zheng et al [9] indicated that laser therapy is a key treatment option for capillary malformation and shallow venous malformation. Additionally, the use of lasers as a therapeutic modality for various oral cavity lesions is considered one of the most significant technological advances, according to Kriesner et al [13]. Their properties of absorption, diffusion, and transmission, as well as the vaporizing, coagulating, and cutting abilities of the tissues, have made lasers useful in the surgical treatment of vascular lesions, particularly those of the oral mucous membrane [2]. Despite any pain or bleeding that may be caused by modern excisional surgery, no bleeding was detected during the operation with the diode laser, which provided the operator with better vision [14,15]. Other benefits of laser surgery were coagulation, excellent healing, no postoperative complications, and no suturing needed. Thus, patients can accept this technique better [16]. Although a CO2 laser may be recommended for vascular lesions, its use can pose some difficulties. Although MacCaffrey and Cortes noted that the CO2 laser was more efficient in cutting than coagulating, the CO2 laser beam's straight-line, open-tube delivery may not allow for good visualization of the lesion, making it challenging to control vascular bleeding effectively. In this regard, Genovese [18] mentioned that pigmented tissues rich in hemoglobin and melanin absorbed the argon laser well at a wavelength of 514.5nm, and that it was the most appropriate device to remove vascular lesions. Still, because it is not absorbed by water, the presence of saliva complicates its use in the buccal mucous membrane. The diode surgical laser utilizes a mixture of gallium arsenide and aluminum to convert electrical energy into luminous power. The wavelength of dental use ranges from 800 to 980nm, located in the ionized part of the spectrum, near the infrared. Pigmented tissues absorb all of the diode laser's wavelengths, similar to those of the argon laser, while hemostasis does not occur as rapidly as with argon lasers. Since water absorbs it well, it has substantial application within the buccal cavity in hemangioma surgeries [2]. Diode laser has several advantages over other lasers, because it is lightweight, compact, portable, and relatively quiet, and has many advantages over conventional solid-state and gas lasers, such as Nd: YAG, KTP=YAG, and argon, which are voluminous and difficult to transport and can have many minutes of warm-up time and require water cooling and regular maintenance [2,19]. Usually, laser treatment is performed in a focused mode by excising the lesion, which may compromise the esthetic zone by exposing bone and causing gingival recession [20]. So, defocused application of laser treatment leads to coagulation of lesion in minimally invasive manner.

Conclusion

Using laser diodes in the treatment of oral hemangioma as a conservative approach because of fewer postoperative complications and providing simple surgical procedures with minimal side effects can be beneficial for patients and physicians.

Acknowledgment

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Conflict of Interest

There is no conflict of interest to declare.

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