



Report of Five Oral Vascular Malformation Treated by means of Diode Laser: Different Modalities, Same Results

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Abstract

Introduction: *Vascular malformations (VM) are characterized by blood vessels that are formed abnormally. Due to its low complication rate and fast recuperation time, laser therapy has recently supplanted open surgery as the treatment of choice for vascular malformations. We report four cases of oral vascular malformations treated by means of diode laser with two methods of coagulation and surgery.*

Observations: *Four patients clinically diagnosed as oral vascular malformations. underwent treatment by means of diode laser. Three patient were treated by photocoagulation method and one patient received surgical excision. Except for one patient who reported pain and discomfort, the remaining cases reported no postoperative complications.*

Conclusion: *Small oral vascular malformations were successfully treated with 810 nm and 940 nm diode lasers via photoablation and photocoagulation.*

Keywords: *Vascular Malformations; Mouth Mucosa; Lasers, Case Reports*

Introduction

Vascular anomalies encompass a wide variety of lesions related to the disorders of vascular development which are abnormalities of the endothelium and result in abnormal and hamartomatous vessel growth. They are now classified as vascular tumors, blood vessel proliferation, and vascular malformations (VMs), which are characterized by abnormally produced blood vessels [1, 2]. hemorrhaging episodes, esthetic issues or impairment of oral normal functioning may warrant treatment of vascular malformations [1]. VMs may be treated with a variety of techniques, including surgical resection, sclerotherapy, embolization, cryotherapy, medicinal therapy (beta-blockers, cortisone), and laser surgery [3].

Lasers have been used in the treatment of vascular lesions since the late 1980s [4]. The CO₂ laser (10,600 nm) is utilized for vaporization or excisional treatments, while diode (800–980 nm) or Nd:YAg lasers (1064 nm) may be employed for photocoagulation. It has been discovered that diode lasers are both safe and efficient for treating vascular lesions. Compared to the surgical technique, they are linked to faster operating times and less

postoperative problems[1, 5, 6]. The strong coagulation characteristics and affinity of the 940 nm diode laser for hemoglobin molecules are its distinguishing features. Specifically, non-contact fibers allow for the coagulation of vascular lesions with less danger of mucosal erosions and tissue necrosis. Because of this characteristic, the therapy is very safe and has a lower risk of ulcers formation[7]. The 810 nm diode laser pass through the epithelium ad penetrates 2-6 mm into oral tissues. It is absorbed by water and hemoglobin [8].

Consequently, the diode laser has been found to be a safe and effective treatment option for vascular ectasia Diode laser devices are small, compact, portable, and silent, unlike traditional solid-state and gas lasers like Nd:YAG, KTP, and argon [9]. Small lesions are often treated in a single session, since the process is clinically straightforward and quick[10].

We present four cases of oral vascular malformation here that were treated with 810 nm and 940 nm diode laser to emphasize that diode laser is a suitable option for treating oral cavity vascular malformations and that it produces extremely effective results without side effects like hemorrhage, pain, and scarring.

Observations

Case 1

A 62-year-old woman attended oral medicine clinic with the chief complaint of a blue-colored lesion on the lower lip vermilion which was present for the past 3 weeks. Clinical examination revealed an asymptomatic exophytic lesion on the left lower lip vermilion. This 2mm lesion was soft and it partially blanched on diascopy (Fig. 1.A). the clinical diagnosis was established as VM. Thus, under local anesthesia (lidocaine 2% with epinephrine 1/80000), the lesion was photocoagulated with a 2 watt 940 nm Diode laser (BioLase, USA) in a noncontact (2-3 mm distance) and continuous wave mode. A 300- μ m non-initiated tip was moved above the lesion with a sweeping motion to photocoagulate the lesion until it turns white. The operator, the patient, and the assistant all followed the guidelines for laser safety. Tetracycline ophthalmic ointment and oral acetaminophen 500 mg were prescribed for seven days after the procedure. The initial follow-up after 10 days showed complete healing (Fig. 1. B). She had no post-op pain or edema. Patient was checked after 20 days. No recurrence of the lesion was observed.

Case 2

A 61-year-old woman with the chief complaint of a buldge on her lip was referred to the Oral Medicine Department. The lesion has been present for 15 years with a gradual growth rate. Medical history was not

significant. On clinical examination a blue-colored nodule of around 0.5 cm diameter with no pain and negative diascopy was observed, which caused an aesthetic issue. (Fig. 2. A.) A Clinical diagnosis of vascular malformation was confirmed and the lesion was treated with diode laser. After local anesthesia (lidocaine 2% with epinephrine 1/80000), a 2-W continuous wave, contact mode, diode laser (Doctorsmile, Italy) 810 nm was employed to ablate the lesion. The lesion was removed by means of an initiated tip of 300 μ m diameter. Tetracycline ophthalmic ointment was administered for one week after laser treatment. The patient had no pain or tenderness after two weeks and one month after treatment (Fig. 2. B.). No recurrence was observed in this lesion.

Case 3

A 56-year-old woman attended to Oral Medicine Department for routine dental examination with the past medical history of mild thalassemia, oral herpes, and taking valsartan for hypertension. On intraoral examination a 1-cm bluish nodule with a smooth surface deep seated in the left mandibular mucobuccal vestibule was detected (Fig. 3. A). The patient mentioned a non-certain duration of 10 years and she reported no bleeding episode. Diascopy test was positive and the lesion was clinically diagnosed as VM. Under local anesthesia (lidocaine 2% with epinephrine 1/80000), a-810 nm diode laser (Doctorsmile, Italy) with the power of 2 watts in a non-contact continuous wave mode was applied to photocoagulate the lesion by means of a μ m-300 diameter tip. One week later, the patient had no sign of the lesion. (Fig .3. B.) No recurrence was observed in a one month follow up.

Case 4

A 56-year-old woman was referred to the oral medicine department with the chief complaint of a lip lesion of 5 years' duration. No history of smoking, drug addiction, mouth breathing, or illnesses were reported. A solitary, smooth-surfaced nodular lesion with firm consistency and bluish color was observed on the right side of the lower labial mucosa. The lesion was of 2 cm in diameter, and the diascopy test revealed partially blanching. (Fig 4.A. and B). Based on the above findings, the clinical diagnosis of VM was made, and laser photocoagulation was considered for treatment. The lesion was photocoagulated using diode laser 810-nm (Doctorsmile, Italy) with a power of 2 watts. A non-initiated laser tip of 300 μ m diameter was moved in a sweeping direction over the lesion with a distance of 2-3 mm for 10 minutes until the lesion turned a little white. Two weeks later, we used a 2.5-watt power to remove the remnants of the lesion. Tetracycline ophthalmic ointment was administered after each treatment session. The patient returned one week after

therapy with discomfort and soreness. However, after two weeks discomfort and wound were gone, and no sign of recurrence was observed. (Fig. 4. C).

Case 5

A 61-year-old man who had a noticeable lesion on his buccal mucosa was referred to oral medicine department of Shahid Beheshti university of medical sciences. The patient's main complaint was that a lesion appears four to five years ago and grew gradually. Prostate issue was brought up in the patient's medical history, which was under treatment by a physician. An exophytic lesion in the left buccal mucosa with a diameter of 1.5 cm and a soft-to-firm consistency was discovered upon intraoral examination (Fig 5. A.). The diascopy test came out negative. A laser treatment plan for the patient was considered after a differential diagnosis of vascular malformation was established. The lesion was photocoagulated using an 810-nm diode laser (Doctorsmile, Italy) with a power of 2 watts. A non-initiated laser tip of 300 μm diameter was moved in a sweeping direction over the lesion at a distance of 2-3 mm for 10 minutes until the lesion turned white (Fig 5. B.). Two weeks later, the patient had no sign of the lesion. (Fig .5. C.) No recurrence was observed after one month.

Discussion

Laser application for minor oral surgery provides a dry operating area, excellent visibility, decreased trauma and postoperative edema, as well as minimal discomfort and scar formation. Meanwhile, laser assisted surgery is associated with appropriate infection control, blood bacterium reduction, patient acceptance due to decreased postoperative discomfort, less amount of local anesthetic prior to soft tissue interventions, minimal decontamination prior to procedure, and less need for post operation antibiotics. On the other hand, laser therapy has some limitations such as requirement of critical precautions, high expenses of laser equipment, and need for specialized trained operators [3, 11, 12].

According to Bacci et al. treatment of minor oral VMs with a diode laser is faster with less side effect than conventional scalpel surgery [6]. Therefore, we used diode laser to treat our cases of minor vascular malformations successfully in a shorter time and with fewer complications than scalpel surgery. However, larger and deeper VMs may require special considerations [13]. Angiero et al. used a 980-nm diode laser to treat hemangiomas and venous malformations. Regarding the esthetic outcomes and resolution of these lesions, the diode laser has been demonstrated to be effective[14]. Azevedo et al. treated lip venous lakes with diode laser 808 nm photocoagulation without complications [5]. This also happened in our cases. Pain,

hemorrhaging, scarring, and swelling were not observed in our cases and complete healing was noticed in approximately 2–3 weeks. In another study, diode laser (980 nm) had less adverse effects than sclerotherapy for OVMs. The authors found that diode laser therapy is preferable for smaller vascular lesions due to decreased postoperative discomfort and adverse effects[3].

Other studies addressing esthetic issues and recurrence rate of oral venous lesions by means of different laser wavelengths (Nd:YAG, Er,Cr:YSGG, CO₂, and diode 980 nm lasers) showed that laser treatment of vascular lesions is effective regardless of the treatment procedure (photo thermal coagulation, vaporization, or surgical excision) or wavelength. After six months, patient satisfaction and esthetic results was comparable [2]. Three out of our four patients were treated by photocoagulation (diode 940nm) and one by surgical excision (diode 810nm). Except for one patient who reported pain and discomfort, no postoperative complications were reported in the remaining cases. In addition, no recurrences were identified in any cases in short term. Diode laser with a wavelength of 940 nm can be used to cut oral tissue more effectively than a of 810 nm one because of its higher absorption in water, HbO₂ and hemoglobin [15]. In accordance to us, Monteiro et al. demonstrated that CO₂ laser excision or diode laser photocoagulation may effectively cure small vascular venous malformations without complications[16].

Limitations of the Study

Medical imaging plays an important role in the diagnosis of vascular malformations. Ultrasound specifically color Doppler and MRI can identify high-flow patterns as well as determine the extent of the lesion. Magnetic resonance imaging is especially useful in defining the extent of vascular malformation[17]. Therefore, peri and postoperative imaging assessment should be encouraged. However, since the lesions were small and superficial, located in low-risk areas, financial constraints and limited resources, we were unable to carry out these in our subjects.

Conclusion

Diode lasers with wavelengths of 810 nm and 940 nm maybe used effectively to treat small oral vascular malformations via photo ablation and photocoagulation.

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