Treatment of lip hemangioma using forced dehydration with induced photocoagulation via diode laser: report of three cases

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Several vascular lesions are related to the lip area. There is no universally accepted protocol for the treatment of hemangiomas and vascular malformations. In the oral cavity, high-power lasers represent an excellent therapeutic option for this type of lesion. Their coagulative properties allow for the performance of procedures without the risk of bleeding, which promotes a better healing pattern and a differentiated postoperative appearance. This study describes three cases of lip hemangioma treated with forced dehydration with induced photocoagulation (FDIP) via diode laser. All the reported cases were followed up until complete healing of the operated area had total remission of lesions, with no complications or adverse effects. The findings of the present study suggest that FDIP is effective and useful in the treatment of hemangiomas in the oral cavity. Laser treatment of these lesions prevents their recurrence and is well tolerated by patients. (Oral Surg Oral Med Oral Pathol Oral Radiol 2015;119:e89-e94)

A great number of terms are used to describe vascular lesions. In 1996, the International Society for the Study of Vascular Anomalies adopted a classification proposed by Mulliken and Glowacki,[1] which is currently the most accepted classification. This classification is based on clinical behavior and histologic characteristics and divides vascular anomalies into (1) tumors (hemangiomas, hemangioendotheliomas, hemangiopericytomas, among others) and (2) vascular malformations.[1,2]

Hemangiomas are subclassified depending on their depth of invasion (superficial, deep, and compound), whereas vascular malformations are generally subdivided into low-flow and high-flow lesions. A low-flow lesion involves a capillary, venous, or lymphatic vessel or a combination of vessels. Malformations with an arterial component (most commonly arteriovenous) are considered high-flow lesions.[2,3]

Hemangiomas are mesenchymal tumors formed by blood vessels that displayed an increase in cell proliferation.[4] They grow rapidly, regress slowly, and never reoccur. All three stages in the life cycle of a hemangioma are characterized by a unique assemblage of biologic markers and processes, and those are: (1) proliferating phase (0 to 1 year of age), (2) involuting phase (1 to 5 years of age), and (3) involuted phase (>5 years of age)[5]; however, spontaneous involution may be incomplete, and nearly 15% to 20% of the residual lesion may remain. In cases of complete involution, scar formation, replacement with fibroadipose tissue, tissue discoloration, and telangiectasia are usually observed.[6]

A total of 65.3% of the affected patients are children, with family history leading to nearly a twofold increase in the chance of developing the tumor.[7] These lesions are more common among Caucasians, who have a prevalence of 10% to 12%; however, it is known that the occurrence of anomalies is sporadic.[8]

Hemangiomas clinically present as a smooth or lobulated mass of variable size that can be sessile or pedunculated, have a dark red color, and undergo ischemia when compressed. Additionally, they are commonly present on tongue, lips, jugal mucosa, and gums, but can occasionally manifest as an intraosseous lesion in the maxillomandibular complex.[8,9]

Nearly 20% of patients have multiple lesions, and around 10% of tumors grow rapidly to a significant size. In these cases, hemangiomas may be a problem and even a life-threatening condition, depending on their location and proportion. On average, 80% of the lesions are located in head and neck regions. Mucous membranes are involved in 10% of cases.[7]

Differential diagnosis between hemangiomas and vascular malformations are key to optimal treatment in cases of large and expansive lesions; however, it has

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less significance when the lesions are small, in which case a complete and accurate anamnesis and physical examination usually suffice.[2]

In the oral cavity, hemangiomas may cause esthetic and functional disorders. Impairments in airways, chewing, swallowing, and speech require immediate treatment. Ulceration, bleeding, and secondary infections represent other indications for intervention.[10]

According to Doorne et al.,[11] many treatments have been used in the management of vascular lesions, including oral corticoids, intralesional fibrosing agent injections, therapy with interferon alpha 2 b, laser treatment, and embolization. Conventional surgery is also a treatment option, although it may lead to hemorrhage and the operated region rarely recovers with the same esthetic quality.

The use of diode and Nd:YAG lasers in surgeries of soft tissues in the oral cavity is extremely useful due to the fact that it is highly absorbed by chromophores, such as hemoglobin, melanin, and collagen, and also due to its ability in cutting, clotting, and hemostasis, with a higher capacity of tissue ablation and similar properties than potassium titanyl phosphate (KTP) laser.[9] Laser is currently considered the gold standard for the treatment of most vascular lesions.[6]

FDIP, also called transmucosal thermocoagulation, is a touchless technique. The energy of the diode laser is continuously released by a flexible optic fiber, which is slowly moved over the lesion at a distance of 2 to 3 mm from the surface and should not be used on the same site for a long time. The lesion becomes lighter and smaller during treatment. This effect is called "forced dehydration," and it occurs due to the high absorption of laser energy by hemoglobin into the lesion. As it passes through the tissues, the laser beam generates heat and, thus, coagulates tissue down to a depth of approximately 7 to 10 mm, a process called photocoagulation. Photocoagulation is performed within a safety margin slightly beyond the visible extent of the lesion, in order to prevent hemorrhage in the hypervascularized area. Dehydration and whitening of the hemangioma can be observed at the immediate postoperative period.[12,13]

With the purpose of obtaining a better understanding on the management of hemangiomas in the oral cavity and on their treatment with FDIP via diode laser, three cases are reported below.

CASE REPORT

From May 2012 to November 2013, three patients were referred to the Laser Center of the School of Dentistry at Pontifícia Universidade Católica do Rio Grande do Sul due to the presence of hemangioma in the oral cavity. The presumptive diagnosis of this lesion was confirmed by diascopy in all cases.

Patients were treated with diode laser (Thera Lase Surgery, DMC, São Carlos, Brazil) using the FDIP technique, which consisted of circular movements with the optical fiber over the lesion, from the edges to the center, twice in a row in each session. The external boundary was defined within a small safety margin, i.e., slightly beyond the visible edges of the tumor. Diode laser is designed to emit high power infrared light, with a wavelength of 808 ± 10 nm. The diameter of the optical fiber used in this study was 600 μm. No cooling technique was used on irradiated tissues.

The number of sessions varied for each patient, according to the size of the hemangioma and the respective need for irradiation. All procedures were performed with the power of the laser device set at 2.500 mW, using a continuous exposure mode and dispensing an average of 400 J of energy each time. Mean radiation dose was 2.5 W/cm^2.

Photographs were taken as a means of comparing the appearance of the lesion at baseline, at the immediate postoperative period, at 1 week after surgery, and its final appearance at the end of the treatment.

Local anesthesia was infiltrated into the region (4% Articaine with epinephrine 1:100.000, 1.8 mL, 1 cartridge; DFL, Rio de Janeiro, Brazil), and antiinflammatory drugs (Ibuprofen 600 mg, 1 capsule every 12 hours for 3 days) were given postoperatively. No transoperative event was reported, except for the smell of burning during laser ablation.

Time interval between laser irradiation sessions was 4 weeks. Such time interval was established in order to allow local healing before new tissue ablation.

All the cases presented in this study were registered on the national database named Plataforma Brasil for the registration of studies involving humans under the number CAAE 22152113.7.0000.5336. Written informed consent was obtained from each patient before enrollment in the study.

The three cases are discussed in more detail below.

Case 1

A Caucasian female, 70-year-old patient presented with a purplish lesion on the lower lip measuring approximately 7 mm in diameter (Figure 1A). On anamnesis, it was registered that this lesion had evolved for nearly ten years, was painless and exhibited slow growth. The patient reported esthetic dissatisfaction. When questioned about her medical history, she informed them that she suffered from high blood pressure, arthrosis, hypothyroidism, hypercholesterolemia, and took hormone replacement therapy and drugs prescribed by her physician to treat these conditions.

Four laser sessions were performed (Figure 1B). During the entire follow-up period, no functional problem related to speech or swallowing was observed. A mild discomfort was reported by the patient after surgery. A great improvement in esthetic quality could be observed after the end of the treatment, as well as the absence of scars (Figure 1C).

Case 2

A Caucasian female, 52-year-old patient underwent one laser session for the treatment of a hemangioma on the lower lip measuring 4 mm in diameter, whose time of onset was not