Embolization and Diode Laser to a Large Arteriovenous Malformation of the Lip and Buccal Mucosa

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Abstract

Background: Various treatment modalities are available for treatment of Hemangiomas and arteriovenous malformations including cryotherapy, sclerotherapy, embolization, laser and surgical excision.

Case Report: We describe the rare case of a lip and buccal vascular lesion in a 35-year-old male patient, measuring >45 mm × 40 mm in both dimensions. The lesion caused discomfort and aesthetic deformity. Preoperative angiography and embolization of the high-perfusion lesion was performed to minimize intraoperative bleeding followed by one-session definitive Diode Laser Treatment of the lesion. There was excellent postoperative healing and minimal discomfort.

Conclusion: Compared to conventional methods embolization followed by diode laser photocoagulation has many advantages, both in cosmesis and function.

Keywords: Laser; Arteriovenous malformations; Haemagioma; Embolization

Introduction

Mulliken and Glowacki in their classification in 1982 distinguish between various vascular lesions. Hemangiomas and arteriovenous malformations are described as two distinct entities [1]. In the oral cavity they usually present in the tongue, lip, palate, buccal mucosa and gingiva [2]. Various treatment modalities are available including cryotherapy, sclerotherapy, embolization and surgical excision. We report the management of a 35-year-old male with a vascular lesion on the upper lip and right buccal mucosa using embolization and 980 nm diode laser.

Case Report

A 35-year-old male was referred to our clinic complaining of an enlarging bluish colored mass located on the right side of the upper lip and the buccal mucosa (Figure 1). This was present since early childhood, but never caused him any trouble until his early thirties when he started experiencing episodes of oral bleeding that ceased spontaneously, difficulty in chewing and kissing and cosmetic deformity. The lesion was sensitive to palpation and changes of temperature, especially cold weather. Patient’s history was unremarkable and the rest of the head and neck examination was normal. Due to the size of the lesion (>45 mm × 40 mm) and in order to better evaluate the lesion, digital subtraction angiography was performed. The examination demonstrated a vascular lesion which was supplied by the internal maxillary artery (Figure 2). The patient underwent superselective embolization of the internal maxillary artery using glue and post procedure angiography confirmed the vascular obliteration (Figure 3 and 4). Written informed consent was obtained and photocoagulation of the lesion was performed using 980 nm diode lasers by flexible optic fiber in a near-contact mode at energy of 5 watt to 7 watt for 5 sec in a continuous wave until blanching of the tissue was observed. Cooling of the surfaces with normal saline and ice cubes protected the tissues from thermal damage during the procedure. There was no bleeding during the procedure and oral intake started within a few hours. The patient was discharged from hospital on the same day of the operation with non-steroidal anti-inflammatory drugs, oral corticosteroids and chlorhexidine mouthwash. Except for a mild swelling and crusting during the first 10 days the patient had an uneventful postoperative course with good healing and no recurrence on long-term follow-up (2 years later).
Discussion

The International Society for the Study of Vascular Anomalies in 1996 modified the first classification system for vascular anomalies which was introduced by Mulliken and Glowacki [1]. In the updated version vascular diseases are divided into tumors and vascular malformations, which are two distinct entities. Hemangioma which belongs to the first category appears clinically as a red macula or mass in the infancy and is characterized by a fast growth followed by a spontaneous regression. It usually presents 3 different phases: proliferation, involution and involuted [2,3]. Their location in the oromaxillofacial region includes tongue, lips, palate, buccal mucosa and gingival [2].

Arteriovenous Malformations (AVM) are high-flow vascular lesions which have a direct communication between an artery and a vein, bypassing the capillary bed [4]. They occur usually on the tongue (anterior 2/3), palate, buccal and gingival mucosa [2]. Their progression is gradual while trauma, puberty, pregnancy and hormonal changes can induce growth [5]. AVMs are arteriographically classified into three types of lesions according to the morphology of their nidus: 1) arterio-venous fistulae 2) arteriole-venous fistulae 3) arteriole-venulous fistulae [5].

Vascular malformations and angiomatosis can be part of different syndromes which are associated with head and neck region such as Osler-Weber syndrome, Sturge-Weber syndrome and Maffucci syndrome [6].

Vascular anomalies can be associated with uncontrollable growth, obstruction, bleeding, ulceration, deformity and functional lesion.

Therapeutic options for vascular lesions include steroid therapy, cryosurgery, and embolization and laser therapy [3]. Sclerosing agent seems to have excellent results (sodium morrhuate, sodium tetradecyl, polidocanol and ethanolamine oleate, and hypertonic glucose solution).

Lasers emit beam of light energy which is comprised of a single wavelength in nanometers. The wave length depends on the active medium in the laser device which can be gas (CO₂) or solid (diode). The diode wavelengths vary from 800 nm to 980 nm (near the infrared spectrum) [7].

Diode laser is selectively absorbed by hemoglobin, melanin and pigmented tissue [7,8]. The potential of performing coagulation, hemostasis during incision makes it an ideal option for vascular lesions. The energy is delivered by a flexible optic fiber, which is kept in a distance of 2 mm to 3 mm from the lesion, at energy of 2 watt, 5 watt to 7 watt, depending on the size of the lesion in a continuous wave mode for about 5 sec to 10 sec. The tip of the flexible laser is moved over the lesion, until shrinkage and blanching of the tissue is observed in a safety margin. Laser penetrates to a depth of 4 mm to 5 mm and coagulates tissue to a depth of 7 mm to 10 mm (photocoagulation) [3]. Treatment can be performed under local anesthesia on an outpatient basis or general anesthesia if more severe bleeding is anticipated. The areas can be iced before and during therapy to prevent thermal damage of the superficial tissues [3]. Post-operative instructions include soft diet for the first 24 hours, while patients can be discharged on the same day with a mouthwash solution, corticosteroids and regular analgesia [8].

Possible complications of the treatment are necrosis, nerve damage, webs and stenosis of the salivary gland ducts.

Compared to other modalities laser treatment has many advantages. Cryosurgery is indicated for small and superficial lesions.
with the risk of atrophy, scarring and hypopigmentation of the mucosa. Corticosteroids for massive tumors with tapering of the dose can lead to cataract, Cushing and infections. Interferon 2a which is reserved for dangerous hemangiomas can cause neurological, liver side effects and neutropenia [3,9].

Genovese et al., [10] reported that the treatment of hemangioma with a 980 nm diode laser reduced the operating time and ensured a rapid postoperative hemostasis. Angiero et al., [3] investigated the efficacy of treating oral hemangiomas using FDIP (Forced Dehydration with Induced Photocoagulation) via diode laser. He suggests that FDIP is the treatment of oral hemangiomas, as it reduces healing time and prevents recurrence [3]. Bardoshi et al., [2] compared laser treatment therapy with scalpel surgery for vascular lesions of lip and reports that postoperative pain and swelling is mild compared to conventional method. Furthermore, laser treatment avoids scar formation and functional impairment [2].

Although small and superficial lesions can be under observation, patients with large hemangiomas (>3 cm in both dimensions) angiography is imperative to ensure that the lesion is a low-flow one [3]. In case of a high-flow lesion angiography will help to identify the feeding vessel and the anastomoses [3]. In addition, preoperative embolization can reduce the risk of a dangerous bleeding [5]. Sometimes complete injection of embolization materials into the nidus of AVMs can be difficult. In our case (lesion >45 mm x 40 mm in both dimensions) angiography was done and revealed a high flow lesion. Photocoagulation was performed after occlusion of the feeder artery, to prevent life-threatening bleeding.

Conclusion

Laser photocoagulation is an effective method for treatment for oral vascular lesions, presenting better cosmetic results, mild discomfort and faster healing procedure compared to conventional method of surgical excision. In cases of sizeable and high-flow vascular lesions pre-operative embolization reduces the risk of intraoperative hemorrhage.

Summary

- Arteriovenous Malformations (AVM) are high-flow vascular lesions. In Head & Neck they occur usually on the tongue (anterior 2/3), palate, buccal and gingival mucosa.
- Therapeutic options for vascular lesions include steroid therapy, cryosurgery, embolization and laser therapy.
- Diode laser is selectively absorbed by hemoglobin, melanin and pigmented tissue. The potential of performing homeostasis during incision makes it an ideal option for vascular lesions.
- Pre-op Angiography is imperative to ensure that the lesion is a low-flow one. In case of a high-flow lesion angiography will help to identify the feeding vessel and the anastomoses. Preoperative embolization can reduce the risk of a dangerous bleeding.

References