



Use of Surgical Laser for Excision of a Neurofibroma Associated With Neurofibromatosis Type-1

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Published online 28 July 2018



Abstract

Introduction: Neurofibromatosis type 1 (NF1) is an autosomal dominant genetic disorder that affects approximately 1/3500 individuals. Various bone manifestations and peripheral nerves neoplastic lesions associated with NF1 are seen in the jaws. Several oral manifestations may occur in this disorder; therefore the dentist's knowledge and multidisciplinary management of these patients are extremely important.

Case Presentation: In the present article, we present the use of a high-power surgical laser to excise a neurofibroma in a patient with several intraoral manifestations associated with NF1.

Conclusion: The use of diode laser (808 nm) for excision biopsy of tongue nodules showed no thermal damage to the tissue, allowing an adequate histopathological analysis of the neurofibroma

Keywords: Neurofibromatosis type 1; Neurofibroma; Von Recklinghausen disease, Diode laser.

Introduction

Neurofibromatosis (NF), an autosomal dominant genetic group of disorders that affects neural tissues, is divided in: NF type-1 and NF type-2.¹ Neurofibromatosis type 1 (NF-1), also known as Von Recklinghausen disease, affects approximately 1/3500 individuals and accounts for 90% of all cases.² The mutation occurs in a tumor suppressor gene located on the long arm of chromosome 17q11.2, which encodes the protein neurofibromin.³ About 50% of NF-1 affected patients have a positive family history of this disease with variable expressivity whereas the remaining patients represent a new mutation.⁴ NF-1 is characterized by multiple cutaneous neurofibromas, café au lait pigmentation on the skin, axillary or inguinal freckles, pigmented hamartomas of the iris, central nervous system tumors, and skeletal abnormalities.⁵ The patient with NF1 do not necessarily express all these alterations. The diagnostic criteria are met when the patient has two or more of these characteristics.⁶ The majority of the patients with NF1 present oral manifestations.⁷ The main oral manifestations in NF-1 include oral soft

tissues neurofibromas, preferably located on the tongue, hypoplasia of the mandibular ramus with radiolucency in the sigmoid notch, hypoplasia of the temporal, and mandibular components of the temporomandibular joint, absence of sphenoid bone, enlarged alveolar process with dental spacing, enlargement of inferior alveolar canal and mandibular foramen, changes in coronoid notch morphology, and decreased mandibular angle.⁸ The neurofibromas associated with NF1 are mostly benign, but malignant transformation may occur, especially the plexiform variant.⁹

Diode lasers can be used to perform oral soft tissue procedures such as frenectomy, gingival recontouring, crown lengthening, implant exposure and other minor surgeries related to daily clinical treatments. These lasers can also be used in oral pathology to excise oral lesions, such as: fibroma, mucocele, hyperkeratosis, Fordyce granules, neurofibromas and other types of soft tissue lesions.¹⁰ Some of the advantages of using a laser to excise soft lesions may be listed as: excellent hemostasis, reduced swelling and post-operative discomfort, minimal

or no suturing, sterilization of the surgical area, patient acceptance and satisfaction.¹¹ The specimens obtained with a diode laser have good readability.¹² We present the use of diode surgical laser emitting in 808 nm to excise a neurofibroma located on the tongue of a patient with intraoral manifestations of NF1, who did not know about her condition.

Case Presentation

A 44-year-old female, sought dental care at FEAD dental school. During anamnesis, the patient proved to be very confused about reporting her complaint and its systemic condition. During anamnesis, she reported no use drugs and no systemic diseases. The clinical examination showed small nodules scattered throughout the face (Figure 1A). The patient reported having similar nodules located on the abdomen and the presence of some spots on the body. There was no relevant family history of similar nodules and spots. Intra-oral examination revealed two nodules with a firm consistence and coloration similar to mucosa located on the dorsal surface of the tongue (Figure 1B). Alveolar bone expansion, separation of anterior teeth, and overgrowth of attached gingiva without inflammation were observed (Figure 2A). An increase in the diameter of the mental foramen and width of the mandibular canal was noted in the panoramic radiograph. Furthermore, we observed an increase in lateral bowing of mandibular ramus, change in the coronoid notch and mandibular angle reduction (Figure 2B). During the extraction of residual tooth roots, we noted the presence of dysplastic bone. An excisional biopsy was performed on one of the tongue nodules by using a high-power laser (Figure 3), and microscopic examination confirmed the presence of neurofibroma. The laser, a 9 W diode laser (gallium arsenide, Thera Laser Surgery, DMC, São Carlos, Brazil) was used with the following parameters: wavelength emission at 808 nm \pm 10 nm in pulsed wave mode, 1.5 W output, pulse width of 25 milliseconds, pulse interval of 30ms, repetition rate of 33.3 Hz, average power of 1.25 W and a fiber optic delivery system of 400 μ m in diameter. The 808 nm diode laser showed to be effective to perform this kind of surgery with minimal bleeding, therefore, sutures were not necessary. It has been demonstrated that

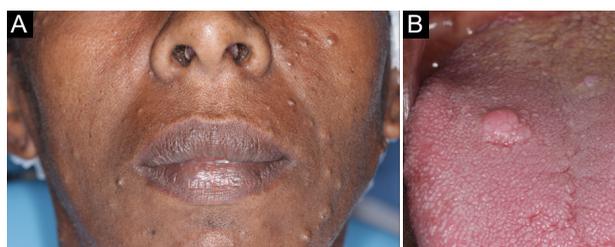


Figure 1. (A) Extraoral View Showing Small Nodules Scattered Throughout the Face. (B) Intraoral view showing two nodules on the surface of the tongue.

diode laser surgery is less invasive compared with scalpel conventional surgery, and patient presents good healing aspects without the need for analgesic medication. The HE stained (Figure 4) specimens showed a connective tissue with fusiform cell proliferation. These cells had basophilic and wavy nuclei and scant cytoplasm permeated by collagen fibers and nerve bundles. Based on these findings, the diagnosis of Neurofibroma was given. The patient was referred to a referral center for patients with NF1 for evaluation, diagnosis and monitoring.

Discussion

NF-1 is a disease that affects 1 in 3500 individuals and is still little known to dentists, despite several oral manifestations that may be associated with it. This condition is due to changes in the NF1 gene located on the long arm of chromosome 17.³ Definitive diagnosis of this condition is of the utmost importance, because of the possibility of malignant transformation of neurofibromas. Malignant peripheral nerve sheath tumor (MPNST) is the main malignancy that occurs in patients with NF1.¹³ In the case reported here, the patient had difficulties with communication during anamnesis and was not aware of her condition. A characteristic of NF-1 is the possibility of the patient having neurocognitive deficits.¹⁴ According to the literature, if the patient has two or more possible features associated with this condition, the diagnosis is NF1.⁷ In the present case, the patient had multiple cutaneous nodules, café au lait pigmentation on the skin, neurofibromas in the tongue, and several alterations were found in the gnathic bones, such as an increase in diameter of the mental foramen and in width of the mandibular

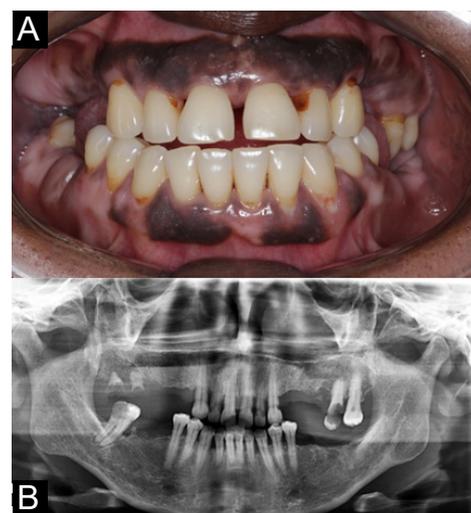


Figure 2. (A) Intraoral view showing expansion of the alveolar bone, separation of anterior teeth, overgrowth of attached gingiva, and general pigmentation. (B) View of panoramic radiograph showing increase in diameter of the mental foramen, width of the mandibular canal, increase in lateral bowing of mandibular ramus, change in the coronoid notch and reduction in the mandibular angle.



Figure 3. Excisional Biopsy of One of the Tongue Nodules by Using a High Power Laser.

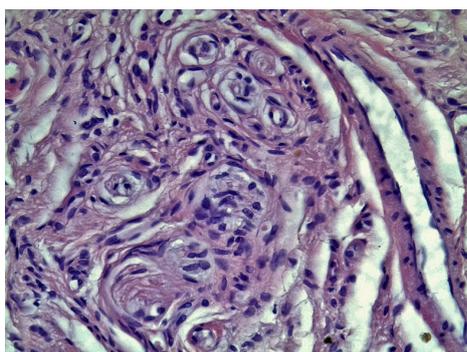


Figure 4. Histological aspect of the lesion showing fibrous connective tissues with fusiform cells proliferation presenting basophilic and wavy nuclei and scant cytoplasm permeated by collagen fibers and nerve bundles (hematoxylin and eosin; x400 magnification).

canal, as well as an increase in lateral bowing of the mandibular ramus, change in the coronoid notch, and decrease in the mandibular angle. Bone alterations are not reported in all patients with NF1. This may be supported by genetic mechanisms such as NF1 gene haploinsufficiency that increases osteoclast activity in affected individuals.¹⁵ Gingival enlargement and pigmentation are common manifestations present in patients with NF1.¹⁶ In the case reported here, the patient showed an overgrowth of attached gingiva and general pigmentation. Given these present manifestations associated with NF1, the patient was referred to a specialized center for diagnosis, treatment and monitoring of NF1. It is very important for these patients to have multidisciplinary management because of the increased risk of endocrine disorders and malignant transformation. These patients should receive genetic counseling to prevent vertical transmission. Lasers can cause thermal damage to tissues, but the use of appropriate settings, such as power output, type of optic fiber used, emission modalities, wavelength, may diminish or even eliminate these effects on the target and surrounding tissues.¹⁷ Some attention must be given to emission modalities, continuous wave (CW) or pulsed emission. Clinicians should always prefer the pulsed emission because it allows the remaining tissue to cool before the next pulse of laser energy.¹⁰ This mechanism

prevents tissue overheating. The thermal effect on tissues must be minimized to enable the therapeutic effect to be obtained with the lowest irradiation time possible.¹⁸ In 2007 D'Arcangelo et al¹⁹ compared the use of a diode laser (808 nm) with that of a scalpel, and showed that due to tissue thermal damage, the continuous mode diode laser tended to produce more pronounced changes than the conventional surgical procedure. The use of diode laser (808 nm), with 1.5 W output power in a pulsed wave mode, with pulse width of 25 milliseconds, pulse interval of 30 milliseconds, and a 400 μm fiber optic delivery system showed optimal results for excising a neurofibroma associated with NF1, showing no thermal damage, and protecting the tissue for an adequate histopathological analysis.

Ethical Considerations

The patient signed a written informed consent prior to beginning the treatment.

Conflict of Interests

The authors declare no conflict of interest.

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