Marsupialisation of an oral mucocele with a diode laser

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Introduction

A mucocele is a prevailing disorder of the oral cavity. This lesion is caused by the accumulation of seromucous fluids in response to trauma, such as biting on the lip, and/or changes to minor salivary glands. Histopathologically, there are two kinds of mucoceles: extravasation (mostly due to trauma) and retention (mostly due to obstruction of the salivary glands). Clinically speaking, the lesion has the form of a bulla and/or a vesicle. Patients do not feel pain when biting on it. It is pink or blue in colour and has a tendency to recur. Its size varies from 1 mm to several centimetres, and it may occur at any age and in any sex. It most commonly occurs on the lower lip, but it can occur in any other part of the oral cavity as well.[1] It is diagnosed clinically in order to assess whether the lesion is pathogenic or not.[2] Trauma scarring, location of the lesion, blue colour, rapid onset, fluctuation and persistence are the main factors for diagnosis. Aspiration of the lesion reveals the presence of mucus.[3] Moreover, radiographic imaging is used to check for obstruction of the salivary gland ducts. Cone beam computed tomography scans and magnetic resonance imaging are also important ways to determine its origin and range.[4] For differential diagnosis, salivary gland and lipoma tumours should be considered. In this regard, the lesion is touched to determine fluctuation. Fluctuation is observed in cysts, abscesses, mucoceles and haemangiomas, whereas the symptom of fluctuation of the lesion is not observed in salivary gland and lipoma tumours.[5] If the lesion does not heal automatically after a duration of two weeks, it should be treated.[6]

Various methods have been proposed for the treatment of mucoceles, including scalpel incision, complete surgical excision, marsupialisation, micro-marsupialisation, intralesional injections of corticosteroids, cryosurgery, laser ablation, intra-lesional injections of sclerosing agent, and electrocautery methods.[7] The removal of a mucocele with a scalpel as done conventionally is associated with problems such as intra-oral bleeding, compromised wound healing and sterility. All these problems can be avoided by treating mucoceles with a laser.[8] Given the introduction of lasers in dentistry and their potential applications in dental treatments, there are excellent treatment opportunities for diode laser.[9] Laser treatment of mucoceles has been reported to provide excellent results.[10]

Medical and dental history

The systemic evaluation of a 36-year-old patient showed no systemic medical problems, no allergies, no medication and no history of surgical procedures, so there was no need for the patient to be referred to a medical consultant. The oral and maxillofacial examination of the patient showed that there were no temporomandibular joint disorders, myofascial disturbances, or functional or parafunctional habits, nor was there Class I malocclusion. However, we found multiple sites of dental caries and calculus accumulation. Apparently, the patient's oral hygiene was poor.

Clinical findings and diagnosis

The patients' chief complaint was that there had been painless swelling on the inner surface of the lower lip for six months. Swelling had been minor initially and then had increased gradually until it had reached the present size. Upon intra-oral examination, a round, solitary, fluctuant swelling was seen on the inner surface of the lower lip at the region of the right central incisor and canine. The swelling extended to the vermilion border of the lower lip and downward towards the lingual vestibule, measuring approximately 10 mm in size (Figs. 1 & 2). The swelling was of the same colour as the adjacent mucosa. The patient revealed that he had a habit of lip biting. There was no difficulty in speaking or chewing. His main complaint was rather of an aesthetic nature. The lesion was diagnosed as a mucocele based on the clinical features and the history of the lip biting habit.

Treatment plan

Pre-procedural preparation

The controlled area was defined and laser warning signs were properly placed to secure the operating room. The laser was then set up and tested for proper function: a laser test fire was carried out, directed towards articulating paper, according to the appropriate safety measures

Figs. 1 & 2: Initial clinical situation showing the mucocele on the lower lip. **Fig. 3:** Clinical situation immediately after the laser surgery.

and using minimum power and settings to ensure correct laser function. Subsequently, the patency of the delivery and the aiming beam was secured. The fibre tip was inspected to ensure that proper cleaving had been carried out and the spot size was uniform. The equipment was checked for cleanliness and the instruments were checked to ensure that they had been properly sterilised. Patient information, including the examination sheet, preoperative radiographs and the consent form were evaluated. Thereafter, the patient and the assistant were equipped with appropriate laser protection goggles for their eyes.

Treatment sequence

Topical anaesthesia was administered using a 10% lidocaine spray. Laser safety googles were put on. Conservative marsupialisation commenced with gently uncovering the lesion roof. Low-level laser therapy of the lesion with different laser settings was then carried out. Afterwards, the patient was instructed on post-surgical care. He was advised to keep the area clean and free from plaque by means of gentle brushing. He was also told to avoid food and liquids that may cause pain or irritation to the sensitive tissue. If needed, he was told to use over-the-counter analgesics.

Aim of laser application and its setting

Laser surgery was chosen because of its many advantages in that it reduces pain for patients, prevents oedema, controls bleeding and, owing to its minimally invasive nature, reduces stress for patients. In general, it can be argued that laser marsupialisation helps us to offer patients the best treatment services possible. The unique physics of the laser and the properties of the targeted tissue should be taken in account when choosing the most suitable laser settings. The 980 nm wavelength is better absorbed in water, and this helps us to carry out marsupialisation as satisfactorily as possible. In the case presented in this article, a diode laser with a wavelength of 980 nm (GIGAA LASER) was chosen. Because such thin tissue had to be removed, it was better to employ continuous wave mode, an initiated fibre and a 0.8 W power output, as these settings make for the best laser–tissue interaction. The high-speed movement of the fibre and high-volume suction can prevent thermal damage to the surrounding tissue. Low-level laser therapy was also performed with a 980 nm diode laser (GIGAA LASER) set to 0.1 W, non-contact mode at a distance of about 1 mm from the tissue, an irradiation duration of 10 seconds, a handpiece diameter

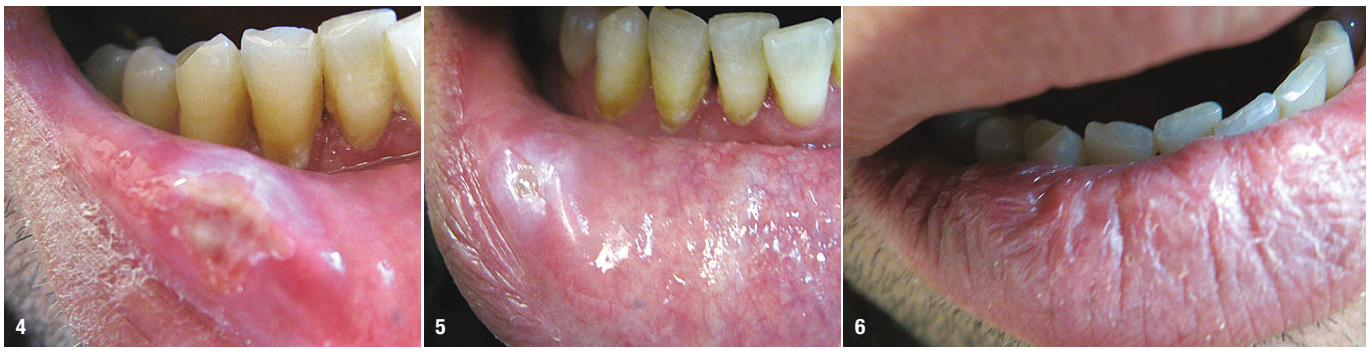

Fig. 4: Low-level laser therapy was performed again three days post-op. **Fig. 5:** Low-level laser therapy was performed again five days post-op. **Fig. 6:** A satisfactory result was seen at the follow-up after one month.

of 3 mm, a spot size of 0.07065 cm^2, scanning mode, a power density of 1.4 W/cm^2 and a dose of 14 J/cm^2. Postoperatively, low-level laser therapy was performed again at the follow-up after one, three and five days.

Surgical technique

The optic fibre was precisely cleaved and lightly initiated. With the fibre held perpendicular to the surface of the tissue, an initial vaporisation was performed via contact of the hot tip with the tissue. During treatment, high-volume aspiration was used to evacuate vapour plume and objectionable odours at the site of vaporisation.

Final result and follow-up

The outcome of the marsupialisation was excellent and no signs of bleeding, carbonisation, or char were observed. The patient did not experience any discomfort. He was calm throughout the procedure and satisfied with the outcome (Fig. 3). Postoperative low-level laser therapy was performed at the follow-up appointments on the first, third (Fig. 4) and fifth days (Fig. 5) postoperatively. The healing process went well and progressed as expected in that there were no signs of swelling and the patient did not experience any pain during the period. A good result with no sign of recurrence was observed one month after the procedure (Fig. 6).

Discussion

Our present study showed that the diode laser can be an excellent aid for achieving successful treatment results when treating oral mucoceles. Good results with laser treatment of mucoceles has been reported in the relevant literature.[10] Kato and Wijeyeweera used a carbon dioxide laser at a wavelength of 10.6 µm and a power of 3 and 4 W in continuous wave mode to remove mucoceles.[11] Pedro et al. used a diode laser at a wavelength of 810 nm and a power of 2 W in continuous wave mode to treat mucoceles.[12] A pulsed laser application is reported by Chinta et al., in which a diode laser was applied at a wavelength of 810 nm and a power of 2 W at 50 ms pulses to treat mucoceles.[13] Another instance of the pulsed mode is described by Agarwal et al., who used a diode laser at a wavelength of 940 nm and a power of 1.3 W at 10 ms pulses.[14] Moreover, Ahad et al. successfully used a pulsed diode laser at a wavelength of 810 nm and a power of 2 W at 30 ms pulses for the removal of mucoceles.[15] Another example is Ramkumar et al., who treated mucoceles with a diode laser at a wavelength of 940 nm and a power of 1.5 W in continuous wave mode with a 400 µm fibre.[16]

Conclusion

A combination treatment with a diode laser (its high power setting for removing the roof of the lesion and its low power setting for acceleration of the healing process) can be a safe and viable treatment modality for management of oral mucoceles.

Literature

about the author

Dr Masoud Shabani is an Iran-based dentist specialised in laser dentistry. He is a lecturer at the Department of Community Dentistry at the School of Dentistry of the Ardabil University of Medical Sciences in Ardabil in Iran. In addition, he is an internationally published author.

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