

Lingual frenectomy with Diode laser therapy: A case report

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ABSTRACT

Ankyloglossia, commonly known as tongue tie, is a congenital anomaly characterized by an abnormally short/tight lingual frenum, which restricts mobility of the tongue tip. Though the ankyloglossia or tongue tie is not a serious manifestation, it may lead to a host of problems including infant feeding difficulties, speech disorders, and various mechanical and social issues related to the inability of the tongue to protrude. Lingual frenectomy is advised for the management of ankyloglossia. The present paper discusses one case of successful management of ankyloglossia or tongue tie with diode laser.

Key words: Ankyloglossia, diode laser, lingual frenectomy.

Lingual frenum is the thin strip of tissue that runs vertically from the floor of the mouth to the under surface of the tongue. The base of the frenum contains a "V" shaped lump of tissue in the floor of the mouth which houses a series of salivary gland ducts. The two largest ducts are in the centre just in front of the attachment of the lingual frenum and are called Wharton's Ducts. They empty the submandibular and sublingual salivary glands. Superficial veins run through the base of the frenum known as varicosities. Their presence is normal, becoming more and more prominent as the patient ages.¹

Tongue tie or ankyloglossia is an abnormal condition affecting the lingual frenum.² The

frenum may be attached at or near the tip of the tongue and held close to the gingival margins of the lower anterior teeth.³ High muscle attachment and frenal pull have been associated with gingival tissue recession.⁴ Rarely, it extends across the floor of the mouth and attaches onto the mandibular alveolus.⁵ Normally, the lingual frenum does not create a diastema between the mandibular central incisors. Ankyloglossia can cause tension in the floor of the mouth, resulting in pulling of the tissue behind the mandibular incisors or the development of a diastema between the mandibular central incisors.⁶ Ankyloglossia may also contribute to the development of anterior open bite due to the

inability to raise the tongue to roof of mouth, which prevents the development of a normal swallowing pattern.⁷ Some authors have also claimed that some ankyloglossia cases can be associated with upward and forward displacement of the epiglottis and larynx, resulting in various degrees of dyspnoea.^{8,9}

Researchers in the field of periodontics and maxillofacial surgery have suggested many techniques to manage patients with ankyloglossia. Techniques include the use of a surgical blade¹⁰, bipolar diathermy¹¹, and LASERS¹².

Although the conventional surgical frenectomies produce good result, they have their own disadvantages. Surgical manipulations on the ventral part of tongue may damage the lingual nerve and cause numbness of the tip of the tongue. Suturing on the ventral surface of tongue at times can cause blockage of Wharton's duct causing mandibular swelling. Suturing can also cause contamination by a "wicking effect", causing secondary infection. This makes it necessary to prescribe postoperative antibiotics.

LASER light is monochromatic, coherent, and collimated; therefore, it delivers a precise burst of energy to the targeted area. Histologically, LASER wounds have been found to contain significantly lower number of myofibroblasts.¹³ This results in less wound contraction and scarring, and ultimately improved healing. LASER wound results in minimal or no bleeding, which is due to sealing of capillaries by protein denaturation and stimulation of clotting factor VII production. The thermal effect of LASER seals the capillaries and lymphatics, which also reduce the postoperative bleeding and edema. In addition, sterilization of

wound by LASER reduces the need for postoperative care and antibiotics. LASER frenectomy provides better postoperative perception of pain and function than with the scalpel technique.¹⁴

Here we present a case report of frenectomy done with diode laser (DIODE LASER-assisted frenectomy).

CASE REPORT

A young male patient aged 30 years visited Department of Periodontics with the complaint of difficulty in complete protrusion of tongue and slight impairment of speech. On examination, ankyloglossia was found. Lingual frenectomy by Diode laser was planned for the

Surgical procedure

LASER SAFETY: Safety protocol prescribed by the manufacturer was followed. Safety glasses were worn by the operator, patient, and assistant. Highly reflective instruments or instruments with mirrored surfaces were avoided, as there could be reflection of the LASER beam. Care was taken to avoid using LASER in presence of explosive gases.

LASER FRENECTOMY: Diode LASER (810 nm) was used for the frenectomy procedure. An initiated tip of 300 µm was used with an average power of 1.00 W in a continuous mode. After application of topical anaesthetic gel, the diode laser was applied in a contact mode with focussed mode for excision of the tissue. The tip of the laser was moved from the apex of the frenum to the base in a brushing stroke thereby releasing the frenum. The ablated tissue was continuously wiped using wet gauze piece to remove the debris on the surface. This takes care of the charred tissue and prevents excessive thermal damage to the underlying soft tissue. The attachment of

frenum to the alveolar ridge was also excised to prevent tension on the gingiva. No suturing was done, and the patient was reviewed after 1 week and healing was satisfactory.

Results:

The LASER procedure was more acceptable to the patient as the procedure took less time and was more comfortable as the area did not require injecting local anaesthesia and absence of post-operative pain and haemorrhage. Also, from the operator's point of view, the LASER technique was easier and faster to perform. The patient had minimal pain and less post-operative discomfort. Healing was uneventful. patient after informed consent was taken from him.

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DISCUSSION

Frenum is a fold of tissue or muscle connecting the lips, cheek, or tongue to the jawbone. It is also known as frenulum, frenula, or frena. Ankyloglossia, commonly known as tongue tie, is a congenital anomaly characterized by an abnormally short/tight lingual frenulum, which restricts mobility of the tongue tip. Though the ankyloglossia or tongue tie is not a serious manifestation, it may lead to a host of problems including infant feeding difficulties, speech disorders, and various mechanical and social issues related to the inability of the tongue to protrude. Lingual frenectomy is advised for the management of ankyloglossia.¹⁵ Several treatment modalities have been suggested in the literature, ranging from surgical blade, bipolar diathermy, and LASER.

LASER is an acronym for Light Amplification by Stimulated Emission of Radiation, based on theories and principles first put forth by Einstein in the early 1900s. The first actual LASER system was introduced by Maiman in 1960.¹⁶ LASER light is a man-made single-photon wavelength.

The process of lasing occurs when an excited atom is stimulated to reemit a photon before it occurs spontaneously. Stimulated emission of photons generates a very coherent, collimated, monochromatic ray of light.¹⁷ Clinical lasers are of two types: Soft and hard lasers. Soft lasers are claimed to aid healing and to reduce inflammation and pain. Its applications include frenectomies, ablation of lesions, incisional and excisional biopsies, gingivectomies, gingivoplasties, de-epithelization, soft tissue tuberosity reductions, operculum removal, coagulation of graft donor sites and certain crown lengthening procedures. Surgical hard lasers, however, can cut both hard and soft tissues. Currently, numerous laser systems; both soft and hard lasers are available for dental use, like neodymium-doped yttrium-aluminum-garnet (Nd:YAG)¹⁸, carbon dioxide (CO₂)¹⁹, semiconductor diode lasers²⁰, erbium-doped yttrium-aluminum-garnet (Er:YAG) LASER.

Diode LASERS are compact and portable in design, with efficient and reliable benefits for use in soft tissue oral surgical procedure. Diode lasers have wavelengths ranging from 655 to 980 nm. They provide excellent wound sterilization along with hemostasis and reduced postoperative pain.²¹ LASER assisted lingual frenectomy is easy to perform with excellent precision, less discomfort, and short healing time compared to the conventional technique. It is comfortable to the patient with little or no bleeding. The semiconductor diode LASER is emitted in continuous-wave or gated-pulsed modes, and is usually operated in a contact method using a flexible fibre optic delivery system. Since the diode laser basically does not interact with dental hard tissues and is an excellent soft AG

tissue surgical laser, indicated for cutting and coagulating gingiva and oral mucosa, and for soft tissue curettage or sulcular debridement. The diode laser exhibits thermal effects using the “hot-tip” effect caused by heat accumulation at the end of the fiber, and produces a relatively thick coagulation layer on the treated surface. Tissue penetration of a diode laser is less than that of the Nd:YAG laser, while the rate of heat generation is higher. The advantages of diode lasers are the smaller size of the units as well as the lower financial costs.²²

The usual mechanisms of diode laser that lead to ablation or decomposition of biological materials are photochemical, thermal, or plasma mediated. Thermal ablation means that the energy delivered by the laser interacts with irradiated material by an absorption process, yielding a temperature rise there.²³ As the temperature increases at the surgical site, the soft tissues are subjected to warming (37 to 60°C), protein denaturation, coagulation (> 60°C), welding (70 to 90°C), vaporization (100 to 150°C), and carbonization (> 200°C).²⁴ The rapid rise in intracellular temperature and pressure leads to cellular rupture, as well as release of vapour and cellular debris, termed the laser plume.²⁵ Moritz et al evaluated in vitro and in vivo study of the bactericidal effect of diode laser and found that an extraordinarily high reduction of bacteria could be achieved. Laser creates locally sterile conditions, resulting in a reduction of bacteremia concomitant with operation.²⁶ It is also postulated that low output power laser mediates an analgesic effect related to depressed nerve transmission in dentinal hypersensitivity.

The diode LASER causes minimal damage to the periosteum and bone under the gingiva being on

treated, and it has the unique property of being able to remove a thin layer of epithelium cleanly and a sterile inflammatory reaction occurs after lasing. Blood vessels in the surrounding tissue up to a diameter of 0.5 mm are sealed; thus, the primary advantage is hemostasis and a relatively dry operating field.

The post-operative experience of pain is a complex phenomenon, influenced by psychological, environmental and physical factors. The pain perception is less as protein coagulum is formed on the wound surface, which serves as a biological wound dressing and seals the ends of the sensory nerves.

CONCLUSION

The presence of tongue clefting suggests that lingual frenum interventions should be performed at a very young age to prevent tongue deformity and speech problems. This case report clearly shows that diode laser definitely has an advantage over conventional methods of lingual frenectomy, as it prevents bleeding and swelling, and is associated with minimal or no postoperative pain. It provides a 'needle-free' approach or no anaesthesia dentistry. Thus, practitioners should consider integrating diode laser in soft tissue surgical procedures for the benefit and comfort of the patient. In the modern dental practice using laser technology, similar procedures can be accomplished with less invasive methods, a more relaxed appointment and less postoperative discomfort.

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