

Case Report

Evaluation of Effectiveness of Diode Laser in the Management of Ankyloglossia: A Case Series

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ABSTRACT

Background: Ankyloglossia is a clinical condition characterised by decreased mobility of the tongue tip due to unusually short, thick lingual frenum which can affect speech, normal deglutition and periodontium and can have social effects. Lasers have emerged as an effective treatment modality for this condition due to its various advantages like less pain or discomfort, postoperative inflammation and faster healing.

Aims and objectives: The aim of the present case series was to evaluate the effectiveness of diode lasers for the treatment of ankyloglossia.

Methods and materials: A total of 10 patients with a mean age of 20.5 years, with partial or complete ankyloglossia classified according to Kotlow's classification of ankyloglossia, were selected for the present case series which were surgically treated by using Diode Laser.

Results: The length of the free tongue improved significantly from mean 7.4 mm preoperatively, to mean 13.1 mm postoperatively, with no recurrence and significant improvement in speech at 9 month of follow up. There was minimal pain or discomfort to the patient intra-operatively as well as post-operatively and also the surgical wound healed significantly at a faster rate.

Conclusion: Thus Diode laser can be considered as effective, comfortable and beneficial mode of treatment for ankyloglossia with greater patient compliance.

Introduction

Ankyloglossia is a clinical condition usually defined on the basis of inability to extend the tip of the tongue beyond the vermillion border of the lips or a line joining the lip commissures, Dosh (1). This may be due to congenital shortness of the lingual frenum or a frenal attachment extending to the tip of the tongue, binding the tongue to the floor of mouth and restricting its extension (2, 3). Ankyloglossia is prevalent in 3.2%

of pediatric patients (4) and occurs in 2 to 3 of every 10,000 adults (5). It is more common in males than females (5). Due to restricted movements, patients exhibit speech difficulties like pronunciation of certain consonants and diphthongs (3). Speech defects include defects in the letters like t, d, n, l, in sounds and words such as ta, te, time, water, and general unintelligibility of speech (2). Ankyloglossia has also been associated with midline diastema, oral motor dysfunction (6) and

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Figure 1: Preoperative view



Figure 2: Application of diode laser



Figure 3: Postoperative view at 9 month



Figure 4: Tongue protrusion preoperatively



Figure 5: Tongue protrusion postoperatively

gingival recession (7). Pioneers in the field of Periodontology and maxillofacial surgery have suggested many techniques to manage patients with ankyloglossia. Techniques include the use of surgical blade, bipolar diathermy, and LASERs. In recent years, LASERs have gained much importance due to certain advantages associated, such as excellent wound sterilization along with hemostasis and reduced postoperative pain (8, 9). Many studies have been reported in literature regarding usefulness of Lasers for treatment of ankyloglossia, but most of them are case reports (**Table I**). Considering the various advantages of soft tissue lasers for lingual frenectomy here we present a case series of 10 patients with 9 months follow-up to evaluate the effectiveness of diode laser in relation to pain (during and after the surgical procedure), post operative healing and improvement in speech after the treatment of ankyloglossia.

Method and materials:

All procedures performed in this study involving human participants were in accordance with the ethical

standards of the institutional and/or national research committee and were approved by the same, with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

A total of 10 patients aged between 17 – 25 years (mean age - 20.5 years), presenting with partial or complete ankyloglossia classified according to Kotlow's classification of ankyloglossia given in 1999 (10), were selected for the present case series. Patients with a chief complaint of difficulty in speech and difficulty in protruding the tongue were included.

Patients with systemic diseases associated with wound healing problems, as in diabetes, autoimmune diseases, and with history of smoking were excluded from the

Table I : Various studies mentioned in literature for treatment of ankyloglossia using Lasers.

Serial no.	Author name	Type of LASER	Follow up	No. of cases	Recurrence
1.	Jafri et al 2014 (18)	Diode Laser AlGaAs (810 nm)	1 month	3	No
2.	Boyapati et al 2014 (16)	Diode LASER 2.5 watt, 320 μ	6 months	1	No
3.	Prabhu et al 2014 (19)	Diode LASER (810 nm) in pulsed contact mode at 1.1 joule/sec	10 days	1	No
4.	Umashanker et al 2011 (20)	LASER (type not specified)	5 months	1	No
5.	Tanya et al 2014 (21)	Diode LASER (Biolase) in contact mode	3 months	1	No
6.	Pradhan et al 2012 (22)	Er,Cr:YSGG LASER (2780 nm) free running pulsed (Waterlase MD)	7 days	1	No

study. Evaluation of pain was done according to criteria described by Gedalia and Brayer (11), (i.e. 0- No pain, 1-Discomfort but cannot be said as pain, 2- Mild pain, 3-Moderate pain, 4-Severe pain). Evaluation of the post-operative improvement in length of free tongue was done over a period of 9 months. The patients were also constantly followed up for a period of 9 months to evaluate improvement in speech and recurrence, if any.

The study protocol was first approved by the institutional ethical committee of Datta Meghe

Institute Of medical Sciences, Sawangi (Meghe), Wardha. Prior to initiating the study written informed consent was taken from the patients participating in the study.

Surgical procedure:

Topical anesthesia Precaine® (8% Lidocaine, 0.8% Dibucaine, mfg. by Pascal international, USA) was applied initially. In some patients, who had discomfort during surgical procedure after application of topical anesthesia, local anesthesia (2% lignocaine) was injected at the base of frenal attachment after assessing

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Table II: Comparison of clinical parameters preoperatively and post operatively.

Case No.	Free tongue length in millimeters with Kotlows classification [10]		Pain assessment Gedalia and Brayer criteria [11]			Speech	
	Pre operative	9 month post operative	Intra-operative	Immediate post operative	1 day post operative	Defect prior to surgery	Post operative improvement
1.	4(class IV)	10(class II)	2	1	0	Present	✓
2.	8 (class II)	13(class I)	2	1	0	Present	✓
3.	4 (class IV)	10 (class II)	2	1	0	Present	✓
4.	8 (class II)	13 (class I)	1	0	0	Present	✓
5.	8 (class II)	14 (class I)	1	0	0	Present	✓
6.	9(class II)	14(class I)	1	0	0	Not present	
7.	8(class II)	14(class I)	3		1	Present	✓
8.	8 (class II)	14 (class I)	2	0	0	Present	✓
9.	9 (class II)	15 (class I)	2	1	0	Not present	
10.	8 (class II)	14 (class I)	2	0	0	Present	✓
Mean ±SD	7.4 ± 1.83	13.1 ±1.72	1.8 ± 0.63	0.5 ± 0.52	0.1 ± 0.31		

pain criteria (11). An initiated tip of 400 µm diode laser (980 nm wavelength) in continuous mode, with

an average power of 1.37 W was used. The tip was moved from the apex of frenum to the base in a

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brushing stroke, and all the fibrous attachments were removed in order to cut the frenum. Tongue movement was checked by protrusion to assess complete elimination of the frenum. No sutures were placed (**Figure 1, 2, 3, 4, 5**). The patients were prescribed analgesics (Ibuprofen 400 mg, twice daily, for three days) and instructed to perform tongue exercises (12), post-operatively. Patients with speech difficulties were sent for speech therapy, and all the patients were recalled after 15 days, 3 months and 9 months for re-evaluation.

Results:

Using the Kotlow's criteria (10) and Gedalia and Brayer criteria (11), Preoperative and postoperative scores were recorded for free tongue and pain, respectively. The surgical site healed without any complications and length of free tongue increased from 7.4 ± 1.83 mm preoperatively to 13.1 ± 1.72 mm post operatively at 9 months (**Table II**). Pain was assessed intra-operatively, immediate post-operatively and 1 day post-operatively. Most of the cases reported very less discomfort and pain (**Table II**). At 9th month of follow-up, significant improvement in speech was observed (**Table II**). No recurrence was observed in any of the cases after 9 months post operatively.

Discussion:

Ankyloglossia is a clinical condition which affects tongue movement and subsequently functions associated with it like speech, swallowing and self cleansing mechanism of mouth. Early diagnosis and prompt surgical intervention has the ability to give significant results. Laser therapy on the other hand is emerging as a boon for soft tissue surgical procedures because of its various advantages. In the present case series, Laser therapy was used for the treatment of ankyloglossia, in which 10 patients of ankyloglossia were treated by surgical excision of lingual frenum

using Diode Laser. Laser assisted lingual frenectomy was very easy to perform. The patients hardly noticed any discomfort and also there was minimal bleeding. The frenum was completely eliminated and the patients could protrude their tongue upto 10 to 12 mm. The excellent hemostasis and absence of postoperative swelling was attributed to increased platelet activation by lasers (13), and sealing of lymphatic vessels (14). In addition, the laser's sterilization of the surgical wound reduced the need for antibiotics postoperatively (4). The length of the free tongue improved significantly from 4 - 9 mm (mean 7.4 mm) preoperatively, to 10 - 15 mm (mean 13.1 mm) postoperatively, with no recurrence till 9 month of follow up. Also there was significant improvement in speech at 9 months. The results obtained were in accordance to various studies in literature as mentioned in Table no I. Laser assisted lingual frenectomy resulted in negligible intraoperative and postoperative pain and also faster and uneventful healing of surgical site, which gives Lasers advantage over surgical blade. This is in accordance with the studies by M. Cenk Haytac and Onur Ozcelik (15) and Boyapati et al (16). Post-operative exercises (12), following tongue-tie surgery were intended to develop new muscle movements, especially those involving tongue-tip elevation and protrusion both inside and outside the mouth, increase kinesthetic awareness of the full range of movements the tongue can perform, encourage tongue movements related to cleaning the oral cavity, including sweeping the insides of the cheeks, fronts and backs of the teeth, and licking right around both lips (17).

Conclusion:

This case series 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. Thus, use of diode laser in soft tissue surgical procedures like lingual frenectomy can be considered as comfortable and beneficial to the patient with greater patient compliance.

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