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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/14962

DOI URL: <http://dx.doi.org/10.21474/IJAR01/14962>



RESEARCH ARTICLE

FRENECTOMY - DIFFERENT TECHNIQUES

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Manuscript Info

Manuscript History

Received: 25 April 2022

Final Accepted: 27 May 2022

Published: June 2022

Key words:-

Maxillary Frenum, Ankyloglossia, Mucogingival Technique, Frenectomy, Laser

Abstract

Introduction:- The frenum is a mucous membrane fold that attaches the lip, cheek and the tongue to the alveolar mucosa, the gingiva, and the underlying periosteum. Aesthetic problems are caused by high maxillary frenum which may compromise the orthodontic treatment results in the midline diastema cases, thus causing a recurrence after the treatment. Ankyloglossia, is also called as tongue-tie, is an embryological anatomical malformation of the tongue, characterized by an abnormally short and a thick lingual frenum. Tongue-tie restricts the physiologic movements of the tongue and results in various functional, behavioural and speech abnormalities.

Material method :- The present article consists of a series of clinical cases of an aberrant frenum which were approached by various surgical frenectomy techniques.

Result:- Different techniques have their own advantages and disadvantages. Laser gives advantages of less post operative pain and discomfort. Lingual frenectomy help in improvement in tongue movement and speech.

Conclusion:- An aberrant frenum can be removed by any of the modification techniques that have been proposed, and a functional and an aesthetic outcome can be achieved by a proper selection of technique which is based on the type of the frenal attachment.

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Introduction:-

A Frenum is a tiny fold consisting of mucosal membranes, muscle, and connective tissue fibers that attach the inner lip, cheek, and tongue to the alveolar mucosa, gingiva, and the underlying periosteum and the floor of the mouth.

^{1,2}An aberrant frenum creates an aesthetic problem in the patient such as a diastema between the maxillary central incisors. During the development of the anterior segment of the upper jaw and teeth, the apical migration of the attachment does not follow the development no bone is deposited inferior to the frenum. The abnormal frenum can be detected visually by applying tension over the frenum to see the movement of the tip of the papilla or the blanching of frenum which is produced due to ischemia in the region. Placsek et al. in 1974 gave the classification of labial frenal attachments :-

1. Mucosal – the fibers of frenum are attached up to the mucogingival junction.
2. Gingival – the fibers of frenum are inserted within the attached gingiva.
3. Papillary – the fibers of frenum are extending into the interdental papilla.

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4. Papilla penetrating – the fibers of frenum cross the alveolar process and extend up to the palatine papilla.

The lingual frenum is a mucosal fold which connects the bottom of the tongue to the floor of the mouth and to the mandible. Ankyloglossia occurs when the frenum is thick and very tight and insertion of which causes limitation in the mobility of the tongue, ³

Indications

The frenum is called as abnormal and is indicated for removal when

- An aberrant frenal attachment, which causes a midline diastema.
- A flattened papilla with the frenum closely attached to the gingival margin, which causes a gingival recession and a hindrance in maintaining the oral hygiene.
- An aberrant frenum along with inadequate attached gingiva and a shallow vestibule

The aberrant frenal attachment can be treated by frenotomy or frenectomy procedures. Frenectomy completely removes the frenum, including its attachment to the underlying bone, while the incision and the relocation of the frenal attachment is called as frenotomy.

Frenectomy is a surgical procedure that removes the frenum, and its attachment to the underlying bone. It can be done by either by the conventional scalpel (classical) technique, Millers Technique, V-Y plasty, Z plasty, electrosurgery, lasers.^{4,5,6}

The present article consists of a series of clinical cases of an aberrant frenum which were approached by various surgical frenectomy techniques.

Case I

A 21 years old female patient reported to the Department of Periodontology with a chief complaint of spacing between the upper front teeth. On examination aberrant maxillary labial frenum with papilla penetrating type attachment was found (Fig 1a). The classical frenectomy procedure was planned to remove frenum, under local anesthesia by using 2% lignocaine with 1:80000 adrenaline. Frenum was engaged with a haemostat into the depth of the vestibule and incisions were placed on the upper and undersurface of the haemostat until the tissue became free (Fig 1b). The triangular resected portion of the frenum was removed along with the haemostat. A blunt dissection was done to relieve the fibrous attachments (Fig 1c). Interrupted sutures were applied at the edges of diamond shaped wound with 5-0 black silk (Fig 1d). Sutures were removed 1 week post-operatively (Fig 1e)

Case II

The 32 years old female patient reported from the Department of Orthodontics with a chief complaint of spacing between upper front teeth. Patient was under the fixed orthodontic treatment since 2 years. On examination orthodontic relapse occurred due to aberrant maxillary labial frenum. Tension test was positive with papillary type frenal attachment (Fig 2a). Miller's technique was planned, under local anesthesia by using 2% lignocaine with 1:80000 adrenaline, the frenum excised and exposure of the alveolar bone in the midline done as in the classical frenectomy. A vertical incision was given adjacent to area of interest to obtain a laterally positioned pedicle graft. Horizontal incision was given along the mucogingival line to release the pedicle graft (Fig 2b,c,d). The graft was sutured across the midline using a 5-0 black silk (Fig 2e). Sutures were removed after 1 week (Fig 2 f)

Case III

A 13 years old male patient reported to the Department of Periodontology from the department of Orthodontics. On examination aberrant maxillary labial frenum with positive tension test was found. It was papillary type attachment causing the deflection of the interdental papilla leading to food accumulation & difficulty in oral hygiene maintenance (Fig 3a). The case treated with V-Y Pasty technique, under local anesthesia by using 2% lignocaine with 1:80000 adrenaline. The frenum was held with the haemostat and an incision was made in the form of V on the undersurface of the frenal attachment (fig 3b). The frenum was relocated at an apical position and the V shaped incision was converted into a Y, while it was sutured with 5-0 silk sutures (Fig 3c). Sutures were removed one-week post operatively (Fig 3d).

Case IV

A 15 years old female patient reported to the Department of Periodontology with a chief complaint of spacing

between the upper front teeth. On examination Hypertrophic Frenum with papilla penetrating type attachment (Fig 4a). Z-plasty was planned, under local anesthesia by using 2% lignocaine with 1:80000 adrenaline with scalpel incision the whole length of the frenum was incised (Fig 4b). Two additional equal-length incisions of angulation between 60° and 90° were made at the ends of the initial incisions. The submucosal tissues were dissected beyond the base of each flap using fine tissue forceps, taking care not to damage the flap apices. This produced double rotational flaps (Fig 4c). These were mobilized and transposed through 90 degrees to close the vertical incisions horizontally. A 5-0 silk sutures were placed, first through the apices of the flaps, to ensure the adequacy of the flap repositioning and then they were evenly placed along the edges of the flaps to close the wound along the cut edges (Fig 4d). The incision were also made from the bottom of the frenal attachment on the labial surface to the palatine area to remove the fibrous attachment that crosses the interdental papilla. Sutures were removed after 1 week (Fig 4e).

Case V

A 18 years old female patient reported to the Department of Periodontology with a chief complaint of spacing between the upper front teeth. On examination Hypertrophic Frenum with papilla penetrating type attachment (Fig 5a). Frenectomy with laser was planned under local anesthesia by using 2% lignocaine with 1:80000 adrenaline. The aberrant frenum was treated with diode Laser (Fig 5b) and the fibrotic component in the interdental area was excised with the help of scalpel (Fig 5c). Post operatively patient had lesser pain and no swelling. But the healing was delayed compared to above techniques (Fig 5d).

Case VI

A 18 years old female patient reported to the Department of Periodontology with a chief complaint of spacing between the lower front teeth. On examination Hypertrophic lingual Frenum from lingual aspect of incisors upto tongue was present (Fig 6a). Frenectomy with laser was planned under local anesthesia by using 2% lignocaine with 1:80000 adrenaline (Fig 6b). The aberrant frenum was treated with diode Laser (Fig 6c). Post operatively patient had lesser pain and no swelling. But the healing was delayed compared to above techniques (Fig 6d). At one month healing was excellent with no scar tissue formation.

Discussion:-

Classical scalpel method, electrosurgery as well as lasers may be used to treat these aberrant frenii. Archer (1961) and Kruger introduced the classical scalpel technique was in 1964. Various modifications were proposed after introduction of classical scalpel technique like Miller's Technique, V-Y plasty, and Z-plasty, electrosurgery, or lasers.

The classical scalpel technique is the most widely used method. The classical technique creates a longitudinal surgical incision and scarring, which causes periodontal problems which may lead to an unaesthetic appearance, thereby necessitating other modifications.

Miller PD in 1985 advocated the Miller's technique. This technique was proposed for the post-orthodontic diastema cases⁽⁷⁾. Ideally Miller's technique should be performed after the orthodontic movement is complete and about 6 months before the appliances are removed. The advantage of this technique are bracing effect to the gingiva and less chances of relapse. No disruption the transseptal fibers and so there is no loss of interdental papilla. This technique helps to achieve orthodontic stability without compromising aesthetics.

The Z-plasty technique is used for broad, thick hypertrophic frenum associated with midline diastema and a short vestibule. This procedure remove the broad band and also helps in vertical lengthening of the vestibule. Z-plasty procedure is safe, cost effective and results in better functional and aesthetic appearance. This technique causes tissue healing by primary intentions; increasing recovery and reducing the risk of tissue contractures⁽⁸⁾.

For broad frenum cases in the premolar molar region V-Y plasty can be used. It allows the lengthening of that area. The main disadvantage of this technique is it fails to provide satisfactory aesthetic results in case of a thick hypertrophied frenum⁽⁹⁾.

The basic concept of surgical laser is Photothermal interaction with tissue. The tissue absorb the radiant light and transform into heat energy which changes the tissue structure. Laser light is converted into thermal energy on contact with the tissue, which produces reaction ranging from incision, vaporization and coagulation. Diode laser gives more surgical precision, accuracy, and reduces unnecessary damage to the underlying tissues, renders a blood less

surgical field resulting in improving visualization and eliminating the need of post operative sutures. Patient treated with laser surgery have no functional complication since there was no damage to the adjacent healthy tissue, with less wound contraction during healing meaning less mucosal scar ⁽¹⁰⁾.

Laser can't be applied on broad and papilla penetrating type frenii also they are time consuming and result in relatively large raw area leading to increased healing period and depth of penetration can't be controlled.

Ankyloglossia, which is also called as tongue-tie, is an embryological anatomical malformation of the tongue, characterized by an abnormally short and a thick lingual frenum. Correct diagnosis of ankyloglossia and early intervention are imperative, since several consequences ranging from restriction of tongue movement to impairment of mandibular growth may occur. ⁽¹¹⁾

Fig 1e:- 1week follow up.



Fig 1a: Papilla
penetrating type frenal
attachment



fig 1b: frenum incised



fig 1c: frenum excised



fig 1c: Sutures placed



Fig 2a: Papillary type
frenal attachment



Fig 2b: Frenum incised
with vertical releasing
incision



Fig 2c: Lateral pedicle
graft obtained



Fig 2d: Graft displacing
across midline



Fig 2e: Graft sutured



Fig 2f: 1week follow up



Fig 3a: Papillary type frenal attachment



Fig 3b: Frenum incised



fig 3c: frenum excised



Fig 3d: Frenum sutured in Y shape



Fig 3e: 1week follow up



Fig 4a: Papilla penetrating type frenal attachment



Fig 4b: Frenum incision



Fig 4c: Incision at both ends of frenum, obtaining two triangular flaps



Fig 4d: Flaps transposed across the midline sutured in the form of Z



Fig 4e: 1week follow up



Fig 5a: papilla penetrating type frenal attachment with enlarged interdental papilla



fib 5b:Frenum incised



Fig 5c: Frenum excised using LASER



Fig 5d: 1week follow up



fig 6a :lingual frenum



fig 6b :lingual frenum incised with laser



fig 6c :lingual frenum incised with laser



Fig 6d: 1week follow up

Conclusion:-

An aberrant frenum attachment can be removed by any of the above modification of techniques, a functional and an aesthetic outcome can be achieved by a proper selection of technique and based on the type of the frenal attachment further improvements in the techniques can still be attempted. Even though Lasers and electro surgery have the advantage of better patient acceptance due to reduced pain perception and postoperative discomfort, they have certain shortcomings.

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