



FRENAL ATTACHMENTS AND SYNDROMES ASSOCIATED: A NARRATIVE REVIEW

Supriya Yadlapati¹, Dr. Naseemoon Shaik^{2*}, Dr. Pudi Sriharsha³, Zohaib Mohammed Ziauddin⁴, Nikitha Gundala⁵, Sreeja Sarpatwar⁶

Abstract:

Frenum is a dynamic structure which encompasses a wide range of physiological variations. It is of utmost importance to understand the association between oral hygiene condition and labial frenum attachment, as they play a major role in the maintenance of gingival health. Abnormal frenal attachment is an important clue in the detection of many syndromes which helps in early identification of the problem and planning the treatment. The present review article covers the Embryology, syndromes associated with frenum and recent advances and various protocols in managing abnormal frenum.

^{1,4,5,6} House Surgeon, MNR Dental College and Hospital, Sangareddy, Hyderabad.

^{2*} Associate Professor, Department of Pediatric Dentistry, MNR Dental College and Hospital, Sangareddy, Hyderabad.

³ Associate Professor, Department of Prosthodontics and Crown & Bridge MNR Dental College and Hospital, Sangareddy, Hyderabad.

***Corresponding Author:**- Dr. Naseemoon Shaik,

*Associate Professor, Department of Pediatric Dentistry, MNR Dental College and Hospital, Sangareddy, Hyderabad. Gmail: dr.naseemoonshaik@gmail.com, phone no: 8105935678.

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Introduction:

Frenal attachments are defined as collagenous muscle fibers which are enclosed within the mucous membrane folds and serve as the means of attachment between the lips and alveolar mucosa covering the underlying periosteum at the midline of both maxilla and mandible. It is a dynamic structure which encompasses a wide range of physiological variations.

Based on location, there are maxillary and mandibular labial frenums and lingual frenum (frenulum linguæ). Maxillary and mandibular labial frenums are also termed as frenulum labii superioris and frenulum labii inferioris respectively. There are mainly three different categories of frenal attachments based on the extent of frenal attachment and morphology-mucosal (at the mucogingival junction, the frenum lies affixed), gingival (frenum remains along the attached gingiva) and papillary (frenal attachment extending towards the palatine papilla and across the alveolar process). Gingival and papillary types of frenal attachment are more widespread than the other types [1].

EMBRYOLOGY:

Labial frenum is derived from the cell remnants of vestibular lamina while the lingual frenum develops during the early gestation period at around 4 weeks when a U-shaped sulcus is formed in front of the oral region of the tongue, which remains free except at the midline region where it remains attached leading to the formation of the lingual frenum. Any disruption occurring at this phase might result in Ankyloglossia or Tongue tie. Septomaxillary ligament along with labial frenum aid in the growth and development of premaxilla by transmitting the septal growth force and any amount of anatomic distortion results in limiting the forward and downward growth of maxillary [2]. Frenulum was histologically studied by Knox and Young and they have founded that the oblique and horizontal fibres of Orbicularis oris along with the elastic fibres constitute the frenum [3].

It is of utmost importance to understand the association between oral hygiene condition and labial frenum attachment, as they play a major role in the maintenance of gingival health. The intimate relation between labial frenum and gingival margin may cause muscle pull and ultimately interfere with gingival health and also impedes with the tooth brushing thereby, worsening the oral hygiene status [4].

Plaque deposition and mandibular gingivitis were mostly unaffected by the position, of lingual

frenum but the maxillary frenal attachment appeared to impact on the persistence of plaque and the severity of gingivitis [5]. An increase in the plaque intensity was observed in maxillary labial frenum with a decrease in the upper labial coverage during rest while the plaque reduced with an increase in the depth of vestibular sulcus.

Labial frenum aids in supporting the upper lip by providing stability and maintaining harmony with the developing bones of maxilla. The frenum is considered abnormal when it jeopardizes with the lip movements and retracts the gingival margin apically, thus contributing to the formation of a diastema. Advent of orthodontic or periodontal issues can be avoided by early detection of aberrant frenum. In addition to being an etiological factor for midline diastema, a labial frenum that is attached in close proximity to the gingival margin also affects the growth of alveolar processes, causes mucogingival issues and interferes with the pronunciation of certain words.

Abnormal lingual frenum impedes the growth and movement of tongue. Intimate attachment of the frenum to the gingival margin may result in midline diastema, gingival recession, bone loss from the muscular pull and impaired lip mobility, particularly when speaking and smiling. Failure of traumatic injuries to heal, feeding difficulties, limitations on lip movement, speech difficulties and unfavourable aesthetics in the anterior teeth.

SYNDROMES ASSOCIATED:

Abnormal Frenal attachment is an important clue in the detection of many syndromes [6].

Infantile hypertrophic pyloric stenosis occurs as a standalone condition or it can develop in combination with other congenital anomalies, most commonly affecting young males by functionally blocking the gastric outlet. Gastric outlet obstruction results from an abnormal thickening of the stomach near the pyloric region. Incidence of cardiovascular, gastrointestinal tract and central nervous system defects are other coexisting congenital defects present. This syndrome is often characterized by the absence or hypoplasia of frenulum labii inferioris [7,8].

An essential diagnostic observation for identifying Ehlers Danlos syndrome is the absence of the labial and lingual frena. It is a genetic disorder caused due to abnormal collagen formation. This condition is also characterized by cutaneous, musculoskeletal and oral manifestations. The most frequent ones include fragility, delayed tissue repair, thin atrophic scarring post wound healing,

and hyper extensibility. Orthostatic sensitivity, diarrhea, urine incontinence, poor postural control, discomfort, and weariness are typical problems in children with this kind. Muscle weakness is frequently a significant symptom and patients may mention having trouble walking. Hypermobility, which frequently causes subluxation and dislocation and as a result, early osteoarthritis and persistent pain, are common musculoskeletal symptoms [9,10].

Orofaciodigital syndrome is a rare genetic disorder presenting with clinical anomalies involving midline lip cleft, cleft/lobulated tongue and palate, gingival frenulae, lingual hamartomas, bifid uvula, tooth hypoplasia, polydactyly, low-set ears with hypertelorism and bulbous nose. Abnormal supernumerary frenula is most commonly noticed and readily identifiable [11].

Holoprosencephaly is another congenital induction disorder caused due to incomplete cleavage of the prosencephalon. Spasticity, choreoathetosis and dystonia are some of the frequently encountered physical manifestations. Infections of the respiratory tract and improper temperature regulation, malnutrition, gastric reflux are additional complications. Absence of the frenulum labii superioris is an important diagnostic sign in the identification of holoprosencephaly [12,13,14].

Ellis-van Creveld syndrome or Chondroectodermal dysplasia is a skeletal dysplasia with an autosomal recessive transmission and is characterized by conical dentition, short limbs, thin, sparse hair, short stature, hypoplastic fingernails, enamel hypoplasia and malocclusion. This syndrome is often associated with hypertrophic frena. Robinow syndrome, Opitz syndrome and Van der Woude syndrome are usually associated with short lingual frenulum or Ankyloglossia [15].

MANAGEMENT

Frenectomy is the procedure advocated in the treatment of aberrant frenum. It involves total frenum removal usually done either by conventional scalpel method or with the help of lasers. Patient acceptance and motivation are essential for the treatment of high frenal attachments, while giving importance to patient's aesthetic concerns. Although, during the classical technique, the surgical incision might lead to undesirable scar formation and periodontal problems leaving an undesirable scar, it is still considered as the widely performed procedure. Surgical techniques include, classical frenectomy

technique, Miller's technique, Z-plasty, V-Y plasty and electrosurgery [16].

In classical frenectomy procedure, the frenum is held with a haemostat and incisions are given on either side of the haemostat until it is free and the frenum is excised which is followed by suturing. Prior to the procedure the surgical area is anaesthetized with 2% lignocaine with 1:80000 adrenaline.

Miller's technique is applied for post-orthodontic midline diastema cases. The interdental papilla and frenulum are detached using a horizontal incision until the alveolar bone is exposed. Z-plasty is recommended when an inter-incisor diastema is present with hypertrophic frenum and when the vestibule is too short. In this procedure a vertical incision is made at the base of the frenulum and a couple of horizontal incisions are given at an angle of 60° which forms a triangular shaped flap with equal size and shape which is transposed to the opposite side and then sutured. V-Y plasty can be done in cases where wide frena in the premolar-molar region should be lengthened. When using a standard scalpel technique on patients with bleeding disorders, it entails a higher risk of haemostasis and also in cases of non-compliant patients, electrosurgery is advised. Post-op is crucial, usually done after one week of surgery to evaluate for tissue scarring.

RECENT ADVANCEMENTS:

Lasers are becoming progressively prevalent in the field of dentistry offering a replacement for traditional scalpel procedures. Frenectomy has recently been performed using lasers like Nd:Yag, Er, diode, CO₂ and diode combined with Er:Yag. The most frequently employed lasers for frenectomies are diode lasers as they are least invasive with decreased inflammatory response and postoperative pain. CO₂ lasers are also used to some extent. The diode laser has become a popular option mainly due to its compact size, economical price, fibre optic delivery, and simplicity of oral soft tissue minor surgical use. Lasers and electrosurgery have been developed to address their undesirable side effects. Randomized clinical trials which were performed, comparing lasers to conventional scalpel techniques came to the conclusion that, in attachments. As alternatives to scalpel frenectomy treatments, electrosurgery and lasers addition to their numerous other benefits, such as a blood-free operating room, precise incision margins, and shorter chairside recovery times, lasers provide patients a pain-free experience [16]. The laser locks the sensory nerve endings and has a coagulation effect on the

arterioles and venules that results in hemostasis and minimizes the requirement for anaesthesia. The fundamental idea behind surgical lasers is photothermal interaction with tissue. Radiant light is taken in by the tissue in this phase, where it is converted to heat energy, which alters the structure of the tissue. By interacting with the tissue, the laser light within was transformed into thermal energy, which, when used efficiently, can result in reactions including incision, vaporisation, and coagulation. Wound healing is usually delayed in laser-treated patients, which is consistent with some findings. The thermal degradation of the surgical site, which impairs the adherence of the incised surfaces for primary closure, is the cause of the delayed wound healing post laser therapy. Therefore, adjuncts such as hyaluronic acid are used after laser therapy, to accelerate wound healing. In periodontal surgery, hyaluronic acid is a promising drug to hasten the process of wound healing [17,18].

Conclusions

Frenums are part of the mouth's normal anatomy but are frequently overlooked. Frenum keeps the tongue as well as the upper and lower lips in a proper position. Problem-causing frenums are typically diagnosed and treated as children, so concerns about them as adults are very low.

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