

LABIAL FRENECTOMY- A REVIEW AND CASE REPORTS

Dr. Manish Ashtankar*¹, Dr. Mala Dixit Baburaj (MDS)² and Dr. Abhishek Singh³

¹MDS, Department of Periodontics & Implantology Nair Hospital and Dental College, Mumbai.

²Professor and HOD, Department of Periodontics & Implantology Nair Hospital and Dental College, Mumbai.

³MDS Student, Department of Periodontics & Implantology Nair Hospital and Dental College, Mumbai.

***Corresponding Author: Dr. Manish Ashtankar**

Department of Periodontics & Implantology Nair Hospital and Dental College, Mumbai.

Article Received on 17/07/2018

Article Revised on 07/08/2018

Article Accepted on 27/08/2018

ABSTRACT

Aberrant frenum causes a problem of midline diastema which leads to unesthetic smile for the patient. Orthodontic correction of midline diastema helps to create aesthetic smile but frenum attachment may interfere it. The labial frenectomy is the procedure performed to remove aberrant frenum attachment. This article is a review of labial frenum and also present 2 case reports.

KEYWORDS: Labial Frenectomy, Midline diastema, aesthetic smile.

INTRODUCTION

An Aesthetic smile is a prime concern of people nowadays. Smile designing gets more focus to achieve this. Patients with midline diastema visit dentist to demand its closure to achieve pleasing smile. Aberrant labial frenum can be a cause for persistence or recurrence of diastema by interfering orthodontic treatment. This review focuses on anatomy, development, epidemiology, complication, and management of labial frenum in detail. Management of 2 cases has also been reported.

What is frenum?

The frenum is a mucous membrane fold that attaches the lip and the cheek to the alveolar mucosa, the gingiva, and the underlying periosteum.

A frenulum is a small frenum. There are several frena that are usually present in a normal oral cavity, most notably the maxillary labial frenum, the mandibular labial frenum, and the lingual frenum.

Their primary function is to provide stability of the upper and lower lip and the tongue.

Development

- The maxillary labial frenum develops as a post-eruptive remnant of the ectolabial band which connects the tubercle of the upper lip into the palatine papilla.
- It extends over the alveolar process in infants and forms a raphe that reaches the palatal papilla.

•Through the growth of alveolar process as the teeth erupt, this attachment generally changes to assume the adult configuration.

Anatomy

The abnormal superior labial frenum has been described anatomically. The frenum is abnormal simply because it may be enlarged or hypertrophied, or to assume that the frenum is abnormal simply because of the incidental presence of a midline diastema of the teeth.

It consists mainly of connective tissue and epithelium, with some nerve fibers. Elastic and collagen fibers are found to traverse the entire length of the frenum, originating in the periosteum, which covers the anterior maxillary alveolus. No microscopic differences have been found between an abnormal or aberrant maxillary labial frenum and one of a more normal configuration or position.^[1]

Knox and Young histologically studied the frenulum, and they have reported both elastic and muscle fibers (Orbicularis Oris - horizontal bands and oblique fibers). However, Henry, Levin, and Tsaknis have found a considerably dense collagenous tissue and elastic fibers but no muscle fibers in the frenulum.^[2]

Epidemiology

Epidemiology of the labial frenum attachment is given by Placek et al 1974.^[3]

UPPER JAW	Mucosal	Gingival	Papilla	Papilla Penetrating
PREVALENCE (%)	46.5	34.3	3.1	16.1
Incident of Pull Syndrome (%)	4.5	53.4	100	84
Pathological Changes in Papilla (%)	3.6	8.4	45.5	9.4

LOWER JAW	Mucosal	Gingival	Papilla	Papilla Penetrating
PREVALENCE (%)	92.1	6.5	0.2	1.2
Incident of Pull Syndrome (%)	6.5	76.2	100	100
Pathological Changes in Papilla (%)	9.3	71.4	83.3	50

Nagaveni NB, Umashankara KV studied 3000 Indian children with primary, mixed and permanent dentition. Simple frenum was found as most prevalent type in all kind of dentition in this study. The incident of simple frenum was increased from 60% in the primary dentition to 78% in the permanent dentition. The second most frequent type was the persistent tectolabial frenum, which decreased gradually with age, from 21.2% in the primary dentition to 5.6% in the permanent dentition.^[4]

Classification

•By Placek et al (1974).^[5]

1. Mucosal – when the frenal fibres are attached up to the mucogingival junction.
2. Gingival – when the fibres are inserted within the attached gingiva.
3. Papillary – when the fibres are extending into the interdental papilla.
4. Papilla penetrating – when the frenal fibres cross the alveolar process and extend up to the palatine papilla.

•By Sewerin (1971)^[6] describes the different types of normal variation in the morphology of the frenum.

1. Simple frenum
2. Persistent tectolabial frenum
3. Simple frenum with appendix
4. Simple with nodule
5. Double frenum
6. Frenum with nichum
7. Bifid frenum
8. Frenum with two or more variations at the same time.

Problems

A frenum becomes a problem if the attachment is too close to the marginal gingiva. Tension on the frenum may pull the gingival margin away from the tooth. This condition may be conducive to plaque accumulation and inhibit proper tooth brushing.

Abnormal frenum has been found to be associated with:

- Loss of Papilla
- Recession
- Persistence of Midline Diastema
- Difficulty in Brushing
- Malalignment of teeth
- Compromised denture fit or retention.

Diagnosis

- Abnormal or aberrant frena are detected visually, by applying tension over it to see the movement of papillary tip or blanch produced due to ischemia of the region.
- Miller (1985) has recommended that the frenum should be characterized as pathogenic when it is unusually wide or there is no apparent zone of attached gingiva along the

midline or the interdental papilla shifts when the frenum is extended.

Syndromes

•**Ehlers-Danlos syndrome**^[10]: It is a genetic disorder characterized by hyper extensive skin and hypermobile joints with no gender predilection. An absence of the inferior labial and lingual frenum has been described in this disorder.

•**Infantile hypertrophic pyloric stenosis**^[9]: Occurs commonly in males at a ratio of 4.5 to 1 with an unknown etiology. There is a disturbance in the frenum formation. The absence or hypoplasia of mandibular frenum is seen in patients with this syndrome.

•**Holoprosencephaly**^[11]: It is an autosomal dominant condition characterized by a brain malformation due to defects in prosencephalon. It is characterized by defects including cyclopia, a single nostril, single central incisor and premaxillary agenesis. An absence of labial maxillary frenum is one of the characteristic features of this condition.

•**Ellis-van Creveld syndrome**^[12]: It is an autosomal recessive disorder mainly affecting enamel, hair, and nails. Features present in the patient are missing teeth, abnormal frenal attachment, microdontia, and hexadactyly. Oral manifestations: the fusion of the anterior portion of the upper lip to the maxillary gingival margin, as a result of which no mucobuccal fold exists, causing the upper lip to present a slight V-shaped notch in the middle (partial harelip or lip-tie). The anterior portion of the lower ridge is often serrated and presents with multiple small labial frenula. The maxillary and mandibular alveolar processes present with notching or submucous clefts and continuous or broad labial frenula with dystrophic philtrum.

•**Oro-facial-digital syndrome**^[7]: is a group of at least 13 related conditions that affect the development of the mouth, facial features, and digits.

Abnormalities of the oral cavity that occur: split (cleft) in the tongue, a tongue with an unusual lobed shape, a cleft palate. In some cases band of extra tissue called hyperplastic frenula that abnormally attach the lip to the gums.

•**Pallister-Hall Syndrome**^[13]: Oral manifestations include micrognathia, macroglossia and abnormal supernumerary frena extending from the buccal mucosa to the alveolar ridge.

•**Opitz C Syndrome**^[8]: C syndrome, also known as Opitz trigonocephaly syndrome, is a rare disorder transmitted as a result of "gonadal mosaicism". Mosaicism refers to a condition in which a person has cells that differ from each other in genetic makeup. The difference is usually a variation in the number of chromosomes.

Management

•The aberrant frena can be treated by frenectomy or by frenotomy procedures. Frenectomy is the complete removal of the frenum, including its attachment to the underlying bone, while frenotomy is the incision and the relocation of the frenal attachment.^[5]

•Frenectomy can be achieved by

1. Scalpel: convention, cost-effective but has a disadvantage like bleeding and patient compliance.
2. Electrocautery: advocated because of advantages like the mild bleeding and the absence of postoperative complications. However, it is associated with certain complications which include burns, the risk of an explosion if combustible gases are used, interference with pacemakers and the production of surgical smoke. However, Argon Beam Coagulation (ABC) use reported with minimal complication.^[14]
3. Laser

Advantages: Eliminate word like duration of the surgery, the simplicity of the procedure, the absence of postoperative infections, lesser pain, swelling and the presence of a small or no scar makes it safe and effective for patient.^[15]

Disadvantages: A delayed healing as compared to that in the conventional scalpel techniques, a reduced surgical precision which results in an inadvertent laser-induced thermal necrosis and/or a photoacoustic injury.

•The different techniques are

1. Conventional (Classical) frenectomy: by Archer (1961) and Kruger (1964).

Indication: for midline diastema cases with an aberrant frenum to ensure the removal of the muscle fibres which were supposedly connecting the orbicularis oris with the palatine papilla.^[2]

Case Report 1

A 24 years old female patient was referred from the department of orthodontics for correction of frenum. A patient was having the chief complaint of spacing between her front teeth. No abnormal finding was there on medical examination.

Intraoral examination showed papillary type maxillary labial frenum attachment with diastema between maxillary central incisors (fig1a). It was decided to treat this patient with conventional frenectomy technique with the scalpel after taking consent.

Armamentarium - Haemostat, BP handle, scalpel blade no.15, gauze sponges, 3-0 black silk sutures, suture pliers, scissors, and a periodontal dressing (Coe-pak).

Surgical procedure: The area was anesthetized with a local infiltration by using 2% lignocaine with 1:200000 adrenaline. The frenum was engaged with a haemostat which was inserted into the depth of the vestibule [Fig-2a] and incisions were placed on the upper and the undersurface of the haemostat until the haemostat was free. The triangular resected portion of the frenum with the haemostat was removed. A blunt dissection was done on the bone to relieve the fibrous attachment [fig-3a]. The edges of the diamond-shaped wound were sutured by using 3-0 black silk with interrupted sutures [Fig-4a]. The area was covered with a periodontal pack [fig-5a]. Patient was prescribed with analgesic Tab Diclomol 50mg TDS for 3days. The pack and the sutures were removed 1 week post-operatively. The healing was uneventful. [fig-6a] showed postoperative view after 8 weeks.

2. Miller's technique^[16]: Miller PD in 1985

Indication: For the post-orthodontic diastema cases.

Timing: After the orthodontic movement is complete and about 6 weeks before the appliances are removed. This not only allows healing and tissue maturation, but it also permits the surgeon to use orthodontic appliances as a means of retaining a periodontal dressing.

Armamentarium: Haemostat, scalpel blade no.15, gauze sponges, 5-0 black silk sutures, suture pliers, scissors, and a periodontal dressing (Coe-pak).

Surgical procedure: (1) first a horizontal incision to separate the frenulum from the interdental papilla, (2) excision of the frenulum and exposure of labial alveolar bone in the midline, (3) then take a laterally positioned pedicle graft to obtain primary closure across midline and (4) gingivoplasty of any excessive interdental tissue labially or palatally.

3. V-Y Plasty^[17]

Indication: For lengthening the localized area, like the broad frena (papillary type) in the premolar-molar area.

Armamentarium: Haemostat, scalpel blade no.15, gauze sponges, 4-0 black silk sutures, suture pliers, scissors, and a periodontal dressing (Coe-pak).

Surgical procedure: After anesthesia holds frenum with the haemostat and made an incision in the form of V on the undersurface of the frenal attachment. Then relocate frenum at an apical position and convert the V-shaped incision into a Y and suture with 4-0 silk sutures. A periodontal pack can be placed.

4. Z Plasty

Indication: Hypertrophic labial frenum with a low insertion, which is associated with an inter-incisor diastema and also in cases of a short vestibule.

Case report 2: A 22 years male patient presents with chief complaint of irregular teeth and a bad look. A patient was referred from the department of orthodontics for frenectomy. Patient's medical history was not significant.

Intraoral examination showed papilla penetrating type hypertrophic labial frenum and midline diastema between maxillary central incisors with anterior open bite and proclined incisors [fig.1b].

After taking patient's consent it was decided to do frenectomy with 'Z' plasty technique with scalpel.

Armamentarium: Scalpel blade no.15, gauze sponges, tissue forceps, 4-0 vicryl sutures, suture pliers, scissors.

The area was anesthetized with a local infiltration by using 2% lignocaine with 1:200000 adrenaline. The length of the frenum was incised with the scalpel [Fig.2b, 3b]. Horizontal limbs for 'Z' plasty were marked at each end at 60° angulations [fig.4b]. By using tissue forceps, with care not to damage the apices of the flaps, the submucosal tissues were dissected beyond the base of each flap. Thus, double rotation flaps which were at least 1 cm long were obtained. The resultant flaps which were created were mobilized and rotated to close the vertical incisions horizontally [Fig-5b]. Absorbable 4-0 vicryl sutures were placed, first through the apices of the flaps, to ascertain the adequacy of the flap repositioning and

then they were evenly spaced along the edges of the flaps, to close the wound along the cut edges of the attached mucoperiosteum and the labial mucosa [Fig-5b]. Sutures were removed after 1 week [Fig 6b]. The healing was found to be uneventful, with no hypertrophic scar formation and tension at the frenum area.

Figure legends

Case report 1

Fig.1a: Maxillary labial frenum (Papillary type) with diastema between maxillary central incisors.

Fig.2a: The frenum was engaged with a haemostat which was inserted into the depth of the vestibule.

Fig.3a: A blunt dissection was done on the bone to relieve the fibrous attachment.

Fig.4a: The edges of the diamond shaped wound were sutured by using 3-0 black silk with interrupted sutures.

Fig.5a: The area was covered with a periodontal pack.

Fig.6a: showed postoperative view after 8 weeks.

Case report 2

Fig.1b: Showed papilla penetrating type hypertrophic labial frenum and midline diastema between maxillary central incisors with anterior open bite and proclined incisors.

Fig.2b: The length of the frenum was incised with the scalpel

Fig.3b: Horizontal limbs for 'Z' plasty were marked at each end at 60° angulations.

Fig.4b: The resultant flaps which were created were mobilized and rotated to close the vertical incisions horizontally.

Fig.5b: Sutures given.

Fig.6b: Postoperative view after 3 weeks.

Figures



Fig. 1a



Fig.2a



Fig.3a



Fig. 4a



Fig.5a



Fig.6a



Fig. 1b



Fig. 2b



Fig. 3b



Fig. 4b



Fig. 5b

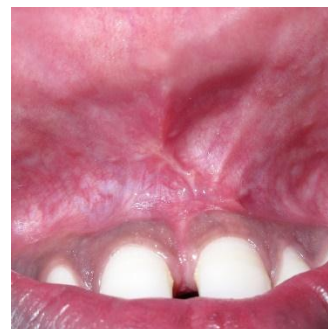


Fig. 6b

DISCUSSION

The relationship between the maxillary midline diastema and the labial frenulum has been the subject of much controversy. Prior to 1940, frenectomy was considered before orthodontic treatment.^[18] Frenulum was considered to be the primary cause of the diastema. Later on, Broadbent^[19] showed the problem is self-correcting after eruption of teeth. Taylor^[20] in examining 6-year-olds found that 98% had a midline diastema. By age 12 only 7% still had a persistent diastema, thus confirming the findings of Broadbent.

Currently, surgical correction is advocated after orthodontic treatment and eruption of the permanent maxillary anterior teeth. It may be because of difficulty in moving teeth through scar tissue and the self-correcting nature of the problem.^[20]

A classical frenectomy is widely followed technique instead of various modifications. The classical technique leaves a longitudinal surgical incision and scarring, which may lead to periodontal problems and an unaesthetic appearance, thereby necessitating other modifications.^[17]

The Z-plasty technique is indicated as ideal for a broad, thick hypertrophic frenum with a low insertion, in presence of with an inter-incisor diastema and a short vestibule. It removes the fibrous band and helps to achieve vertical lengthening of the vestibule. Basic Z-plasty flaps are created using an angle of 60° on each side. Classic 60° Z-plasty lengthens scars by 75%, while 45° and 30° designs lengthen scars by 50% and 25%, respectively.^[21] The Z pattern is effective as it promotes

re-distribution of tension on the skin and the wound and helps in healing along the skin lines. It helps in minimizing scar formation and has a camouflaging effect. Angles which are smaller than 60° are easier to transpose but results in less lengthening and realignment of the scar to <90°. Angles larger than 60° should be avoided because the force required transposing the flaps increases markedly, making the closure of the wound difficult. The length of each of the lateral limbs of the Z-plasty must be precisely equal to the central incision over the original scar, or puckering at the corners will occur, and additional undermining and trimming of the flaps will be necessary to obtain proper closure. Precisely, equal lengths and angles of the lateral arms are keys for obtaining proper flap closure after transposition in Z-plasty.^[22]

CONCLUSION

Frenectomy is a removal of frenum should be considered for potential complications associated with it. Various techniques can be employed for the same but selection of it according to the type of attachment is important for the achievement of proper functional and aesthetic result. Electrocautery and laser have its merits and demerits over other technique but cost-effectiveness also considered before treatment planning.

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