

## Freedom from the Frenum: The Journey So Far

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### Abstract

This case series focuses on the various treatment procedures for maxillary frenum. A number of morphological variations of the maxillary frenum has been reported and no pre-set procedure can be used for all of them. Therefore, a careful assessment of the type of frenum is required for a tailor-made treatment to ensure complete removal of the frenal attachments to prevent re-attachment that may call for a second surgical procedure.

**Keywords:** Frenectomy; Frenum; Frena; Mucogingival Deformity; Aberrant Frenum

### Introduction

A frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attaches the lips and cheeks to the alveolar mucosa or gingiva and underlying periosteum [1]. The basic function of the frena is to provide stability to the lips, buccal, labial mucosa, in addition to an accessory role in speech and tongue movement with regards to the lingual frenum.

Based on the location there are three frena in the maxillary arch including two buccal and one labial frenum and four in the mandibular arch which includes two buccal, one labial and one lingual frenum/frenulum.

Based on attachment, it is classified by Mirko, *et al.* in the year 1974 [2] as:

- A. Mucosal attachment of the frenum: an attachment of the frenum to the mucogingival junction.
- B. Gingival attachment: an attachment of the frenum to the attached gingiva.
- C. Papillary attachment: insertion of the frenum at the papilla.
- D. Papilla penetrating attachment is in those cases when the attachment of the frenum passes right up to the papilla while inserting in attached gingiva.

According to 2017 classification, aberrant frena lies under the subcategory of mucogingival deformities and conditions around the teeth that falls into the main category of developmental and acquired conditions. The word 'aberrant' refers to any deviation from normal. In this context, an aberrant frenum would be one which is too close to the marginal gingiva and interfering with oral hygiene, the pull of which causes gingival recession and/or midline diastema. These cases often warrant a frenectomy, which is the complete surgical removal of the frenum and severing all of its underlying muscle attachment.

According to Olivi., *et al.* indications for frenectomy include [3]:

- i. Anomalous frenum associated with inflamed gingiva, resulting from poor oral hygiene.
- ii. Anomalous frenum associated with gingival recession.
- iii. Maxillary frenum associated with a diastema after complete eruption of the permanent canines.
- iv. Abnormal and/or anomalous maxillary frenum (class III or IV), resulting in the presence of a diastema during mixed dentition.
- v. Anomalous mandibular frenum with high insertion, causing the onset of gingival recession.

A number of surgical methods have been reported for frenectomy. The most common of which are scalpel and laser techniques. This case series shall discuss maxillary labial frenectomy using the following procedures:

- Conventional method
- Paralleling method
- Z-plasty
- Laser frenectomy.

### Case Series

Informed Consent was taken from all patients before commencement of surgical procedures. Haematological Investigation were carried out and all the results were within physiological limits.

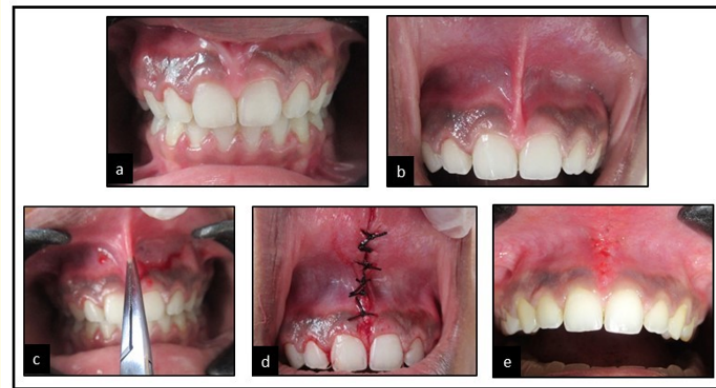
#### Case 1: Classical technique

The classical technique was introduced by Archer (1961) and Kruger (1964). This approach was advocated in the 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 [4]. Armamentarium used include no.15 surgical blade on a BP blade handle, haemostat, 4-0 black braided silk, needle holder, cotton gauze, normal saline.

After infiltration of adequate local anaesthetic, the frenum is held with a haemostat till its deepest portion. Incisions were given above and below the held haemostat until it was free with the severed frenum. The excision of the frenum results in a rhomboidal defect. The remaining attached fibres were dissected and the site was re-checked for residual attachments. The edges of the rhomboidal wound were approximated and sutured using interrupted sutures. Post-surgical instructions were given to the patient. Patient was recalled for suture removal and post-operative healing was satisfactory (Figure 1).

#### Case 2: Paralleling technique

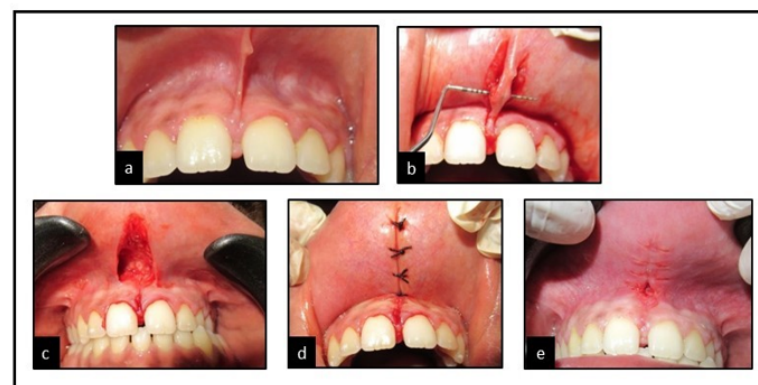
This technique was advocated as a more conservative approach and to overcome the issue of open wound at the base of the conventional frenectomy site which was thought to predispose patient discomfort and inability to maintain oral hygiene [5].



**Figure 1:** Conventional technique. 1a and 1b: Pre-operative photograph. 1c: Frenum held with hemostat. 1d: Suturing done. 1e: 1 week post-operative.

This method is often indicated in patients with papillary or papilla penetrating type of attachment and a narrow band of fibrous attachment is seen. Armamentarium used include no.15 surgical blade on a BP blade handle, periodontal probe, 4-0 black braided silk, needle holder, cotton gauze, normal saline.

After the area is anaesthetised with infiltration of 5ml of 2% local anaesthetic with vasoconstrictor, the frenum is retracted and two incisions are placed parallel to each other longitudinally on either side of the frenum. Any muscle and/or fiber attachment was severed using blunt dissection. Relieving incisions were given at the superior and inferior aspects to completely excise the frenum. The wound is a narrow rectangular defect. Interrupted sutures were placed approximating both the edges of the wound resulting in a primary closure. Suture removal was done (Figure 2).



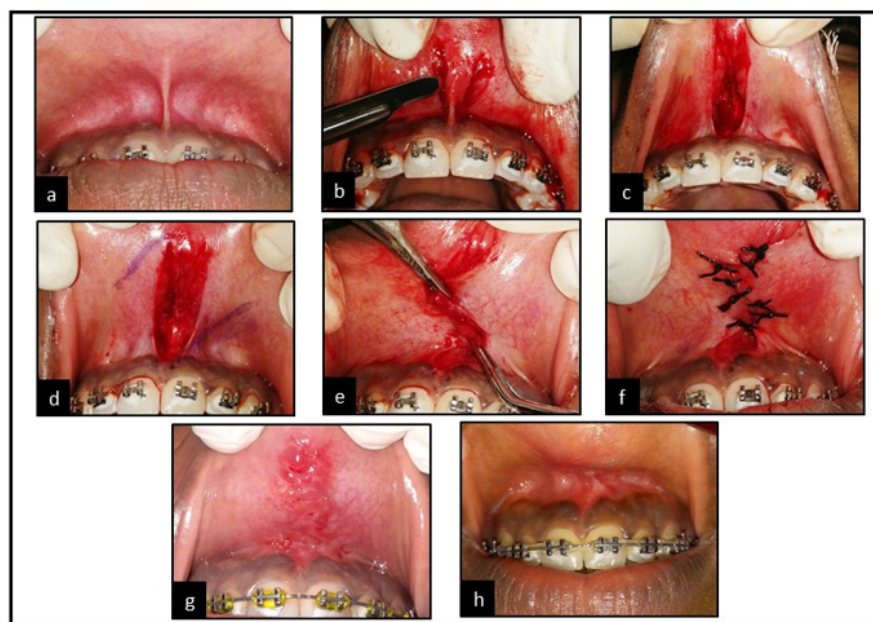
**Figure 2:** Paralleling technique. 2a: Pre-operative photograph. 2b: Frenum excised with parallel incisions. 2c: Surgical wound after frenum excision. 2d: Suturing done. 2e: Week post-operative.

### Case 3: Z-plasty technique

The technique Z plasty was given by Schuchardt [6].

It is used in cases of frenum hypertrophy or a frenum with wide base. The theory behind this method is the approximation of the flaps to cover the intraoperative area and preventing a gaping wound.

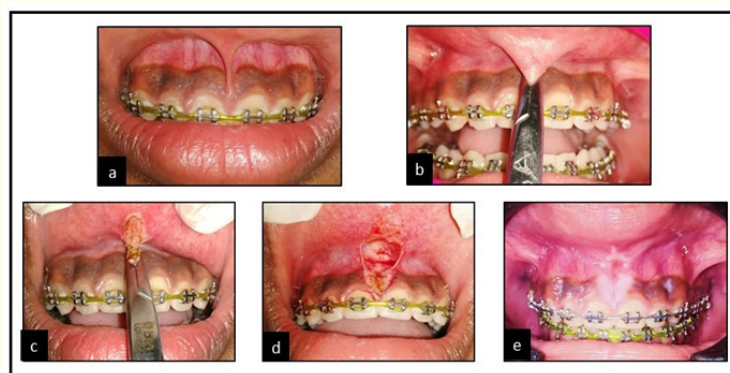
After injecting 2% local anaesthetic, the length of the frenum was excised similar to the paralleling technique. After this, at the ends of the frenal attachment markings were made with tissue marking pencil at sites of future incisions at angles between 60 to 90 degrees. Precaution is to be exercised in ensuring that the length of these incisions should correspond to the area to be approximated by these future flaps. By using tissue forceps, the tissue is incised underneath to relieve the flap on both places. Thus, resultant double flaps are obtained which are the transposed covering the opposing areas. Suturing is done initially at the apices of the triangle to prevent tension on the suture lines and approximation of the flaps without folding of the flaps is done and sutured with interrupted sutures. Suture removal was done and healing was satisfactory with no scar formation (Figure 3).



**Figure 3:** Z-plasty. 3a: Pre-operative photographs. 3b: Incisions given on either side of the frenum. 3c: Surgical wound. 3d: Marking of future incision position. 3e: Flap approximation. 3f: Suturing done. 3g: 1 week post-operative. 3h: 2 weeks post-operative.

### Case 4: Laser frenectomy

In this case, Diode Laser of wavelength 810 nm was used with 5 W in contact mode. A patient with papillary type of frenum was selected and local anaesthetic was administered. The frenum was held with haemostat placed deep into the vestibule. The fiberoptic of the laser was used to excise the frenum both above and below the held haemostat. The tissues were continuously mopped with saline soaked gauze. No sutures were given after the procedure (Figure 4).



**Figure 4:** Laser frenectomy. 4a: Pre-operative photograph. 4b: Frenum held with hemostat. 4c: Intra-operative. 4d: Immediate post-operative. 4e: 10 days post-operative.

## Discussion

In addition to the age-old traditional techniques, a number of modifications in interventions have been reported throughout literature. Although termed as the conventional technique, the procedure cannot be considered as gold standard due to its inherent disadvantages. Although merits are that the procedure ensures complete removal of underlying attachments as the rhomboidal surgical wound provides accessibility to sever the attachments. Limitations include scar tissue formation, loss of interdental papilla in cases of papilla-penetrating type, increased post-operative discomfort [7].

Edward [8] advocated a modification of the conventional procedure, by apically repositioning of the frenum, splitting of trans septal fibers between two central incisors followed by gingivoplasty of excess labial/palatal tissue in the interdental area. However, the healed scar in the midline appeared unaesthetic to the subjects.

Another modification is the Incision Below the Clamp Technique wherein the incision is performed by placing the clamping parallel to the vestibule depth and near lips mucosa, and then incision is performed beneath the haemostat and this is followed by immediate suturing after incision on the area of the mucolabial fold. This is in contrast to incision performed over the clamp in conventional technique would create a wide open wound that leads to excessive bleeding given the enormous amount of small capillaries in the site, and incision below the haemostat and tissue removal will also cause mucolabial fold that retracts laterally and worsens the situation [9].

Paralleling technique offers many benefits and has been used extensively due to patient comfort factors [10]. However, improper case selection for the same can lead to a greater risk than benefit. Advantages of this method include Primary closure, better patient perception, decreased chances of loss of interdental papilla [11]. The limitation of the paralleling technique is that it cannot be used on frena with a wider base as it can lead to a larger surgical wound similar to a conventional technique.

Z-plasty is a procedure that is often undertaken. Merits of this procedure include healing by primary closure, vertical deepening of the vestibule. The only demerit of z-plasty procedure is that it often becomes tedious to the clinician. Advantages of V-Y plasty include minimal surgical intervention Disadvantages include unesthetic results in thick, hypertrophic frenum.

Miller's technique: Advantage of this method is the prevention of orthodontic relapse as the flap provides a collagenous band of tissue rather than the formation of a scar. Limitations are it can be attempted only in patients with adequate attached gingiva and vestibular depth [12].

V-Y Plasty is a surgical method done to lengthen the localised area in addition to removal of frenum. It is advocated most often for the buccal frena. A V-shaped incision is given at the base of the attachment of the frenum, relieving the frenum and the relocating it to a more apical portion. This converts the initial V to a Y shaped defect. This is then sutured in the shape of the corresponding Y. However, this can lead to insufficient closure of the wound and healing by secondary intention which may ultimately lead to a negative aesthetic outcome [3].

The technique advocated by Miller PD in the year 1985 involves excision of frenum along with a triangular shaped lateral pedicle graft obtained from the adjacent region and coronally advanced to superimpose onto the exposed zone and sutured. The ideal time for performing this surgery is 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 [4].

Other innovative interventions include 1. Modified Papilla Preservation frenectomy Technique by Kadkhodazadeh M., *et al.* 2016 [13]: A technique to minimize the surgical scar on the buccal surface and preserve the papilla, thereby yielding optimal aesthetic results. Limitation includes the requirement of an extra incision in the palatal surface to preserve the papilla. 2. Modified Double Pedicle Flap by Bagga., *et al.* 2006 [14] which involves a V-shaped incisions followed by approximation of the wound defect by two triangular pedicle flaps from the adjacent attached gingiva.

Although the use of diode laser seems to be a more feasible option for the clinician, it can act as a double edged sword in terms of lack of bleeding, which may provide patient comfort but also prolong the post-operative healing period [15].

In addition to the type of frenal attachment, the depth of vestibule is also an important factor to be considered before commencing frenectomy procedures, in instances of adequate vestibular depth, a frenectomy would suffice but an aberrant frenum with inadequate vestibular depth calls for vestibular deepening followed by frenectomy procedure to provide space for the frenal re-attachment at a more apical position.

## Conclusion

As there are two sides to a coin, there are benefits and limitations to each procedure. With the advent of newer technologies, innovative aspects of intervention rise up. However, the ultimate goal of any treatment is predictable and favourable outcomes. Any treatment decision taken should be based on the presenting clinic features and available resources, for which a knowledge of the indications and contra-indications of each technique must be sound. The procedure should be custom-made to obtain the expected results.

## Conflict of Interest

Nil.

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