https://doi.org/10.48047/AFJBS.7.8.2025.481-492

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

FRENECTOMY CASE SERIES THE JOURNEY SO FAR

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Volume:7Issue,8Aug2025

Received:20Jun,2025

Accepted:15July,2025

Published:22Aug2025

doi:10.48047/AFJBS.7.8.2025.481-492

ABSTRACT

The frenum is a mucous membrane fold that attaches the lip and the cheek to the alveolar mucosa, the gingiva, and the underlying periosteum. The 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. This case series focuses on the various treatment procedures for maxillary frenum.

KeyWords:Frenectomy,LASER,Electrocautery,Z Plasty , V-Y Plasty , Paralleling Technique

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]. Aesthetic concerns have increased the importance of seeking dental treatment to achieve a perfect smile. The continuing presence of a diastema between the maxillary central incisors in adults has often been considered an aesthetic problem. The presence of an aberrant frenum is one of the aetiological factors for the persistence of a midline diastema, the focus on the frenum has

become essential [2]. The delay in correcting these abnormal frenal attachments puts the patients at risk of compromised oral hygiene, gingival recession, bone loss, periodontitis, and eventually tooth loss [3].

CLASSIFICATION OF FRENUM

Classification of frenal attachments by Sewerin (1971) [5]

- Normal frenum
- Simple frenum with nodule
- Simple frenum with appendix
- Simple frenum with nichum
- Bifid frenum
- Persistent tectolabial frenum
- Double frenum
- Wider frenum

Classification of frenal attachments by Mirko et al (1974) [3]

- Mucosal – when the frenal Fibers are attached to the mucogingival junction.
- Gingival – when the Fibers are inserted within the attached gingiva.
- Papillary – when the Fibers extend into the interdental papilla.
- Papilla penetrating – when the frenal Fibers cross the alveolar process and extend up to the palatine papilla.

According to Olivi., *et al*. indications for frenectomy include [4]:
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 the 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.

Several 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/Classical method

- ❖ Paralleling method
- ❖ Z-plasty
- ❖ Electrocautery frenectomy
- ❖ Laser frenectomy
  .
- ❖ Modified Frenectomy Technique
- ❖ V-Y Plasty

CASE 1: CLASSICAL/CONVENTIONAL TECHNIQUE

The classical technique was introduced by Archer (1961) and Kruger (1964). This technique is an excision-type frenectomy that includes the interdental tissues, the palatine papilla, and the frenulum [6].

INDICATION:

This approach is advocated in midline diastema cases with an aberrant frenum to ensure the removal of the muscle Fibers that were supposedly connecting the orbicularis oris with the palatine papilla [6]

ARMAMENTARIUM:

It includes a no.15 surgical blade on a BP blade handle, a hemostat, 4-0 black braided silk, a needle holder, cotton gauze, and normal saline.

PROCEDURE:

After infiltration of adequate local anesthetic, 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 Fibers 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. The patient was recalled for suture removal and post-operative healing was satisfactory (Figure 1)

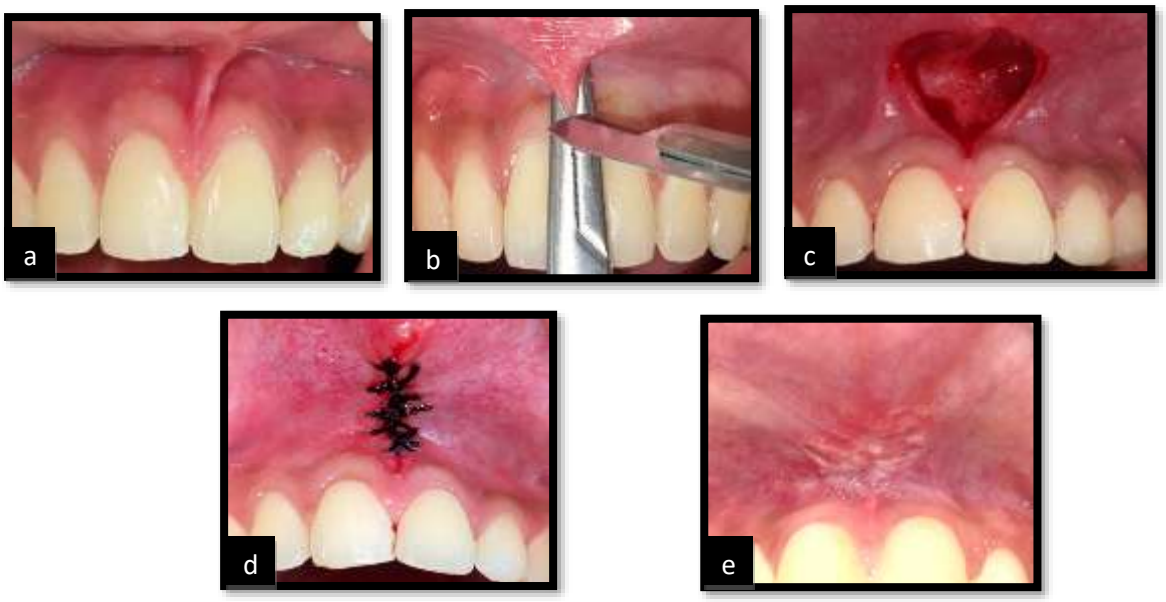

FIGURE 1: **classical/conventional technique** *1a: Pre-operative photograph. 1b: Frenum held with hemostat. 1c.d: Intraoperative 1e: 1week post-operative.*

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 [7]

INDICATION

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:

It includes a no.15 surgical blade on a BP blade handle, a hemostat, 4-0 black braided silk, a needle holder, a periodontal probe, cotton gauze, and normal saline.

PROCEDURE:

The area is anaesthetized 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 Fiber attachment was severed using blunt dissection. Relieving incisions were given at the superior and inferior aspects to excise the frenum completely. 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 and post-operative healing was satisfactory (Figure 2)

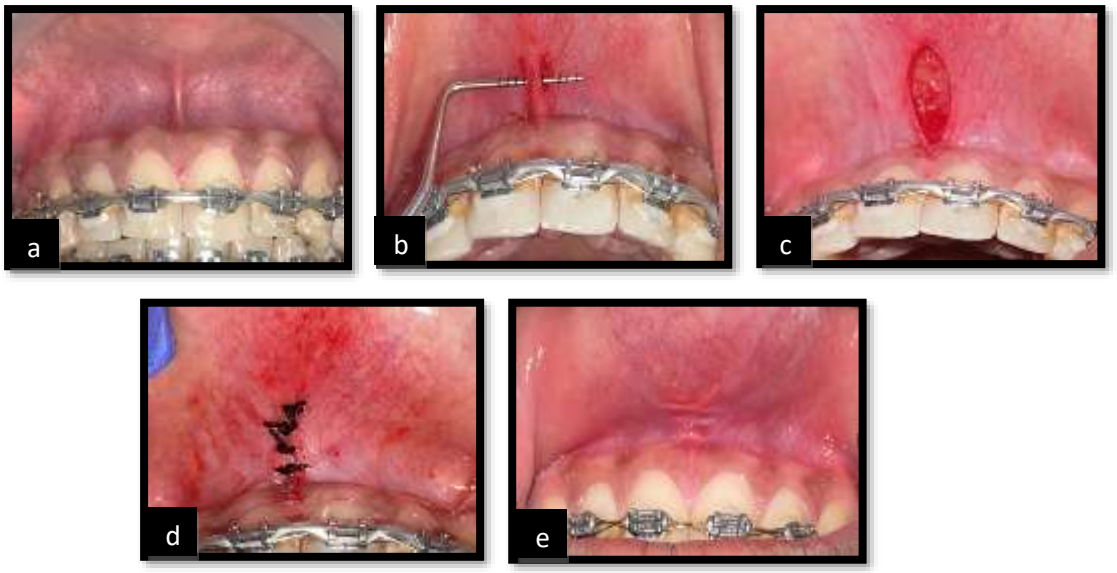

Figure 2: *Paralleling technique. 2a: Pre-operative photograph. 2b: Frenum excised with parallel incisions. 2c: Surgical wound after frenum excision. 2d: Suturing done. 2e: Week post-operative.*

CASE REPORT 3 (Z PLASTY)

The technique Z plasty was given by Schuchardt [8]

INDICATION

This technique is indicated for hypertrophic labial frenum with a low insertion, associated with an inter-incisor diastema, The theory behind this method is the approximation of the flaps to cover the intraoperative area and prevent a gaping wound.

ARMAMENTARIUM:

It includes no.15 surgical blade on a BP blade handle, hemostat, 4-0 black braided silk, needle holder, cotton gauze, and normal saline.

PROCEDURE:

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)

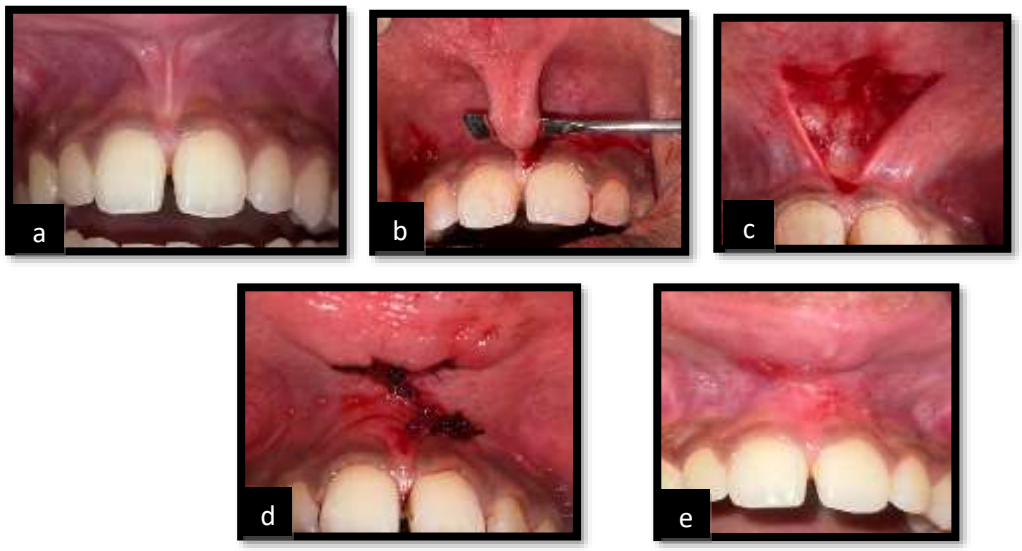

Figure 3: *Z-plasty. 3a: Pre-operative photographs. 3b: Incisions given on either side of the frenum. 3c: Surgical wound. 3d: Suturing done. 3e: 2week post-operative.*

CASE REPORT 4 (ELECTROCAUTERY)

Electrosurgery has been defined as the intentional passage of high-frequency waveforms, or currents through the body's tissues to achieve a controllable surgical effect. By varying the mode of application of this type of current, the clinician can use electrosurgery for cutting or coagulating soft tissues[9]

ARMAMENTARIUM:

It includes no.15 surgical blades on a BP blade handle, hemostat, 4-0 black braided silk, needle holder, cotton gauze, normal saline, and Electrosurgical unit

PROCEDURE:

After administering adequate local anesthesia with a solution of 2% lignocaine with 1:80,000 adrenaline; a hemostat was inserted into the depth of the vestibule to grasp the frenum The setting on the cutting electrode was set to a power supply of 230V, frequency of 50/60Hz, 1.25A, and power output of 50+20%VA. The output power was kept at 50W. Two incisions using the loop electrode were made as in the classical frenectomy technique, above & below the hemostat. Continuous saline irrigation was done during the procedure. The triangular tissue of the labial frenum was then removed and blunt dissection was done on the bone and laterally

from the incision lines on both sides to relieve the fibrous attachments, following which, the edges of the diamond-shaped wound were sutured using 3-0 black silk interrupted sutures.(Figure:4)

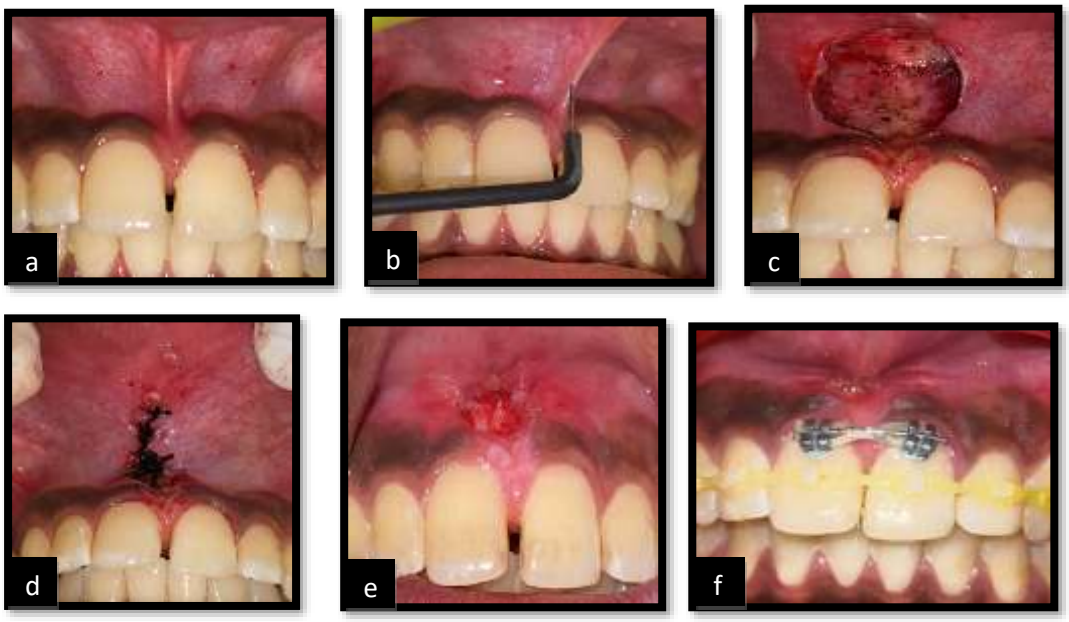

Figure 4: Electrocautery*. 4a: Pre-operative photographs. 4b: frenum excised with loop electrode. 4c:* Blunt dissection was done to release fibrous attachments on both sides of the incision*. 4d: Suturing done. 4e: 1week post-operative. 4f: 2 weeks post-operative.*

CASE REPORT 5 (LASER FRENECTOMY)

Diode lasers are semiconductors that use solid-state elements as active media, with wavelengths between 810nm and 980nm. Because diode laser wavelengths approximate the absorption coefficient of pigmented tissue containing hemoglobin, melanin, and collagen chromophores, they are indicated for soft-tissue surgeries[10].

ARMAMENTARIUM:

It includes no.15 surgical blade on a BP blade handle, hemostat, 4-0 black braided silk, needle holder, cotton gauze, normal saline, and Diode Laser

PROCEDURE:

In this case, a Diode Laser of wavelength 810 nm was used with 5 W in contact mode. A patient with a 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:5)

Figure 5: *Laser frenectomy. 5a: Pre-operative photograph. 5b: Immediate post-operative. 5c: 14 days post-operative.*

CASE REPORT 6 (MODIFIED FRENECTOMY TECHNIQUE)

In the new technique for labial frenectomy in the maxilla, surgical incisions are made on the palatal surface. Frena extending to the palatal papilla may be associated with bone defects in the midline. Thus, the attachments in the bone surface and underneath the papilla must be eliminated. For this purpose, the papilla preservation flap can be combined with classic frenectomy to efficiently preserve the papilla. The technique is designed to minimize the surgical scar on the buccal surface and preserve the papilla, thereby yielding optimal esthetic results [14].

ARMAMENTARIUM:

It includes no.15 surgical blade on a BP blade handle, hemostat, 4-0 black braided silk, needle holder, cotton gauze and normal saline.

PROCEDURE:

First, a semilunar incision is made in the palatal surface 5 mm from the tip of the papilla. Next, sulcular incisions are made around the teeth. The papilla preservation flap is elevated between the teeth to transpose the papilla from the palatal to the buccal.19 A 1.0- to 1.5-mm full-thickness flap, extensive enough to allow easy access to the bone defect, is elevated at the buccal surface. The attachments are separated from the defect and bone surface with a curette. After the attachments in the defect are completely eliminated, the flap is repositioned and sutured to the palatal surface. The frenum is then classically cut and sutured via frenotomy. In this way, the position of the frenum is changed apically without invading the papilla.(Figure 6)

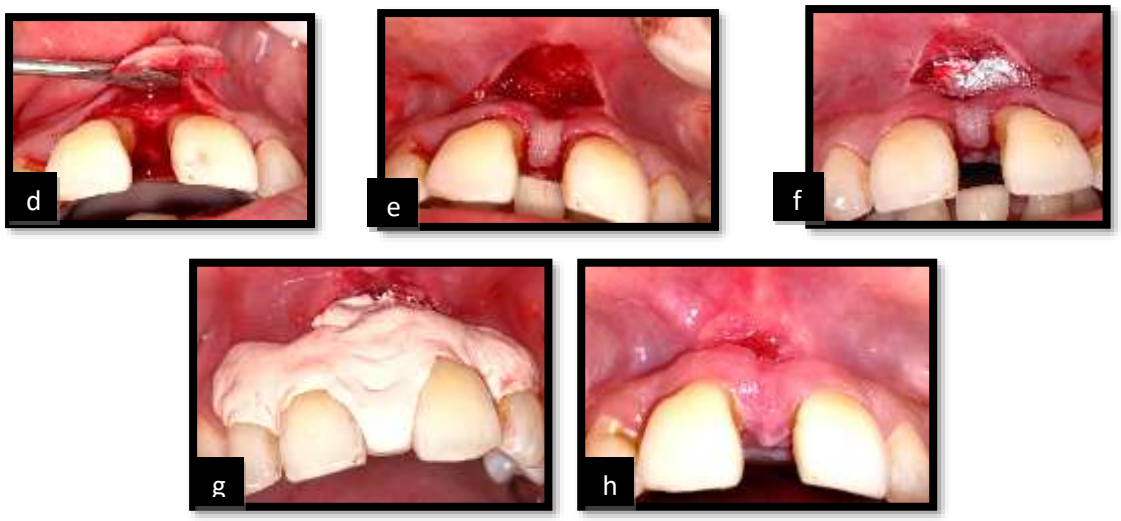

Figure 6: *Modified frenectomy Technique. 6a, b: Pre-operative photograph. 6c, d:* A semilunar incision is made in the palatal surface and continued in the form of a sulcular incision to elevate the flap 6e,f: The frenotomy done 6g: Coe Pack Placed 6h: 10 Days Postoperative

***CASE REPORT 7 (*V-Y PLASTY)**

V-Y plasty is a prevalent technique used in plastic surgery procedures. In this procedure, a V-shaped incision is made on the lower part of the frenal attachment, followed by an undermining of peripheral tissues [18]

INDICATION:

elongating the area with an abnormal frenal attachment to improve esthetic appearance in midline diastema cases, and also less scar formation is maintained [18]

ARMAMENTARIUM:

It includes no.15 surgical blade on a BP blade handle, hemostat, 4-0 black braided silk, needle holder, cotton gauze and normal saline.

PROCEDURE:

the area was anesthetized with a local infiltration 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. The frenum was relocated at an apical position and the V-shaped incision was converted into a Y, by suturing it with 4-0 silk sutures. A periodontal dressing was placed. The periodontal dressing and the sutures were removed at one week of follow-up (Figure 7)

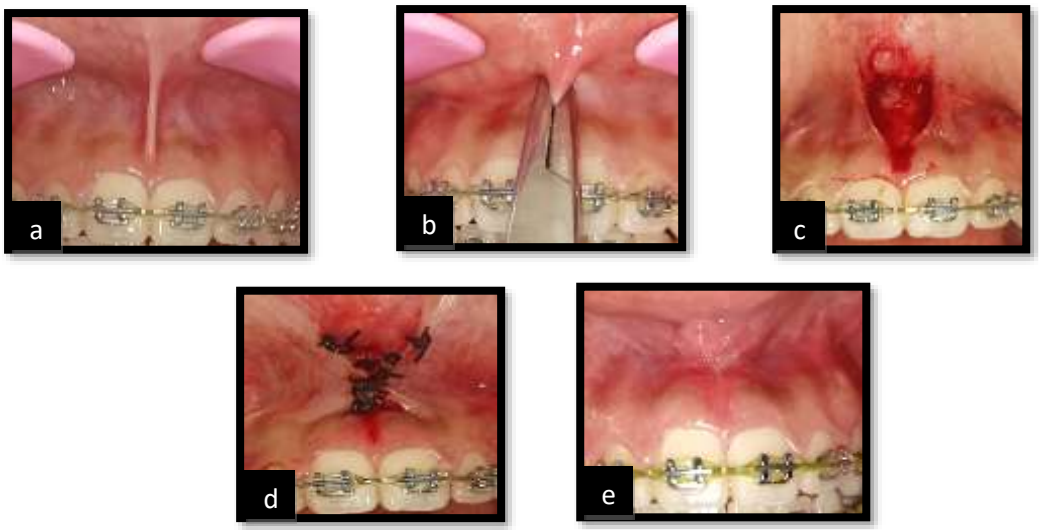

Figure 7: V-Y PLASTY*. 7a: Pre-operative photographs. 7b: frenum holds with haemostat 7c:* V incision was given to release fibrous attachments on both sides and reposition the V incision to form a Y shape*. 7d: Suturing done. 7e:2 weeks post-operative.*

DISCUSSION:

In the era of periodontal plastic surgery, more conservative and precise techniques are being adopted to create more functional and aesthetic results. The diagnosis of the hypertrophic frenum is usually made when, upon pulling the frenum, blanching of the palatal papilla can be observed. Mirko et al.[3] found that certain types of maxillary frenum influence the periodontal condition, In addition to the age-old traditional techniques, several intervention modifications have been reported throughout the literature. Although the procedure is considered a conventional technique, it cannot be considered a 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 severe attachments. Limitations include scar tissue formation, loss of interdental papilla in cases of papilla-penetrating type, and increased post-operative discomfort [11].

The paralleling technique offers many benefits and has been used extensively due to patient comfort factors [12]. 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, and decreased chances of loss of interdental papilla [13]. The limitation of the paralleling technique is that it cannot be used on the frenum with a wider base as it can lead to a larger surgical wound similar to a conventional method.

Other innovative interventions include 1. Modified Papilla Preservation Frenectomy Technique by Kadkhodazadeh M., *et al*. 2016 [14]: 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.

Although the use of a 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

Awooda et al., [15] performed frenectomy in eight patients using a diode laser and showed a dry and bloodless field during the operation, no post-operative swelling, no pain or discomfort, with a normal healing process. The authors suggest and stimulate the use of laser for soft tissue surgery because of its time-saving, patient comfort, and easy manipulation
Electrosurgery can be used to perform other periodontal surgical procedures like gingivectomy, gingivoplasty, incision, and drainage of the periodontal abscess, biopsies, operculectomy, soft tissue-ridge recontouring, etc. However, extra caution must be carried out to avoid contact with the bone since irreparable damage will occur. The major advantage of electrosurgery today is the coagulation to reduce bleeding and resulting in a clean field with better visibility during the surgery [16]
In addition to the type of frenal attachment, the depth of the 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:

While an aberrant frenum can be removed by any of the modification techniques that have been proposed, a functional and aesthetic outcome can be achieved by a proper technique selection, based on the type of the frenal attachment. Though the approaches to the problem of not using the traditional scalpel, like electro-surgery and lasers have merits, further improvements can still be attempted. With the advent of newer technologies, innovative aspects of intervention rise. However, the ultimate goal of any treatment is predictable and favorable outcomes. Any treatment decision taken should be based on the presenting clinic features and available resources, for which knowledge of the indications and contra-indications of each technique must be sound. The procedure should be custom-made to obtain the expected results.

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