



Comparative Results of Frenectomy by Different Surgical Techniques - A Case Series

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Abstract

Introduction: A frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attach the lips and cheeks to the alveolar mucosa and/or gingiva and underlying periosteum. Maxillary labial frenum is capable of creating a diastema and recession, affecting aesthetics. In addition to that, high frenum also hinders oral hygiene maintenance. Aberrant frenal attachment is a very common problem in Indian population. Various surgical techniques are available for correction of the same.

Objective: The present case series was attempted to evaluate the difference in post-operative pain levels with VAS scale at 24 hours and 7th day.

Materials and Methods: Patients with high labial frenum were randomly selected from the outpatient periodontology department, in whom frenectomies were performed by conventional scalpel technique, electro-cautery, soft tissue diode laser, Z plasty and paralleling technique. Their post-operative follow ups at 24 hours and 7th day were compared for the differences in post-operative comfort levels.

Conclusion: Soft tissue diode laser frenectomy can be considered as the most comfortable surgical procedure with comparatively less post-operative pain.

Keywords: Frenectomy; Midline Diastema; Soft Tissue Diode Laser; Mucogingival Technique; Aberrant Frenum

Introduction

In the oral cavity, frenum is yet often misunderstood anatomic structure. Now-a-days people are concerned about aesthetic smile and closure of diastema between maxillary central incisors. High aberrant frenal attachment is a very common delinquent in the general population and people want to achieve the pleasing smile. The aberrant frenum encroaches gingival problems leading to gingival recession and midline diastema which may interfere with plaque removal and placement of tooth brush that may cause tension on this frenum.

A frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attach the lips and cheeks to the alveolar mucosa and/or gingiva and underlying periosteum [2]. It extends over the alveolar process in infants and forms a raphe that reaches the palatal papilla. Over the growth of alveolar process as the teeth erupt, this attachment generally changes to assume the adult configuration. The primary function of frenum is to provide stability of the upper and lower lip and the tongue [3].

Depending upon the extension of attachment of fibres, frenum has been classified as follows [4]:

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

Other variations of normal frenal attachment include [5]:

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

Clinically, papillary and papilla penetrating frenum are considered as pathological and have been found to be associated with loss of papilla, recession, diastema and plaque accumulation [6,7]. Removal of the aberrant frenum is enabled by either frenotomy or frenectomy. Frenotomy is the incision and relocation of the frenal attachment, whereas frenectomy is the complete excision of the frenum along with its attachment to the underlying bone [8].

Frenectomy can be treated by different surgical techniques including conventional (scalpel) technique, electrocautery and soft tissue diode lasers. Amongst these with conventional frenectomy technique patient experiences discomfort and pain after surgery. So, one of the most common alternative and feasible technique for laser frenectomy is soft tissue diode laser. Lasers, such as the neodymium doped:yttrium aluminum garnet (Nd:YAG), carbon dioxide (CO₂), and erbium-doped (Er):YAG lasers, enable minimally invasive dentistry for soft tissue procedures [9]. Diode lasers are semi-conductors and they are indicated for soft tissue surgeries as their wavelength approximates the absorption coefficient of pigmented tissues containing hemoglobin, melanin, and collagen chromophores [10]. The aim of the present case series was to evaluate the difference in post-operative pain levels with VAS scale at 24 hours and 7th day post-frenectomy using different techniques.

Materials and Methods

Since the conventional procedure of frenectomy was first proposed, a number of modifications of the various surgical techniques like the Miller's technique, V-Y plasty and Z-plasty have been developed to solve the problems which are caused by abnormal labial frena. The clinical comparative study was carried out in department of periodontology, V.Y.W.S. Dental College and Hospital, Amravati. Systemically healthy participants with maxillary papillary or papilla penetrating type frenum with good oral hygiene were selected in the case series.

Diagnosis

The aberrant frena are detected visually by applying tension over the frenum to see the movement of the papillary tip or the blanch which is produced due to ischaemia in the region. The frenum is characterized as pathogenic when it is unusually wide or when there is no apparent zone of the attached gingiva along the midline or the interdental papilla shifts when the frenum is extended.

Management

The aberrant frenum 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 [4].

Frenectomy can be achieved by

- **Scalpel:** Convention, cost-effective but has a disadvantage like bleeding and patient compliance.
- **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.
- Lasers

Case Report 1 (conventional)

25 year old female patient was referred from the department of orthodontics for correction of frenum. Patient was having the chief complaint of spacing between her front teeth. Her medical history was non-contributory. Intraoral examination showed papilla pen-

etrating type maxillary labial frenum attachment with diastema between maxillary central incisors. It was decided to treat this patient with conventional frenectomy technique with scalpel after taking consent.

Surgical procedure

The area was anesthetized with a local infiltration by using 2% lignocaine with 1:80,000 adrenaline. The frenum was engaged with a haemostat which was inserted into the depth of the vestibule and incisions were placed on the upper and the undersurface of the haemostat until the tissues were free. The triangular resected portion of the frenum with the haemostat was removed. A sharp dissection was done of muscle fibres to relieve their attachment. The edges of the diamond-shaped wound were undermined and sutured by using 3-0 black silk with interrupted sutures. The area was covered with a periodontal pack. Patient was prescribed with antibiotic cap. Amoxicillin 500 mg TDS, analgesic Tab. aceclofenac BD for 3 days. The pack and the sutures were removed 1 week post-operatively. The healing was uneventful showed postoperative view after 8 weeks.

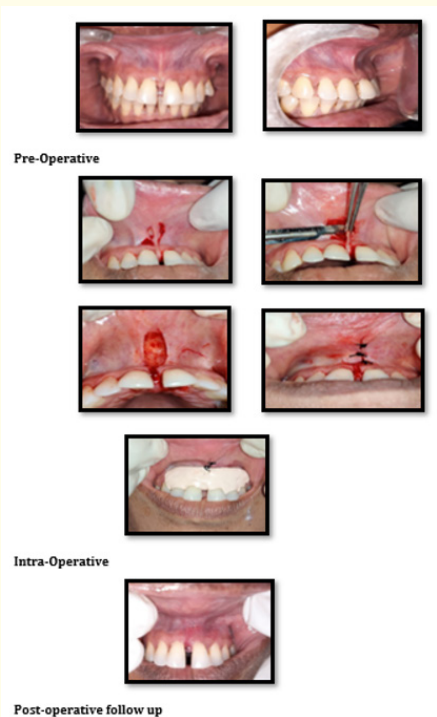


Figure 1

Case Report 2 (Electrocautery)

22 year old male patient was reported to department of periodontology for poor esthetics due to malalignment teeth. Her medical history was non-contributory. Intraoral examination showed papillary type maxillary labial frenum attachment with diastema between maxillary central incisors. It was decided to treat this patient with electrocautery technique after taking consent.

Surgical procedure

The area was anesthetized with a local infiltration by using 2% lignocaine with 1:80,000 adrenaline, the frenum was then excised by using a loop electrode tip at 2 MHz current with a cutting coagulating mode. Electrocautery offered the advantage of minimal procedural bleeding and there was no need of sutures. The healing was by secondary intention.



Figure 2

Case Report 3 (Paralleling technique)

30 year old systemically healthy female patient reported to department of periodontology for poor esthetics due to malalignment of teeth. Intraoral examination showed papilla penetrating type

maxillary labial frenum attachment with diastema between maxillary central incisors, which was excised by paralleling technique.

Surgical procedure

The area was anesthetized with a local infiltration by using 2% lignocaine with 1:80,000 adrenaline. The frenum was retracted and two paralleling incisions were placed on the side of ridge of the frenum with a number 11 blade. After initial incision, deep dissection of the muscle fibers was done to eliminate all the attachments. Incised frenum was removed by giving releasing incision on the top and bottom of the frenum. After frenum excision, the wound was closed with sutures to attain primary closure.

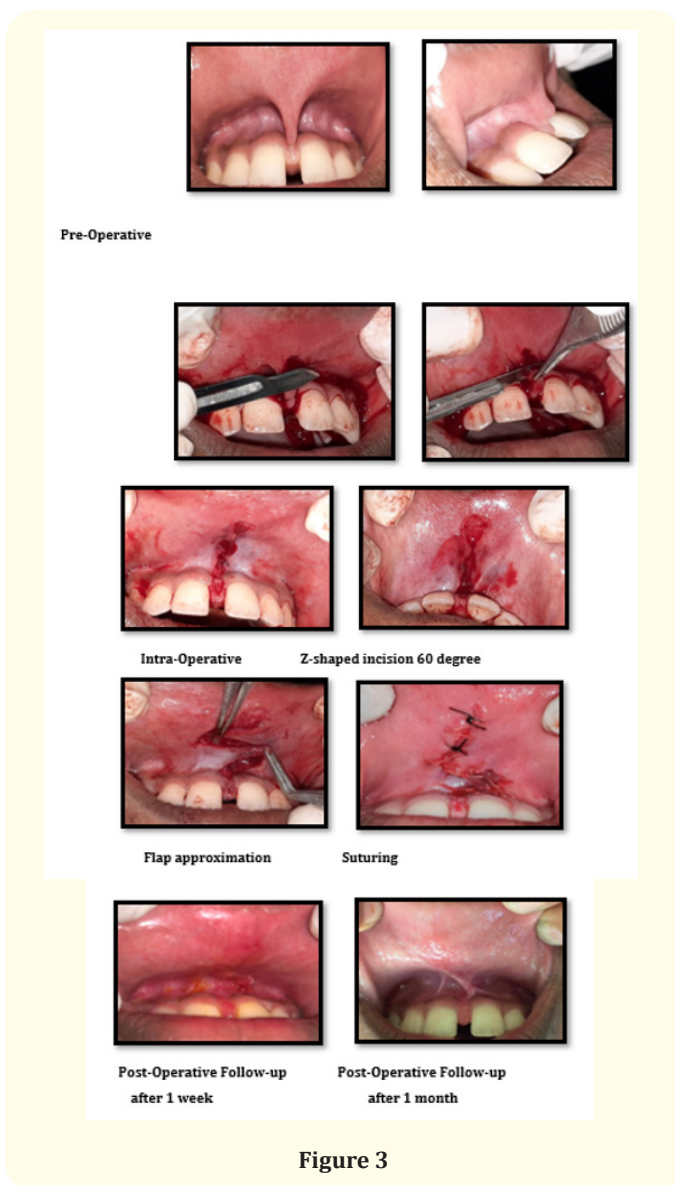
Case Report 4 (Soft tissue Diode Laser)

24 year old male patient was referred from the department of orthodontics for correction of abberant frenum. 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 frenal attachment with diastema between maxillary central incisors. It was decided to treat this patient with soft tissue diode laser technique after taking consent.

Armamentarium used as: Soft tissue diode laser and gauze sponges.

Surgical procedure

The area was anesthetized with local infiltration by using 2% lignocaine with 1:80,000 adrenaline. A soft tissue diode laser with 980 nm wavelength was used. A 300 µm fiber with tip at 3 W at pulsed mode was used. After the frenum was excised with the laser; fiber tip was used in a pulsed mode in a paint brush stroke, from the base to the apex of the frenum thereby excising its underlying fibres. Post-irradiation with the laser tip, any remnant fibers over the periosteum were removed by gently sweeping the laser tip at a reduced power and the ablated remnant tissue was cleaned with gauze soaked in saline. Patient received post-operative instructions and the use of an analgesic was prescribed SOS.





Post-operative follow up

Figure 4

Case Report 5 (Z plasty)

This technique is indicated for hypertrophic labial frenum with a low insertion, associated with an inter-incisor diastema.

A 26 years male patient presented with chief complaint of irregular teeth. 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 proclined incisors. After taking patient’s consent it was decided to do frenectomy with ‘Z’ plasty technique with scalpel.

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

Surgical procedure

The area was anesthetized with local infiltration by using 2% lignocaine with 1:80,000 adrenaline. The length of the frenum was incised with the scalpel. Horizontal limbs for ‘Z’ plasty were marked at each end at 60° angulations. 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 rotational flaps which at least 1 cm long were obtained. The resultant flaps which were created were mobilized and rotated to close the vertical incision horizontally. 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 mucosa. Sutures were removed after 1 week. The healing was found to be uneventful, with no hypertrophic scar formation and tension at the frenum area.

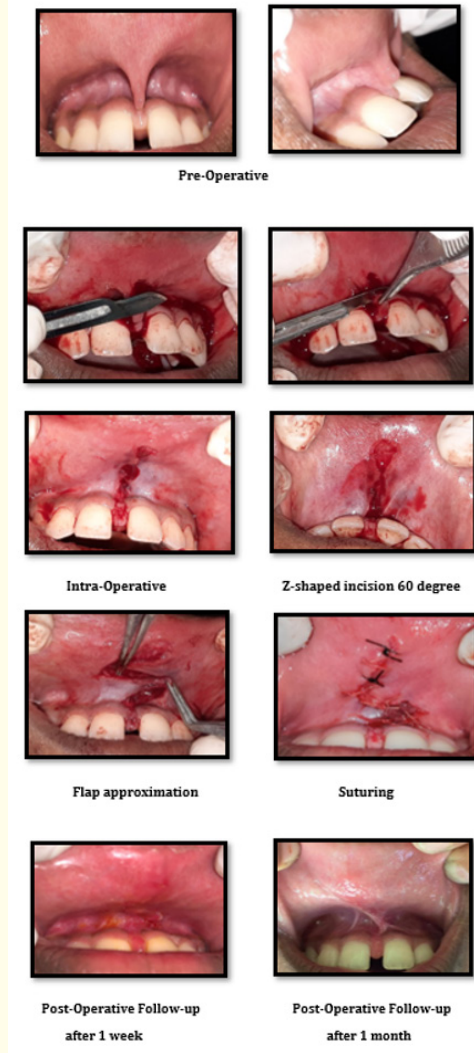


Figure 5

Case Report 6 (VY plasty)

Indicated for lengthening the localized area, like the broad frena (papillary type) in the premolar-molar area.

A 25 year old male patient was referred from the department of orthodontics for correction of frenum. Patient was having 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. It was decided to treat this patient with v-y plasty frenectomy technique with the scalpel after taking consent.

Surgical procedure

The area was anesthetized with local infiltration by using 2% lignocaine with 1:80,000 adrenaline. After anesthesia, frenum was held with the haemostat and an incision was made in the form of V on the undersurface of the frenal attachment. Then frenum was relocated at an apical position and V-shaped incision was converted into a Y and sutured with 4-0 silk sutures. A periodontal pack was placed.

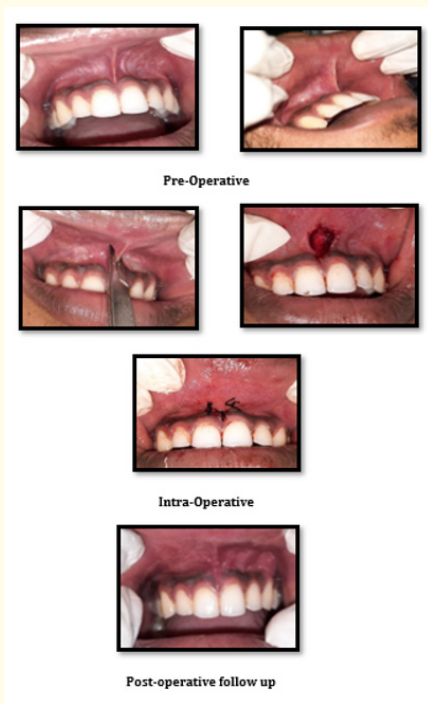


Figure 6

Case Report 7 (Miller’s technique)

For the post-orthodontic diastema cases.

Timing

After the active 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.

22 year old female patient was referred from the department of orthodontics for correction of frenum. No relevant medical history was there.

Intraoral examination showed papilla penetrating type maxillary labial frenum attachment with diastema between maxillary central incisors. It was decided to treat this patient with Miller’s technique with the scalpel after taking consent.

Surgical procedure

Excision of the frenulum with paralleling technique and exposure of labial connective tissue in the midline was done, then take a laterally positioned pedicle graft to obtain primary closure across midline and gingivoplasty of any excessive interdental tissue labially or palatally.

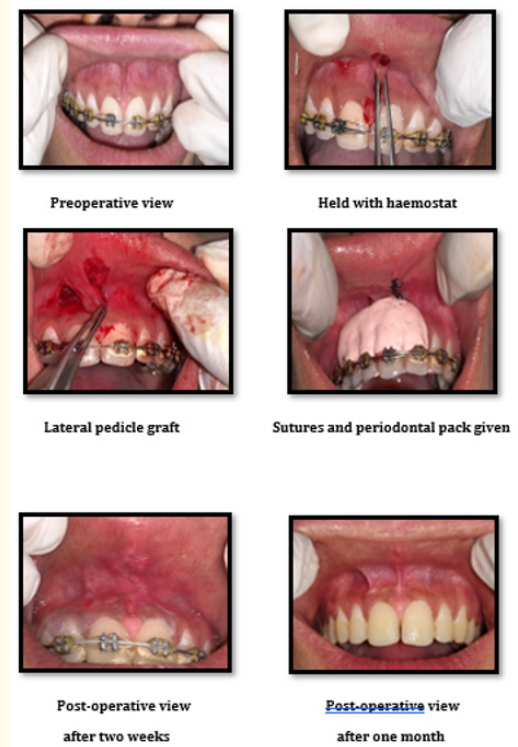


Figure 7

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

[5]. Frenulum was considered to be the primary cause of the diastema. Later on, Broadbent showed the problem is self-correcting after eruption of teeth. Taylor 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.

Conclusion

Soft tissue diode laser frenectomy can be considered as the most comfortable surgical procedure with comparatively less post-operative pain as compared to other surgical procedures.

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Conflicts of Interest

Nil.

Funding

Nil.

Ethical Approval

Ethical approval obtained from Institutional ethical committee.

Informed Consent

For this of case series, formal consent is required

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