LABIAL FRENECTOMY WITH CONVENTIONAL SCALPEL TECHNIQUE AS PRELIMINARY PREPARATION FOR DIASTEMA CLOSURE: A CASE REPORT

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ABSTRACT

Introduction: Midline diastema refers to a space between the maxillary central incisors, commonly observed in children and typically resolving with age. However, approximately 6% of cases persist into adolescence or adulthood, potentially compromising smile aesthetics. One etiological factor in such persistent cases is an abnormally wide or elongated maxillary labial frenum extending between the central incisors. Surgical management via frenectomy is often indicated. This case report aims to highlight the management of a papillary penetrating frenum type using conventional frenectomy. **Case report:** A 16-year-old female patient reported dissatisfaction with the appearance of her smile due to a noticeable gap in the maxillary anterior region. Intraoral examination revealed a high attachment of the maxillary labial frenum accompanied by a midline diastema. The patient was diagnosed with a mucogingival deformity in the form of a high maxillary labial frenum attachment, classified as the papillary penetrating type. The chosen treatment was a conventional frenectomy using a single hemostat technique. Postoperative follow-up demonstrated a transition of the frenal attachment to the gingival type, thereby facilitating the initiation of fixed orthodontic therapy to correct the diastema. The frenectomy procedure resulted in favorable outcomes without any complications. **Discussion:** Conventional scalpel frenectomy using a single hemostat technique may be an option as a first step before orthodontic treatment. The procedure effectively repositioned the frenum attachment and created favorable conditions for preliminary preparation. **Conclusion:** Conventional frenectomy using the single hemostat technique proved to be an effective and safe treatment for high maxillary labial frenum attachment.

Keywords: Frenectomy, Maxillary labial frenum, Midline diastema

INTRODUCTION

An esthetic smile positions dental treatment as an essential aspect of dentistry, as it contributes to enhancing an individual's appearance. One of the common esthetic concerns encountered is the presence of a gap between the maxillary central incisors, known as maxillary midline diastema. This condition is regarded as a significant esthetic problem.[1,2] The prevalence of diastema has been reported to reach 64.6% in children at the age of 6 years and decreases to 14.3% by the age of 12 years. Furthermore, its prevalence is higher in boys compared to girls after the age of 9 years.[3]

The etiology of diastema is multifactorial.[4] Attia classified its causes into four main categories: (1) dental anomalies, such as microdontia, hypodontia—particularly of the maxillary lateral incisors—or the presence of supernumerary teeth (mesiodens); (2) periodontal abnormalities, including aberrant labial frenulum attachment or periodontal disease; (3) muscular factors, such as macroglossia; and (4) neuromuscular disorders, including abnormal tongue positioning at rest or during physiological functions such as swallowing and speech. Among these, an aberrant attachment of the maxillary labial frenulum has been reported as one of the most frequent etiological factors.[4,5]

The frenulum is a structure that provides stability to the upper lip, lower lip, and tongue.[6] High frenulum attachment types, such as papillary or papilla-penetrating, may result in various clinical implications, including speech disturbances, esthetic concerns, masticatory difficulties, as well as associations with diastema, tooth malposition, loss of interdental papilla, challenges in maintaining oral hygiene, and gingival recession, which may potentially lead to psychological distress in affected individuals.[5] Frenectomy is one of the treatment modalities that can be performed in cases of high frenulum attachment.[3]

Frenectomy is a surgical procedure performed by excising the frenulum entirely, including its attachment to the underlying bone.[2,7] Several previous studies have reported spontaneous closure of the maxillary midline diastema following frenectomy, either with or without adjunctive orthodontic treatment.[7]

The selection of a frenectomy technique is determined by the operator, taking into account the effectiveness, efficiency, and affordability of the procedure, with each method presenting its own advantages and limitations.[5,7] The conventional frenectomy technique was first introduced by Archer (1961) and Kruger (1964), and is recommended in cases of midline diastema with abnormal frenulum attachment to ensure complete removal of muscle fibers suspected to connect the orbicularis oris to the palatal papilla. This procedure involves the excision of the interdental tissue, palatal papilla, and the frenulum in its entirety with the aid of a hemostat.[8]

Patients with high frenulum attachment may encounter challenges in orthodontic treatment planning. Therefore, this case report aims to describe the conventional frenectomy procedure as a preparatory step prior to orthodontic treatment for diastema closure.

CASE REPORT

A 16-year-old female patient presented with a complaint of a gap in the upper anterior teeth, first noticed approximately one year earlier. The condition caused reduced self-confidence, and the patient sought treatment with fixed orthodontic appliances to close the space. No prior treatment had been undertaken. The patient's body weight was 50 kg and height 152 cm. Vital signs were within normal limits: compos mentis with a Glasgow Coma Scale (GCS) score of 15, blood pressure 118/78 mmHg, pulse rate 72 beats/minute, respiratory rate 23 breaths/minute, pupils isochoric, and sclera anicteric.

Extraoral examination revealed no abnormalities. Intraoral examination showed a high attachment of the maxillary labial frenum associated with a midline diastema (Figure 1). Based on history and clinical findings, the patient was diagnosed with a mucogingival deformity in the form of a high maxillary labial frenum attachment, classified as the papillary penetrating type. The treatment plan consisted of a conventional frenectomy using a single hemostat as a guide for repositioning the frenum attachment, followed by orthodontic treatment. The patient received an explanation of the procedure, and written informed consent was obtained.

Figure 1. High maxillary labial frenum, papillary penetrating type.

The treatment procedure began with prophylaxis on all tooth surfaces using prophylaxis paste (Spectra) with a low-speed handpiece and rubber cup bur (Figure 2). Asepsis of the extraoral area around the lips and the intraoral surgical site was performed using 10% povidone-iodine (Figure 3). Local anesthesia was administered using Pehacaine® (Lidocaine HCl 20 mg and Epinephrine 0,0125 mg in 1 mg) with an infiltration technique at the mucolabial fold around the apices of maxillary central incisor (FDI = 11 and 21) for anterior superior alveolar nerve anesthesia, with 0,5 cc for each tooth (Figure 4). Additional infiltration anesthesia was applied at the palatal region of maxillary central incisor., approximately 5 mm from the gingival margin, with 0.5 cc for each tooth. The patient's lip was retracted using a finger to facilitate visualization and access (Figure 5).

Figure 2. Tooth surface prophylaxis.

Figure 3. Asepsis of the surgical area.

Figure 4. Infiltration anesthesia at mucolabial fold of maxillary central incisor.

Figure 5. Lip retraction for visualization.

The frenum was held using a single hemostat placed into the depth of the vestibule as a guide (Figure 6). An incision was made on the right side of the hemostat from top to bottom, followed by an incision on the left side (Figure 7). Suturing was performed once in the middle of the tissue after incision using the simple interrupted method with non-absorbable silk 4/0 suture to minimize bleeding (Figure 8). A vertical tissue incision was made on the interdental papilla between maxillary central incisor until reaching the bone (Figure 9).

Figure 6. Frenum clamped with curved hemostat.

Figure 7. Tissue incision on the right and left side of the hemostat.

Figure 8. Suturing in the middle of the tissue.

Figure 9. Tissue incision at interdental papilla of maxillary central incisor.

Irrigation of the surgical site was performed with sterile 0.9% saline to remove blood and saliva (Figure 10). Hemostasis was achieved by suturing the remaining open tissue in the labial area using the simple interrupted technique with non-absorbable silk 4-0 sutures (Figure 11). The patient was prescribed postoperative medications, including antibiotics (Amoxicillin 500 mg every 8 hours) and non-steroidal anti-inflammatory drugs (Diclofenac potassium 25 mg every 8 hours), and was given postoperative instructions.

Figure 10. Irrigation of the surgical area.

Figure 11. Suturing the remaining open tissue in the lip area.

Figure 12. New maxillary labial frenum attachment, gingival type.

At the two-week follow-up visit, the patient reported no complaints at the suture site and experienced minimal postoperative pain (VAS score: 1). Vital signs were within normal limits. Clinical examination revealed a newly established frenum attachment without signs of inflammation (Figure 12). The patient also underwent aff hecting and spooling using 0.9% NaCl.

At the one-month postoperative follow-up, the patient reported no complaints at the suture site and no postoperative pain. Clinical examination demonstrated complete healing of the tissue without signs of inflammation. The patient was subsequently scheduled for placement of fixed orthodontic appliances by an orthodontist to correct the midline diastema.

DISCUSSION

The superior maxillary labial frenulum is a midline fold of connective tissue that connects the inner surface of the upper lip to the anterior maxillary gingiva.[9] Placek classified frenulum attachment into four types: (a) Mucosal: attachment of the frenulum on the mucosa up to the mucogingival junction; (b) Gingival: attachment of the frenulum reaching the attached gingiva; (c) Papillary: attachment of the frenulum up to the interdental papilla; and (d) Papilla penetrating: attachment of the frenulum crossing the alveolar process and extending to the palatal papilla.[3,10] Changes in the size, shape, and location of the frenulum may occur during various phases of growth and development. The size of the frenulum tends to decrease with growth. The frenulum is generally broad and thick in early childhood, then diminishes and becomes thinner with increasing age.[11]

A high frenulum attachment may cause gingival margin recession, impaired plaque elimination, and a central diastema that compromises esthetics.[12] The diagnosis of frenulum attachment height can be performed using the “Blanch test,” which involves applying traction to observe the movement of the papillary tip or blanching due to ischemia in the area.[10,3,10] In this case, the patient presented with a central maxillary incisor diastema compromising esthetics, which was caused by a papilla-penetrating type of labial frenulum attachment.

The maxillary labial frenulum under normal conditions is a dynamic structure, in which, along with the growth of the alveolar process, its initial attachment between the deciduous teeth gradually migrates apically or closer to the vestibule.[13] Failure of

this process results in the occurrence of a central diastema. Moreover, frenulum attachment that causes a diastema wider than two millimeters has been reported to rarely close spontaneously.[14,15] A high labial frenulum that is left untreated may lead to relapse following orthodontic treatment.[3,16] The presence of fibrous tissue often poses an obstacle, particularly when the traction of the frenal muscle contributes to relapse in cases of central diastema.[17] Correction in such cases can be achieved through frenectomy.[3,14]

Frenectomy is a surgical procedure involving the complete removal of the frenulum, including the underlying fibrous tissue.[5,18] This surgical procedure can be performed using several methods, such as excision with a scalpel, electrosurgery, or lasers including CO_2, erbium (Er): yttrium aluminum garnet (YAG), and neodymium-doped YAG (Nd:YAG).[5,20] The conventional excision method with a scalpel using a hemostat is divided into the single-hemostat and double-hemostat techniques. Conventional frenectomy with a scalpel is still considered the gold standard and is commonly employed due to its relatively simple technique. The hemostat serves as a reference to estimate the portion of the frenum that should be excised during the frenectomy procedure.[17]

In this case, the single-hemostat technique was selected due to the high frenal attachment, as well as the considerable thickness and relatively large dimensions of the frenulum. These anatomical characteristics would have hindered adequate surgical visualization if a double-hemostat approach had been employed, as the incision demarcation lines would likely be obstructed and not clearly discernible. Given these limitations, the single-hemostat technique provided a more controlled and predictable operative field. In this technique, as applied in the present case, the frenulum is clamped with a hemostat extending into the depth of the vestibule to provide stability and guidance, followed by excision with a blade until the frenal fibers at the interdental papilla are completely severed and removed.[17] This method offers several advantages, including procedural simplicity, effective bleeding control, and favorable esthetic outcomes. The disadvantages of this method include its suboptimal performance in reducing pain and postoperative discomfort, as well as its potentially unsatisfactory aesthetic outcomes, particularly in cases involving wide and thick hypertrophic frenum.[18,19,20]

Follow-up at two weeks and one month post-surgery was conducted as both subjective and objective evaluations of the treatment outcome.[21] The clinical findings at follow-up showed no signs of inflammation, consistent with other case reports indicating that conventional frenectomy with a hemostat yields favorable treatment outcomes with minimal complications.[22,23,24] The transition of frenulum attachment to the gingival type postoperatively indicates successful management and facilitates the patient's initial treatment before placement of fixed orthodontic appliances to optimally close the midline diastema and minimize the risk of relapse after treatment.

CONCLUSION

Labial frenectomy using the conventional scalpel technique proved to be a safe and effective surgical approach for managing a high labial frenum attachment

associated with midline diastema. The procedure facilitated optimal healing without complications and established favorable conditions for subsequent orthodontic treatment. As a preliminary step, frenectomy plays an important role in improving treatment outcomes and long-term stability in diastema closure.

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