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Case report: A-short period management of female adolescent with Papillary Penetrating (PP) frenulum attachment

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Abstract

Background: A space between the anterior teeth and midline diastema is really important for aesthetic concerns in adolescents. Midline diastema may be related to high frenal attachment. Frenectomy is a treatment option for high frenal attachment. The entire removal of the frenum may be followed by orthodontic treatment.

Case Presentation: A female 16-year-old patient complained of feeling embarrassed because of a gap in her front teeth. A frenectomy with orthodontic treatment is used to correct midline diastema. A frenectomy procedure uses conventional technique. The Straight Wire Technique (SWT) technique for orthodontic treatment. Midline diastema is complete correction at the 3rd control.

Conclusion: Frenectomy before orthodontic treatment, followed by a medium-anchored Straight Wire Technique (SWT) with an elastromic chain or power chain, can be an alternative technique with a short duration.

Keywords: Midline Diastema; Frenectomy; Orthodontic treatment

1. Introduction

A space between anterior teeth, often known as a "diastema" in adolescence, is a really important for aesthetic concerns (1). Adolescent psychosocial behaviour between the ages of 15-19 may be related to dental dissatisfaction. De Melo Kaarlye (2021) found that in adolescents, crowding and spacing were the occlusal characteristics that provoked the most aesthetic issues. Prevalence midline diastemas are common among young children, occurring in 98% of 6 year olds, 49% of 11 year olds, and 7% of 12 to 18 year olds.

Due to the maxilla's growth and remodeling, the relative height of the frenum usually decreases as a child grows. Prior to the eruption of the permanent canines, many children have persistent diastemas and a thick maxillary frenulum, so closing the gap with orthodontic treatment is required (1) and (2). Through various growth and development stages, the frenum's size, shape, and location may change (Singh et al., 2023). There are several classifications describing different levels of frenal attachment. The most popular and reliable classification systems are Kotlow's classification, the Stanford superior labial frenum classification, Sewerin's typology, Placek et al., and the labial frenum attachments revealed by Place. The labial frenum can be seen and classified using direct visual examination under natural light, which involves lifting the upper lip with both index fingers and thumbs (4). Placek et al. (1974) identified the level of frenal attachment into four categories: mucosal (frenal fibers are attached up to the mucogingival junction), gingival

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1 (fibres are inserted within the attached gingiva), papillary (the fibers extend into the interdental papilla), and papilla penetrating (the frenal fibres cross the alveolar process and extends up to the palatine papilla) (Singh et al., 2023).

3
Frenectomy is a treatment option for high frenal attachment. The entire removal of the frenum, together with its attachment to the underlying bone, is known as a frenectomy. Frenectomy can be performed using either standard knife surgery, electrosurgery, or lasers. For the treatment of midline diastema, there are numerous alternative treatment options, such as orthodontic appliances, restorative procedures, and prosthodontic rehabilitation (5). The purpose of this article is to explain how to close with a short period an anterior diastema in a female adolescent patient with a Papillary Penetrating (PP) Frenulum Attachment.

2. Case presentation

A female 16-year-old patient complained of feeling embarrassed because of a gap in her front teeth. She wanted the gap to be closed in, and her lower teeth were corrected at the same time. Patients visit initially for dental caries treatment, including scaling for calculus. [Picture 1]. The patient continued to receive treatments to repair her frenulum. The conventional frenectomy technique is used to perform the frenectomy procedures. Asepsis and isolating are the first procedures. The frenectomy surgery initially Local infiltration is given by using 2% lignocaine with 1:80.000 adrenaline. The lip is extended, and the frenum is engaged with a hemostat to the depth of the vestibule. Triangular frenum tissue is extracted through incisions made on the upper haemostat's and bottom surfaces. The underlying fibrous attachment to the bone is exposed. These fibers are cut horizontally, separated from the bone, and dissected, and the wound's edges are then gently undermined and repositioned.

Haemostat was inserted into the superior frenulum, the deepest depth of the vestibule. To determine where the incision is made. The No. 15 Bard Parker blade was used to make two parallel, vertical incision. The incision is made from the superior needle holder to the attachment area of the frenulum palatine papilla. The triangular resected frenum was removed, and the underlying tissue was exposed. Horizontal incisions were made to separate the attached fibers with the gradual blending of vestibular tissue. All the fibrotic tissue is excised. The incision's margins are separated by tissue, and then sutures are placed using an interrupted approach. A secondary suture with a 4-0 suture was placed. [Figure 2]



Figure 1 Pre-treatment Photographs



Figure 2 [right] Post frenectomy, [left] 7 days post frenectomy

Seven days after the treatment, remove the sutures. Three days later, the upper and lower jaw impressions were used for the model study. The bracket with a 0.22" mini-roth slot was inserted using the Straight Wire Technique (SWT) technique. Bracket maintenance begins with the allignment, space closure, and finishing stages. Beginning with the allignment phase, initially by Niti Wire 0.016" for the upper and lower jaws. Spase closures and the finishing phase are made of rectangular stainless steel wires. Stages of space closure using rectangular stainless steel 0.016 x 0.016" combined with power chains 16-26, lace back, and bend back. Midline diastema is complete correction at the 3rd control. The finishing phase correction was done by rectangular stainless steel wires 0.016 X 0.022" [Figure 3]. Education has been explained as debonding the bracket. In this case, the patient refused to remove the bracket because it was in keeping with the teenage trend. Then a 16-26 wire ligature is used for passive treatment of the bracket.



Figure 3 3rd Control During Orthodontic Treatment

3. Discussion

Midline diastema has a multifactorial etiology. The midline diastema, which is usually caused by abnormal frenum morphology (6). The abnormal morphology-caused midline diastema isn't going to spontaneously close after the eruption of the lateral incisors and canines. Frenulum with papilla penetrating (the frenal fibers pass the alveolar process and extend up to the palatine papilla) should be corrected by a frenectomy procedure with complete removal of the high frenum, including its attachment to the underlying bone (3,6). The aim of the frenectomy in this case is to remove the abnormal frenum, which has caused inadequately attached gingiva, esthetic reasons, and a shallow vestibule that makes it difficult to maintain good oral hygiene (Singh et al., 2023).

There are several frenectomy techniques. There is frenectomy using conventional (classical), electrosurgery, laser, V-Y, Z plasty, and Miller's technique. The conventional method is still an acceptable alternative to frenectomy for orthodontic treatment (7). The advantages of this method are that it provides orthodontic stability without sacrificing aesthetics. This method prevents the interdental papilla from separating since healing occurs by intention and the transseptal fibers are not physically disturbed (8).

In midline diastema cases with an abnormal frenum, the conventional method approach was recommended to ensure the removal of the muscle fibers that were supposedly connecting the orbicularis oris with the palatine papilla. Conventional method with triangular triangles has two additional advantages. Firstly, while a continuous band of gingiva forms across the midline during healing, there is no anesthetic scar formation. The interdental papilla is not destroyed because the trans-septal fibers are not surgically disturbed. The secondary suture also produced midline gingiva that were similar and had a good color match (7,9).

There are differences in the timing of frenectomy when using an orthodontic method to correct a midline diastema. According to the American Academy of Pediatric Dentistry's study results, 88% of respondents preferred having a frenectomy done after closing an orthodontic space, 43.3% preferred having one done just before beginning orthodontic treatment or just before closing a median diastema, and 14% agreed that the timing of the procedure is unimportant and that the procedure can be done at any time (10). The rationale behind performing a frenectomy before initiating orthodontic treatment is that because the frenum is big and bulky and extends to the papilla palatina, closing the area may be difficult. Early orthodontic treatment may result in faster tooth mobility and the prevention of old scar tissue (6,10).

In this case, the orthodontic treatment was divided into three phases. There are leveling and alignment, retraction and closure, and finishing. The Straight Wire Technique (SWT) has a slot geometry for transferring force to the teeth via orthodontic appliances with applied force and ranges between 15 and 20 Nmm. The orthodontic tooth movement (OTM) results in mechanical forces and tissue adaptation in the surrounding alveolar bone and periodontal ligament (PDL) (11). Apical root resorptions are more likely to occur if tensions and torques are biomechanically uncontrolled or excessive. Nickel-titanium alloys (NiTi) are especially well-suited to transfer minor forces and torques to the teeth because of their low Young's modulus and following tipping movement. SWT technology is first used with niti wire alloy to reduce undermining resorption. The rigidity and stability are provided by the stainless steel archwire. The OTM's use of stainless steel arcwire provides high force and bodily movement. Although there is no crowding of the upper jaw, niti wire should be used to initiate the orthodontic sequencing (12,13). Even though there is no crowding in the upper jaw, this case's orthodontic treatment sequence begins with niti wire. Starting the orthodontic treatment to prepare the bodily movement for diastema closure by activating the pressure and tensile area in the periodontal ligament with low force.

Different tooth movements result from various loading forces (moment-to-force ratios). By bodily movement of the teeth, the midline diastema can be closed. Displacement or translation of the teeth produced by distributed forces across the entire depressed periodontal surface (13). Accelerate orthodontic movement can be achieved with correct technique, healthy periodontal tissue, and good oral hygiene (14,15). A good clinical assessment of periodontal conditions in patients under the age of 19 with no associated systemic disease and good dental hygiene. Before going through orthodontic treatment, adequate education is required to maintain good oral hygiene. This hypothesis is supported by the Persson (2018) report, which found that progressive periodontitis and other periodontal complications are related to aging in people between the ages of 20 and 64. Closing diastema can be corrected by an elastic module with ligature, elastomeric chain or power chain, intra/inter maxillary elastic to Kobayashi ligature, coil spring, J-Kook head gear, sliding jig and traction, and Mulligan's v-bend sliding mechanics. Elastic modules with ligature, elastic chain/power, and coil spring chain are recommended for narrow diastemas (16). According to Barsoum et al., (2021), there is no significant recreation time diastema closure using a Niti coil spring or elastomeric chain. In this case, using the elastomeric chain is acceptable because the advantages of the power chain for retraction include interrupted periods of rest, allowing for tissue regeneration and tolerance (17). For quick results with tooth movement, controlling the orthodontic treatment using the power chain must be done every three to four weeks (14,16).

4. Conclusion

A-Short Period Closing diastema can be achieved with correct technique, healthy periodontal tissue, and good oral hygiene. Accelerate orthodontic movement must be considered a risk of excessive force in the periodontal ligament and elimination of local distribution when translation of teeth is high. Frenectomy before orthodontic treatment, followed by a medium-anchored straight wire technique (SWT) with an elastomeric chain or power chain to close the diastema, can be an alternative technique.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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