

Diastema closure and aesthetic rehabilitation: An interdisciplinary approach

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Abstract

Midline diastema is a common problem amongst the adults which has a great impact on the aesthetics. Common causes for the development of such a condition include high frenum attachment, proclination of teeth, dentoalveolar disproportion etc. The treatment of such condition requires accurate diagnosis of aetiology and its elimination followed by space closure using orthodontic modalities. This case report presents a case of 20 year old female patient with the chief complaint of space between the upper front teeth. High frenum attachment was diagnosed as primary aetiology and was eliminated by laser assisted frenectomy. The space closure was accomplished using orthodontic treatment. One year follow up showed a satisfactory outcome with complete closure of midline diastema and rehabilitation of aesthetics.

Keywords: Diastema closure, Diode laser, Frenectomy, High frenum attachment.

Introduction

Maxillary anterior spacing or diastema is a common aesthetic complaint amongst the patients and has a great influence on smile. Both the mixed and permanent dentition stage is affected by such a condition. Midline diastema as described by Keene *et al.* is the spacing greater than 0.5mm between the proximal surfaces of adjacent maxillary and mandibular incisors.¹ The incidence of maxillary and mandibular midline diastema reported in literature is 14.8% and 1.6%, respectively.^{2,3}

Weber *et al.*⁴ described various aetiologies for development of midline diastema including high frenum attachment, discrepancy in the size of alveolar bone and tooth, supernumerary teeth, missing lateral incisors, midline cysts, proclination of teeth resulting from habits such as thumb sucking, mouth breathing and tongue thrusting etc. Angle⁵⁻⁷ concluded the presence of abnormal frenum as the cause for midline diastema and this view was supported by other researches.

An accurate diagnosis of the aetiology is the most important step before any treatment can be initiated. For the successful treatment and prevention of relapse the primary aim is to eliminate the aetiology followed by space closure. Space closure is done using simple removable appliances incorporating finger springs or split labial bow or using fixed orthodontic appliances.⁶

Graber *et al.* proposed the use of "blanch test" to determine the extension of tissue fibre of the labial frenum to the palatine papilla. This test is accomplished by lifting the upper lip upward and forward until the frenum is tightly stretched. If the procedure produces a blanching or change of contour in this area, the frenum is considered hypertrophic. Surgical correction is advocated in such cases.⁷

All the cases of diastema cannot be treated using a single modality. Treatment depends on the aetiology. Several treatment modalities proposed ranges from the classic frenectomy or orthodontic treatment to more radical

procedures of subapical osteotomies, corticostomies, septotomies and reverse-bevel gingivectomy.⁸

Frenectomy using laser is now commonly preferred over the classical surgical frenectomy as it is more comfortable for the patient. No scalpel is used so no stitches are required. No or minimum postoperative bleeding, absence of scar tissue formation, good wound healing, less pain, and complete lack of swelling.⁵

This case report presents a case of midline diastema with a high frenum attachment diagnosed as a primary etiology. The midline diastema was treated with a combination of laser assisted frenectomy followed by orthodontic closure of the midline space.

Case Report

A 20 year old female patient came to the department with the chief complaint of spacing in the upper anterior tooth region. Aesthetics was the primary concern. Medical and dental history was found to be non contributory. Clinical examination revealed the presence of midline diastema of 2.5 mm and fractured central incisors associated with the history of trauma 5 years back (**Fig.1**). Vitality test gave a positive response for both the central incisors. A thick labial frenum was observed which was thought to have a major influence on the diastema. A blanch test was done to determine the level of alveolar attachment. Blanching of the palatal papilla was observed when lip was stretched upwards and outwards using intermediate pressure. As the thick labial frenum was found to have a major influence on the diastema frenectomy followed by orthodontic movement of central incisors was planned to close the space. Complete blood investigations were done followed by the surgical intervention. The topical anesthesia was sprayed at the site of operation followed by infiltrating anesthesia using 2% lidocaine solution.

The frenectomy was performed using diode laser with a wavelength of 980 nm. The laser was operated at a power of 3.0 watt in continuous wave mode, with a 32- micron quartz

optical fiber. The frenum was stretched slightly by lifting the upper lip. The fiber tip was held in light contact with the tissue, used in a gentle, sweeping brushing strokes (Fig.2). Hemostasis was achieved without suturing. Analgesics were not prescribed since no postoperative discomfort was expected.

After complete healing of the frenal area fixed orthodontics was used for proper alignment and space closure. The patient was observed through out the orthodontic phase of the treatment. After the orthodontic treatment was over the fractured anterior teeth were restored using composite (Fig.3).



Fig. 1: Preoperative Photograph



Fig. 2: Intraoperative photograph



Fig. 3: 1 Year follow up after orthodontic treatment

Discussion

Midline diastema is a major aesthetic concern especially when present in the maxillary anterior region. Appearance of such spacing is considered normal during the mixed dentition phase and requires no active treatment. High frenum attachment is commonly blamed for persistent

diastema, but more recently etiologic role of this structure has been understood to influence only a small proportion of cases. Other aetiologies associated with diastema include muscular imbalances, physical impediments, abnormal maxillary arch structure, oral habits, and various dental anomalies.

In this case report there is a persistent midline space after complete eruption of permanent dentition. Correct treatment of the spacing requires accurate diagnosis of the aetiology. Thorough clinical examination and blanch test revealed the presence of a thick labial frenum extending on to the palatal papilla. The primary aim of the treatment is to eliminate the aetiology followed by space closure using fixed orthodontics. Abnormal frenum attachment may require removal either before orthodontic treatment or at the end of active treatment.⁸

There are two different schools of thoughts amongst the orthodontists concerning the timing of frenectomy. Some orthodontists advocate early removal of the frenum, so as to eliminate any obstacle for surgical access. Others propose earlier closer of diastema followed by frenectomy so that the resultant scar tissue will help to hold the teeth in close apposition.^{9,10}

Frenectomy which can be performed by a scalpel, electrocautery, or with soft tissue lasers. Conventional method for frenectomy using scalpel results in greater post surgical pain and discomfort, and delayed healing as compared to laser assisted frenectomy.⁶ Reduced postoperative oedema with laser assisted frenectomy is attributed to the precision of surgical laser procedures which has no adverse effect on surrounding normal tissue, the ability of lasers to seal lymphatic channels which in turn results in less postoperative discomfort, the sealing of nerve endings resulting in reduced inflammatory response, also the formation of a fibrin clot protects the wound from external irritation, causing minimal or no pain post surgery thus avoiding the use of analgesic drugs¹²

Other advantages of laser assisted frenectomy include a relatively bloodless surgical field and minimal post surgical event; the ability to precisely coagulate, vaporise, or cut tissue; sterilisation of the wound site, no or minimal swelling and scar formation; most of the cases require no suturing; little mechanical trauma; reduction of surgical time; decreased post surgical pain; and greater patient acceptance.

The clinical application of the diode (980 nm) laser for oral procedure has proved to be of beneficial effect for daily practice, it is thus considered to be practical, effective, convenient, safe, acceptable alternative to conventional techniques of frenectomy.¹³

Conclusion

Presence of midline diastema is a common aesthetic problem amongst the adults. Correct diagnosis of the aetiology and its elimination is of prime importance for the successful treatment. Various treatment modalities are available such as fixed and removable orthodontics, veneers, crown, direct composite build up. However, selection of the

treatment option depends upon the underlying aetiology. High frenum attachment has been recognised as a prominent aetiology and requires surgical excision. Conventional surgical excision using a scalpel is associated with greater number of disadvantages. Laser assisted frenectomy is more convenient for both patient and the clinician since is associated with less post operative events and faster healing.

Conflict of Interest: None.

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