

## FACTORS TO BE CONSIDERED IN THE TREATMENT OF MIDLINE DIASTEMA

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### ABSTRACT

Space or gap existing in the midline of the dental arch is termed as Midline Diastema. Generally, the term is used in reference to the maxillary arch, but midline Diastema could also be present in the mandibular arch. Usually the space exists between the two central incisors. It is important to understand the cause of the particular condition in order to undertake its proper treatment.

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### INTRODUCTION

A diastema is defined as a space greater than 0.5mm between the proximal surfaces of adjacent teeth. Angle (1907) described the dental midline diastema as rather common form of incomplete occlusion characterized by a space between the maxillary and less frequent –mandibular central incisor. Usually the space exists between the two central incisors. Midline diastema always creates an unpleasant appearance and interferes with speech depending on its width" {angle1907}. It is important to understand the cause of the particular condition in order to undertake its proper treatment

#### The causes of midline Diastema are as follows

1. The incisor is of a normal or smaller size, but the dental arch is larger.
2. The incisor has a smaller size and dental arch is normal, e.g microdontia, which is most commonly associated with peg, shaped lateral incisors.
3. A midline frenum is attached at improper site to the soft and bony tissues. A normal frenum is attached to the gingival superior to the central incisors. Abnormal frenum attachment could be
  - a. A high labial frenum that attaches to the incisive papilla or to the palatal soft tissues lingual to the incisors.
  - b. A wide and fibrous frenum at the site of attachment, which prevents approximation of the two central incisors.

To detect the abnormal frenum, the blanch test could be used .when the upper lip and the frenum are stretched, the tissue between the central incisors moves and get blanched.
4. Presence of supernumerary teeth in the midline or presence of cystic lesions or other pathologies in the midline.
5. Congenital absence of lateral incisor: this leads to distal drifting of the central incisors in the available space leading to midline Diastema
6. One or more incisors are severely rotated .Rotation around 90 degrees from the normal position would exhibit space between the incisors.
7. Deleterious oral habits like thumb or digit sucking, anterior tongue thrust, etc, give abnormal pressure to the anterior teeth leading to their anterior proclination along the spacing in between them.
8. Pathological condition like juvenile periodontitis or periodontal weakness in adults.

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#### Size of teeth

The mesiodistal widths of the anterior teeth and the arch width should be measured. These measurements should be compared with the norms to determine whether it is contributed due to tooth size discrepancy, check whether all four incisor are small or only the lateral incisor are smaller with normal sized central incisors .Approximate mesiodistal widths of the anterior teeth and approximate arch widths , both in mm , are given in tables respectively . If only the lateral incisor is small, the Diastema should be closed orthodontically by moving the central incisor together reciprocally. Then the lateral incisor position can be corrected orthodontically and tooth size can be restored by composite build up or placement of crowns over lateral incisors.

#### Inter arch Relationship

When the combined width of the mandibular anterior teeth is very large and the combined mesiodistal width of the maxillary teeth is less, then the lower arch is well align but it does not relate with the upper arch. Thus, labial positioning of the upper anterior with spacing in between upper teeth presents to match the upper arch with the well aligned lower arch. Such a case would require inter - proximal enamel reduction from lower anterior teeth or extractions of lower second premolars followed by fixed orthodontic appliances in both the arches. After the spaces are closed in the lower arch, the maxillary incisors should be retracted. This would reduce or eliminate the Diastema in the maxillary arch.

#### Position of the Maxillary Incisors

Sometimes, maxillary incisors are labially inclined with the presence of diastemas between them. This could result from a prolonged oral habit like thumb sucking and / or tongue thrusting. If the habit actively persists when the patient reports for orthodontic treatment. After the elimination of the habit, orthodontic correction is commenced.

When the over jet is excessive, the incisors should be retracted using any of the fixed or removable appliances. Use of fixed edgewise appliance would result in good bodily movement of teeth with good

final finishing. Retraction of incisors in itself could close the Diastema. But if Diastema still persists even after incisor retraction, treatment should be directed towards redistribution of space followed by esthetic enlargement of teeth to counteract the tooth material deficiency after completing the orthodontic treatment.

Sometimes the incisors are badly rotated giving appearance of diastemas. Orthodontic de-rotation of these teeth would automatically eliminate the Diastema. But the retention of these rotations requires supracrestal fibrotomy around the tooth and fixed retainers.

#### **Presence of tooth Anomalies and other Pathologic Lesions in the soft or Hard Tissues in the midline**

Generally, mesiodens is present as a supernumerary tooth in the hard or soft tissue and acts as an impediment in the eruption of permanent central incisor in their correct position and also approximation of these teeth is not possible because of its presence. Again any fibrous cystic or bony lesion may also be present. Radiographic assessment with intraoral periapical x-rays and upper occlusal views are recommended. Extraction of supernumerary tooth should be carried out before commencing orthodontic treatment. Surgical excision in the case of pathological lesion is necessarily done and zinc oxide eugenol dressing for two weeks is placed post surgical at the site of the surgery. Orthodontic correction should follow the removal of the pathological cause.



#### **Pressure of Abnormal Maxillary Labial Frenum**

An abnormally attached maxillary labial frenum or a heavy fibrous frenum between the central incisors complicates the correction of midline diastemas. Frenectomy is a must for orthodontic correction, esthetic and stability of the final result and it should be well coordinated with orthodontic treatment. A popular belief is that if frenum is removed before tooth movement, then scar tissues form between the teeth as healing occurs which impedes the closure of diastema. Also, a prolonged delay of tooth movement after surgery may result in a space that is even more difficult to close. Hence it is preferred by most clinicians to orthodontically close the diastema before frenectomy. In case, the diastema is very large and the frenal attachment is very thick, it might not be possible to close the space completely before the surgical removal of the tissue. In the case partial space closure should be done orthodontically followed by frenectomy. Remaining orthodontic corrections instead of complicating it. Scar stabilizes the orthodontic correction instead of complicating it. In these cases, sliding mechanics for space closure should be used instead of loop mechanics. This maxillary midline diastema tends to recur after treatment because of the elastic gingival fiber network. Hence a bonded lingual fixed retainer is always recommended.



#### **Timing of Orthodontic Management for Midline Diastema**

Closure of midline diastema is not indicated during deciduous dentition phase or the ugly duckling mixed dentition phase. In the mixed dentition, there are two main indications for midline diastema;

- a. Esthetic complaints

- b. Positioning of central incisor that inhibit eruption of lateral incisor or canine

In such a case, if the diastema is less than 2mm, it can be closed using a removable appliance, as these incisors do not require bodily movement. Tipping movement of the incisor would be sufficient to close the space. If the unaesthetic diastema is larger than 2mm, bodily mesiodistal repositioning of incisor is required. This can be achieved by using sliding mechanics with fixed appliances.

In the permanent dentition, esthetic complaint is the major reason for seeking orthodontic correction. In adults, loss of posterior teeth, small sized teeth, or periodontal weakness may cause drifting of all teeth and anterior diastema between incisors. These cases might require partial closure of maxillary incisor spacing and redistribution of the remaining diastema space followed by esthetic restorative procedures or replacement of missing teeth.

#### **Periodontal Status**

The amount of bone support for each tooth should be of special consideration in children with juvenile periodontitis and adults with periodontal problems. Localized juvenile periodontitis is an aggressive periodontal disease, which is seen in teenagers. It is characterized by loss of tissue attachment and loss of alveolar bone around the permanent incisors and first molars. One sees a dentilabial migration of the maxillary incisors as a result of excessive bone loss forming a midline diastema.

The first line of treatment is to control the disease by periodontal therapy like scaling, root planning and with anti-microbial agents like tetracycline and metrogyl. In most cases, consultation with a periodontist is a must. A close collaboration between the orthodontist and the periodontist is desirable. Ideally the treatment of juvenile periodontitis should include correction of systemic condition along with the localized measures. In advanced stages of the disease, it is difficult to retain the teeth in function but in early stages, the disease can be eliminated and the dentition can be retained. The only contraindication to orthodontic treatment for this persistence of gingival inflammation and severe bone loss in spite of adequate phase I periodontal therapy, which includes preparation of tooth surface, plaque control, antimicrobial agents, and control of uncomplicated gingivitis. In adult seeking orthodontic closure of anterior spacing, it is assumed that bone remodeling process may occur more slowly. So, for both teenagers with initial stages of localized juvenile periodontitis and adult with or without periodontal problems, phase I periodontal therapy procedures are finished first, preferably by a periodontist. Orthodontic treatment should be started only after the inflammation of the gingival has reduced to a minimum by the phase I periodontal therapy.

Major occlusal adjustments and periodontal surgical procedures are performed after completion of orthodontic space closure as firstly, orthodontics may change the shape of periodontium reducing the extend of surgery and secondly, the removal of supracrestal fibers during surgery will facilitate retention. Generally to correct pathologic tooth migrations of anterior teeth, a tissue borne removable appliance with a labial wire or light elastic attached to the hooks embedded in the acrylic at the distal surface of each canine is used. These elastics are engaged below the brackets or buttons on the incisors. This would produce light and intermittent forces that would intrude as well as retract the anterior teeth closing the diastema. These light and intermittent forces are ideal for the closure of diastemas created by pathologic migration of anterior teeth. In adult patients, when there is loss of periodontal attachment, surface area of supported root becomes smaller and the center of resistance also becomes further. So, for tooth movement light forces with relatively large moments are needed.

#### **CONCLUSION**

The etiology of midline diastema is a very important factor that has to be taken into consideration before starting any orthodontic correction. Environmental factors as well genetic influences together play a vital role in the etiology of midline diastema hence the orthodontist role to evaluate the various important factors and

predict the risk of a developing midline diastema in future generation is valuable for patient diagnosis, treatment and retention.

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