

Management of maxillary midline diastema in early mixed dentition by 2×2 appliance

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Abstract

Male patient, 10 years of age reported to the orthodontic clinic with a chief complaint of large space in the upper anterior teeth. On intra oral examination a midline diastema of 6mm and bilateral agenesis of maxillary lateral incisors was seen. Bodily closure of the midline diastema was achieved with 2X2 orthodontic appliance, followed by prosthetic replacement of missing lateral incisors.

Introduction

Midline diastemata (or diastemas) occur in approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12-18 year olds.¹ There are many possible causes of midline diastemata, i.e. physiological, dento-alveolar disproportion, missing teeth, midline supernumerary teeth, proclination of the upper labial segment and a prominent frenum. In many of these cases orthodontic treatment alone can help close a diastema. Combined treatment with orthodontic, restorative and oral surgery techniques may be advocated when tooth size discrepancies or supernumerary teeth are present.^{1,2} Other causes may also necessitate a multidisciplinary treatment approach. Maxillary anterior diastema is considered a common esthetic complaint of patients frequently seen in pediatric clinics, especially in mixed dentition stage. With eruption of lateral incisors and permanent canines such midline diastemas reduce. No treatment is initiated if diastema is physiological or transient. Careful treatment planning is important because there is a need to deal with

not only the immediate, but long term adverse complications.³

Treatment in the present case encompasses a multidisciplinary treatment approach to improve the esthetics and psychological well being of the patient.

Diagnosis and Etiology

Male patient, 10 years of age reported to the Department of Orthodontics, Adhiparasakthi Dental College and Hospital, Melmaruvathur, with the chief complaint of spacing in the upper front teeth. Patient and his parents were worried about the un-esthetic appearance of upper front teeth. The patient's medical history was unremarkable. Intra-orally there was a large midline diastema (6mm) present between maxillary central incisors. He was in early mixed dentition stage. His oral hygiene and dentition were in good condition. All the permanent molars, lower four incisors and upper two central incisors were present. He presented with clinically missing maxillary lateral incisors. Extra orally he presented with straight profile, competent lips, acute nasolabial angle and deep mento-labial sulcus (Figure 1).

Treatment Objectives

The treatment objectives included closure of space between maxillary central incisors, space created between permanent central incisor and deciduous canine to be closed by prosthetic replacement. Maxillary permanent canines to be guided in the place of lateral incisor and achievement of appropriate canine and molar relationship.

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Treatment Alternatives

Based upon the proclination of anterior teeth and molar occlusion, either canine could be retained in lateral incisor position and molar relationship finished in class II, or canine moved into its place and molar relationship

finished in class I with replacement of missing lateral incisors.

Panorex revealed bilateral agenesis of maxillary lateral incisors and permanent maxillary canines were erupting in the place of lateral incisors (Figure 2).



Figure 1. Pretreatment extra-oral & intra-oral view



Figure 2. Pretreatment panorex

Treatment Progress

This patient required bodily movement of maxillary central incisors, so a 2×2 fixed appliance was selected. 0.022 slot MBT prescription was used. Initially 0.016 upper Niti arch wire was used to align and level. Progressively 0.019 ×0.025 Niti and stainless steel wires were used. Open coil spring was placed from #16 to #11 and #26 to #21. Elastomeric chain was engaged from #11 to #21 to mesialize both teeth (Figure 3).



Figure 3. After closure of midline diastema



Figure 4. Space maintenance of lateral incisors by an acrylic partial denture till adult dentition

After closure of midline diastema, space between incisors and deciduous canine was maintained by acrylic partial denture (Figure

4). Full time usage of acrylic partial denture was advised, which will prevent the reopening of spaces between maxillary central incisors.

Results and Discussion

A midline diastema usually is part of normal dental development during the mixed dentition. However, several factors can cause a diastema that may require intervention. Effective diastema treatment requires correct diagnosis of its etiology and intervention relevant to the specific etiology. Correct diagnosis includes medical and dental histories, radiographs, clinical examinations and possibly tooth-size evaluations. Timing often is important to achieve satisfactory results. Removal of the etiologic agent usually can be initiated upon diagnosis and after sufficient development of the central incisors. Tooth movements usually is deferred until eruption of the permanent canines, but can begin early in certain cases with very large diastemas.⁴

Generally, diastemas more than 2 mm requires active intervention.⁵ In cases of midline diastema caused by missing teeth, the spaces can be closed orthodontically and/or reconstructed with fixed/removable prostheses after redistributing the spaces with orthodontic treatment. In some other cases, the spaces can be closed with restorative intervention e.g. tooth recontouring with composite resin.⁷

Various tooth movement appliances used to close midline diastema are removable Hawley appliance with finger springs, split labial bow,⁸ a sectional wire with power chain elastics,⁹ M - Shaped diastema closing device and neo-dymium magnets.

M - Shaped diastema closing device tied onto the bands carrying edgewise brackets. The M - shaped spring is narrower than the distance between these two brackets and is stretched for attachment onto the brackets. The compressive force from the activated spring closes the diastema. Lingually bonded diastema closing systems involve a U or V shaped sectional wire and double helical closing loop which are bonded directly to the incisors or attached to the tubes. After space is closed a straight sectional wire is placed which serves as a retainer. Two small neo-dymium-iron-boron magnets attached to the palatal surface of the central incisors can also be used to close diastema.

Removable appliances generally close diastema by tipping the crowns of incisors but there is a strong tendency toward relapse. In the mixed dentition it is necessary to avoid tipping the roots distally.

Fixed appliances can provide better control of dental alignment, crown/root angulation and torque of incisors. In this case Niti open coil spring was used for two purposes, first being distalization of maxillary molars in case of end on end or full cusp class II molar relationship and second mesialization of central incisors. The problem with open coil spring is labial movement and rotation of central incisors that takes place during

treatment. This problem can be controlled by giving cinch back (archwire is bended 2mm distal to molar buccal tube).

Conclusions

To provide a successful outcome and patient satisfaction, coordinated orthodontic, prosthodontic, periodontic and restorative treatments with careful consideration of patient expectations and requests are critical. A multi disciplinary treatment approach is almost always a safer and successful option for treatment of such patients.

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