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CASE STUDY

TRIHELIXSPRING' FOR CLOSURE OF MIDLINE DIASTEMA

Dr. Biswas, P. P., Dr. Nadeer, T., Dr. Mohammed Rijash, Dr. Shaji, A. P., *Dr. Vineeth, V. T. and Dr. Dhanya Elizabeth

Department of Orthodontics and Dentofacial Orthopedics, Royal Dental College, India

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ABSTRACT

Maxillary anterior dentoalveolar spacing has the most negative influence on self-perceived dental appearance among young adults. Interceptive therapy is required for definite closure of midline diastema. Stability of result requires bodily approximation of the incisors. Many well designed sectional springs have been reported in literature for the correction of midline diastema. In this article a case of midline diastema treated with 'Trihelix spring' is selected. This innovative spring is fabricated with A J Wilcock stainless steel, 0.014'' special plus wire and contains three helices. This 'Trihelix spring' is a simple, effective, aesthetic and biologically compatible device with excellent root control for the treatment of midline diastema.

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INTRODUCTION

A "diastema" is defined as a space greater than 0.5 mm between proximal surfaces of adjacent teeth. Midline diastema (or diastemas) occurs in approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12– 18 year olds. (Foster and Grundy, 1986) The presence of maxillary midline diastema is a normal characteristic in the development of the stomatognathic system in the mixed dentition period, especially in the initial phase of the eruption of permanent maxillary central incisors ("ugly duckling" stage). As explained by Broadbent (1937), normal closure of this space occurs in majority of the children, by medial erupting path of maxillary lateral incisor and canine. It may persist in some individuals for the following reasons like, abnormal frenum (AngIe, 1907; McCoy, 1946; Stones, 1951; Sicher, 1952), physiological, dentoalveolar disproportion, localized spacing, missing tooth, due to peg lateral, midline supernumerary teeth, ankylosed central incisor, flared or rotated central incisors, macroglossia, parafunctional habits such as thumb sucking, mouth-breathing and tonguethrusting or due to a self-inflicted pathology by tongue piercing, ethnic and familial characteristics, abnormal closure of premaxillary suture, and midline pathology. (Nainar and Gnanasundaram, 1989) Selecting the most appropriate treatment for the maxillary midline diastema closure is not always an easy decision, given that it presupposes having a sound diagnosis as well as recognizing and managing the cause of the problem.

***Corresponding author:* Dr. Vineeth, V. T.,**
Department of Orthodontics and Dentofacial Orthopedics, Royal Dental College, India.

Case report

A patient reported to the Department of Orthodontics with the chief complaint of midline spacing in the upper anterior teeth. On extra oral examination the patient had a straight profile and anterior facial divergence with competent lips. Intraoral examination revealed midline spacing of 3mm in relation to 11 and 21with papilla penetrating upper labial frenum, with Angle's class I molar relation on left side and super class I on right side, Class I canine relation on rightside, end on relation on left side, overjet of 4mm and overbite of 4mm. An anterior Bolton discrepancy of 1.8 mm existed.

Diagnosis

Angle's Class I malocclusion on class I skeletal base with midline diastema. (Fig-1) The treatment objective for this case was to close the mid line spacing maintaining the same molarrelation and canine relationship and build up the lateral incisors.

Treatment planning

A non-extraction treatment plan was decided for the case. The upper central incisors were bonded with MBT 022 slot brackets. Midline space closure was decided to be done using the 'Trihelix' spring, followed by frenectomy and upper lateral

incisor build up for the Bolton's discrepancy of mandibular anterior excess of 1.8mm.

Fig. 1. Pre treatment

Spring design

This innovative spring is fabricated with A J Wilcock, Stainless steel, 0.014''special plus wire and contains three helices (Fig 2). One large helix of 3mm diameter is towards the cervical and the two small helices of 2.5mm diameter are towards the incisal. It consists of two arms with anti-tip bends of 35^0 bent towards the cervical. The two arms are pulled, forcefully engaged into the incisor brackets and cinched back (Fig 3).A force of approximately 150gms was produced when engaged in to the brackets.

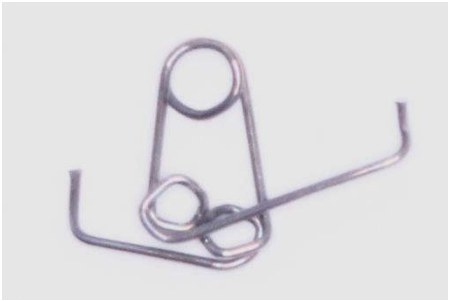

Fig. 2 Trihelix spring

Fig. 3. Trihelix spring

Treatment progress

A definite 3mm diastema closure (Fig 4) was achieved in a span of 6 weeks with good parallelism of roots as revealed from pre (Fig 5) and post (Fig 6) treatment radiographs.

Fig. 4. After first activation

Fig. 5. Post diastema closure

Diastema closure resulted in improved smile (Fig 6&7)

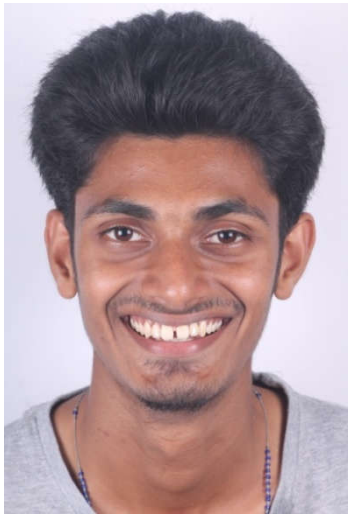

Fig. 6. Pre treatment

Fig. 7. Post treatment

DISCUSSION

According to Bernabe and Flores-Mir (2007) maxillary anterior dentoalveolar spacing had the most negative influence on self-perceived dental appearance among young adults. Young adults are more concerned about their aesthetics, which is compromised in patients with midline diastema. The decision regarding any treatment approach for maxillary midline diastema is not easy. A variety of factors, including the width and the cause of the diastema, and the possible treatment options for each case, should be critically evaluated by the patients, their parents, and the dentist in order to determine the need for treatment, and select the appropriate treatment plan. Several parameters like the patient's age and normal development, any malocclusion present, teeth size, relations with adjacent teeth, antagonist teeth and their osseous base, the presence of diastemas in other arch segments and, finally, the presence of a concomitant pathology should be assessed. After establishing the diagnosis, the treatment should include management of the causative factors, along with the diastema correction and the permanent retention of the result. The treatment of the maxillary midline diastema is usually postponed until the eruption of the permanent canines, but it may start earlier, depending on the cause of the diastema or in cases with a relatively large diastema (Huang and Creath, 1995). Main indications for early closure of a maxillary midline diastema, i.e. during the stage of mixed dentition, are: a) an urgent aesthetic demand by the patient and b) a central incisor position that inhibits the eruption of the lateral incisors or canines, since the lateral incisors might have been displaced into the space where canines normally erupt. (Proffit and Fields, 2000) Restorative measures (veneers, crowning and composite build-up) are subject to on-going maintenance issues. Care must be taken that the emergence profile of any restoration is not over-contoured creating hygiene problems. Care must also be taken with the crown width/length ratio. Orthodontic closure of the diastema, limited to the central incisors in patients with good posterior occlusion or who have economic considerations, can be done with removable orthodontic appliances. Orthodontists usually encounter the challenges with relapse after treating midline diastema. This is especially true in cases where simple tipping movements are done without doing root uprighting. Stability of result requires bodily approximation of the incisors. Though various methods are reported for maxillary diastema closure, in routine fixed appliance techniques a full strap up is normally required. With proper case selection, it is very appropriate to use sectional mechanics, especially since chair side time is minimized and completion of treatment is achieved in a short period of time (Banker *et al*., 1982). Bonding brackets on the four incisors and using 0.018 inch sectional wire and e-chain from lateral to lateral can be used. 2x4 appliance or utility arch can provide better control of incisors during closure of the midline spaces and also can retract any minor incisor flaring (Umar Hussaina *et al*., 2013). Many well designed sectional springs have been reported in literature for the correction of midline diastema. The M spring (Kanyas *et al*., 2016), 'Diastema – closing device' (Offerman, 1984), HIV spring (Harikrishnan, 2015) and the diastema kit (by American orthodontics) are some of the commonly used springs. The use of the 'Trihelix spring' is very advantageous in cases with anterior tooth material discrepancy. Since a full strap up is avoided and the diastema closure is achieved with this simple spring which facilitates build-up of the dimensionally smaller lateral incisors. The root paralleling achieved after diastema closure would provide more stability and better aesthetics. The force values are light and continuous hence more biologically acceptable.

Conclusion

This 'Trihelixspring' is a simple, effective, aesthetic and biologically compatible device with excellent root control that needs to be considered in the armamentarium of the orthodontist especially in adult orthodontics.

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