INTERCEPTION OF SEVERE ANTERIOR TOOTH ROTATION AND CROSS BITE IN THE MIXED DENTITION- A CASE REPORT.

Suresh K.S.*, Nagarathna J**.

ABSTRACT
This is a case report of an, 11 year old boy of mixed dentition age with class I malocclusion presented with severe rotation of upper left central incisor and single tooth anterior crossbite with inadequate space for their alignment. First premolar and retained deciduous lateral incisor were extracted followed by fixed orthodontic treatment which resulted in correction of single tooth cross bite and rapid correction of severely rotated tooth within three months.

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* Professor and Head of the department, Pedodontics & Preventive Dentistry, Government Dental College & Research Institute, Bangalore – 560002, India.
** Lecturer, Department of Pedodontics & Preventive Dentistry, Government Dental College & Research Institute, Bangalore – 560002, India.

INTRODUCTION
Recognizing conditions, which predispose to malocclusion in young children, is an important part of any comprehensive pediatric dental assessment.1 Interceptive treatment is usually carried out in order to reduce the severity of a developing malocclusion. The period of mixed dentition offers the greatest opportunity for occlusal guidance and interception of malocclusion. Eruption disturbances can be broadly classified as disturbances related to time and disturbances related to position.2 Tooth rotation is one among the eruption disturbances related to position which poses greater difficulty for correction more so, if the tooth in rotation is compounded with adjacent tooth malposition and inadequate space in the arch. Tooth rotation can be defined as observable mesiolingual or distolingual intra alveolar displacement of the tooth around its longitudinal axis.3 A rotated upper central incisor can be corrected by a removable orthodontic appliance with
minimal force but severe rotation with adjacent tooth malposition and inadequate space within the arch for their alignment are difficult to correct. Many rotations are associated with an element of apical displacement and will be difficult to correct with removable appliance.\(^4\)

Anterior cross bites are commonly encountered malocclusion, due the discrepancy in the buccolingual relationship of the upper and lower teeth.\(^5\) Graber has defined cross bite as a condition, where one or more teeth may be abnormally malposed either lingually or labially with reference to opposing teeth. Anterior dental cross bite has a reported incidence of 4-5\% and usually becomes evident during the early mixed-dentition phase.\(^6-9\)

The anterior cross bite may result from variety of factors such as lingual eruption path of the maxillary anterior incisors, a repaired cleft lip, trauma to the primary incisor resulting in lingual displacement of the permanent tooth germ, supernumerary anterior teeth, an over-retained necrotic or pulpless deciduous tooth or root, odontomas, crowding in the incisor region, inadequate arch length, a habit of biting the upper lip.

Anterior cross bite may lead to abnormal enamel abrasion of the lower incisors, dental compensation of mandibular incisors leading to thinning of labial alveolar plate, and/or gingival recession. Anterior dental cross bite requires early and immediate treatment to prevent anterior teeth mobility, fracture, periodontal pathosis, and temporomandibular joint disturbance.\(^6-12\)

Lee\(^13\) outlined four factors to consider before selecting a treatment approach

1. Adequate space in the arch to reposition the tooth
2. Sufficient overbite to hold tooth in position following correction
3. An apical positioning of the tooth in cross bite
4. A class I occlusion

The main goal of treatment is to tip the affected maxillary tooth or teeth labially to the point where a stable overbite relationship exists.\(^14\) Relapse is usually prevented by the normal overjet/overbite relationship that is achieved.\(^15\) Treatment modalities for correction of anterior cross bite are tongue blades, reversed stainless steel crowns, fixed acrylic inclined planes, bonded resin-composite
slopes, removable acrylic appliances with finger springs, and Bruckl appliance.\textsuperscript{10,12,16}

Teeth which erupt in cross bite may be corrected from the tipping forces that are provided by removable appliances but in cases of incisor root which are palatally displaced, removable appliance offering tipping force will not produce full correction.

The aim of this case report was to describe the advantages of fixed appliance in correction of severely rotated anterior tooth and anterior dental cross bite with inadequate space for their alignment in mixed dentition patient.

**CASE REPORT**

An 11 year old male patient was reported to Department of Pedodontics, Government Dental College with the chief complaint of irregularly positioned upper front teeth. (Fig-1) The child’s Medical history was non contributory and intraoral clinical examination revealed late mixed dentition in the upper arch with unerupted permanent canine bilaterally and class I molar relation. The maxillary left central incisor was mesiopalatally rotated and maxillary left lateral incisor was palatally erupted was in cross bite associated with retained primary lateral incisor. (Fig-2)

Total space analysis revealed inadequate space for the mesiodistal alignment of rotated central incisor as well as palatally erupted lateral incisor, hence it was decided to extract upper left first premolar to create space for alignment of malpositioned teeth and also to provide sufficient space for the eruption of the permanent canine.

![Fig 1: Pretreatment photograph showing rotated 21& retained 62.](image)
Fig 2: Dental casts showing rotated 21, palatally erupted 22 & retained 62.

The parents were informed about the malocclusion, and a written consent to proceed with the treatment was taken and aimed at correction of the cross bite followed by rotation correction. In the first appointment, retained deciduous left lateral incisor was extracted and after the correction of cross bite, in subsequent appointment upper left first premolar was extracted. Two molar bands were cemented to the upper first molars and preadjusted edgewise brackets of 0.18 slot were bonded on the respected teeth 15,14,11,21,22,24,25 and tooth in cross bite was engaged with 0.16 round nickel titanium wire and bilateral removable posterior bite plane was placed in the lower arch to open the bite in the anterior region. There was rapid correction of the cross bite; hence lower bilateral removable bite plane was removed. The same nickel titanium wire was engaged with the rotated upper left central incisor. Patient was seen for routine orthodontic activation of the full arch appliance once in 15 days. After 3 months of activation, the rotated upper left central incisor was repositioned to its normal position. (fig-3)

Fig 3: Dental casts showing derotated 21 & correction of crossbite w.r.t 22.

The appliance was removed and retention was started by a modified Hawley retainer. At the time of appliance removal, the childs intraoral appearance was consistent with what one
would normally find in a child of his age.

Fig 4: Post treatment photograph showing well aligned teeth.

DISCUSSION

Several clinical treatments have been proposed in the literature for correcting malpositioned teeth which include removable and fixed appliances. Anterior cross bite is a condition which seldom corrects by itself because the maxillary incisor is locked behind the mandibular incisors and continues to progress leading to severe malocclusion, thus early treatment can reestablish proper muscle balance and a well balanced occlusal development. Early treatment is also directed towards preventing dysplastic growth of both skeletal and the dentoalveolar components.\textsuperscript{17} The ideal age for the correction of anterior dental cross bite is between 8 to 11 years during which the root is being formed and the tooth is in the active stage of eruption. The important role plays not only the age of the child but also the motivation for treatment, how he or she perceives the problem.

There are different treatment approaches for the correction of anterior dental cross bite which can be used in early mixed dentition period. These include tongue blade therapy\textsuperscript{18}, reverse stainless steel crowns\textsuperscript{19}, removable Hawley retainer with anterior Z-springs\textsuperscript{14} and bonded resin-composite slopes.\textsuperscript{16} The tongue blade therapy is successful only with patient cooperation, and there is no precise control of the amount and direction of force applied. The reverse stainless steel crowns have been shown to be successful but the two main disadvantages of using reverse stainless steel crowns are the unaesthetic appearance of the crown form and the limitations of working with an inclined slope that is already formed. A removable appliance also requires patient cooperation and parental supervision.\textsuperscript{5} The Lower Inclined Bite Plane is the traditional method used for
correcting anterior single tooth or multiple tooth dental cross bite. It has to be used only if there is enough space in dental arch for labial movement of the upper incisors. Clinically it can be used in cases when upper incisors are in cross bite with more than one half of vertical overbite. The movement of teeth occurs from the resulting force of closing muscle and inclined plane interaction. One of the shortcomings of early treatment is the possibility of a two-phase orthodontic therapy as often it is difficult to estimate the further growth of the mandible. The presence of crowding in mandibular incisors, tempromandibular joint problems, and maxillary deficiency has to be considered before suggesting this appliance.

One should be aware of limitations of using removable appliances in correction of rotated tooth as one obtains point contact resulting in tipping movements which is less effective at derotation of tooth than fixed appliance. If the incisor root positioned palatally torquing the incisor root, with simple tipping force will procline the tooth excessively leading to poor esthetics, poor gingival contour and may increase the chance of relapse. Hence decision was taken to choose fixed appliance as the right approach in correction of malpositioned teeth in this case. A major goal of extraction of maxillary left first premolar in this patient was to make tooth mass compatible with the arch dimension, thereby enhancing the stability of final occlusion also the results of extraction therapy have been proven quite stable over the long term resulting in well alignment of the teeth with their adjacent. For a late mixed dentition child with severe rotation and crossbite were efficiently managed using fixed full arch appliance.

**CONCLUSION**

Timely intervention of malocclusion should be initiated as early as possible to prevent existing problems from getting worse and minimize or eliminate the need for comprehensive orthodontic treatment at a later stage. Treatment of malpositioned teeth are relatively precise if it is planned with fixed orthodontic appliance in attaining of desired postoperative results without any relapse resulted in rapid correction of single Anterior tooth rotation & cross bite
tooth dental cross bite & correction of severely rotated upper left central incisor with good alignment of the erupting canine.

Hence it can conclude that in magnitude of malpositioned teeth, fixed appliance by providing good anchorage, minimal duration, should be considered as the treatment of choice.

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**CORRESPONDENCE**

Dr. Suresh KS
Government Dental College & Research Institute,
Bangalore – 560002
Email – kotumachagisuresh@yahoo.com
Phone - +919740159214

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