

# Correction of Anterior Crossbite with Different Approaches: A Series of Three Cases

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## ABSTRACT

An abnormal labiolingual relationship between one or more maxillary and mandibular incisor teeth is called anterior crossbite. During mixed dentition anterior crossbite is not an uncommon finding. Early diagnosis will help the practitioner to treat minor irregularities seen in developing dentition with ease. The current paper presents three case series which describe the successful treatment of anterior crossbite (single tooth) in children with mixed dentition using removable appliances without any damage to tooth or periodontium.

**KEYWORDS:** Anterior Crossbite, Removable Appliances, Expansion Screw, Z- Spring

## INTRODUCTION

One of the major concerns of pediatric dentist is to guide the developing dentition of a child in line with the stage of orofacial growth and development.<sup>1</sup> Moyers defines a simple anterior tooth crossbite as a dental malocclusion resulting from the abnormal axial inclination of maxillary anterior teeth.<sup>2</sup>

Anterior crossbite should be intercepted and treated at an early stage so as to prevent a minor orthodontic problem from progressing into a major dento-facial anomaly. An old orthodontic saying states “the best time to treat a crossbite is the first time it is seen”.<sup>3</sup> Anterior crossbite could be the result of: labially positioned supernumerary tooth causing lingual deflection of the permanent incisor; trauma to the primary tooth causing displacement of the developing permanent tooth germ; an arch-length deficiency can cause a lingual deflection of permanent anterior teeth during eruption; habit of biting upper lip; repaired cleft lip.<sup>4,5</sup>

Anterior dental crossbite requires early and immediate treatment to prevent anterior teeth mobility and fracture, periodontal problems, and temporomandibular joint disturbances.<sup>5-8</sup>

A variety of approaches can be used to intercept anterior crossbite in mixed dentition. In the following article, three cases of anterior crossbite were treated with different treatment approaches i.e. two cases were treated with Hawley’s appliance with Z-spring and posterior bite plane and the third case with Hawley’s appliance incorporating jack screw with posterior bite plane.

## CASE REPORT

**Case No 1:** A 9-year-old female patient came to the

Department of pedodontics and preventive dentistry, College of Dental Sciences, Davangere, with a chief complaint of irregularly placed upper front teeth. The patient had no significant past medical or dental history. No abnormality was detected on extra oral examination. Intra oral examination revealed Angle’s Class I molar relation with permanent maxillary right lateral incisor and permanent maxillary left central incisor in crossbite (Figure 1A). Space analysis showed adequate space available for the permanent dentition. Thus, the treatment plan was to correct the crossbite. Hawley’s appliance incorporating “Z” spring was used in this case for the correction of both the teeth in crossbite with posterior bite plane so as to achieve a 2 mm incisal clearance (Figure 1B). The patient was instructed to wear the appliance full time. Activation was carried out in both helices simultaneously by opening the helices 2mm each time. The crossbite of central incisor was corrected in two activations within a span of two weeks, and that of the lateral incisor in six weeks with one activation each week (Figure 1C). No retention was provided as adequate overjet and overbite had been achieved.



Figure 1A - Pre-operative frontal view showing crossbite in relation to maxillary right lateral incisor and left central incisor

Figure 1B – Intra oral view with appliance

Figure 1C – post operative frontal view

How to cite this article:

M Manoharan, Disha P, Nagaveni NB, Roshan NM, Poornima P. Correction of Anterior Crossbite with Different Approaches: A Series of Three Cases. *Int J Oral Health Med Res* 2016;3(3):41-43.

**Case No 2:** A 9-year-old male patient came to the same department with a chief complaint of irregularly placed upper front teeth. Extra oral examination revealed normal profile with competent lips. Intra oral examination revealed Angle's class I molar relation bilaterally and permanent upper left central incisor in crossbite with adequate space for crossbite correction (Figure 2A). The correction of the crossbite was carried out using a removable appliance with Z – spring (Figure 2B). The bite was opened by incorporation of posterior bite plane into appliance so as to achieve a 2 mm incisal clearance. Activation was done in both the helices simultaneously by opening the helices 2mm each time. The patient was followed up for 3 weeks following which correction was achieved (Figure 2C). No retention was provided as adequate overjet and overbite had been achieved.



Figure 2A - Pre-operative frontal view showing crossbite in relation to maxillary left central incisor

Figure 2B - Intra oral view with appliance

Figure 2C - post operative frontal view

**Case No 3:** A 9-year-old male patient came to the same department with a chief complaint of irregularly placed upper front teeth. Extra oral examination revealed normal profile with competent lips. Intra oral examination revealed Angle's class I molar relation bilaterally and permanent upper left central incisor in crossbite with adequate space for crossbite correction (Figure 3A). The correction of the crossbite was carried out using a removable appliance with expansion screw (jack screw) (Figure 3B). The bite was opened by incorporation of posterior bite plane into appliance so as to achieve a 2 mm incisal clearance. Activation was carried out 2 times in a week with quarter turn (90° rotation) for each time. Correction was accomplished in 4 weeks (Figure 3C). No retention was provided as adequate overjet and overbite had been achieved.

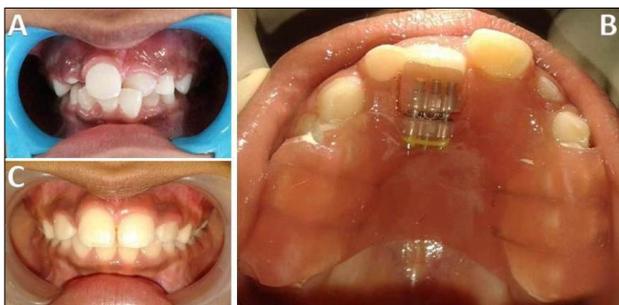


Figure 3A - Pre-operative frontal view showing crossbite in relation to maxillary left central incisor

Figure 3B - Intra oral view with appliance

Figure 3C - post operative frontal view

## DISCUSSION

Anterior crossbite can be defined as the lingual positioning of the maxillary anterior teeth in relationship to the mandibular anterior teeth.<sup>9</sup> Anterior dental crossbite has an incidence of 4-5% and usually becomes evident during the early mixed dentition stage.<sup>10, 11</sup> The ideal age for the correction of anterior dental crossbite is between 8 to 11 years during which the root is being formed, and the tooth is in the active stage of eruption. The child's age not only plays an important role but also the motivation for treatment, how he or she perceives the problem.<sup>12</sup> Treatment, if delayed to a later stage may become more complicated.<sup>13</sup> Relapse is prevented by the normal overjet/overbite relationship that is attained.<sup>14</sup>

The clinician should determine whether the crossbite is skeletal or dental from the profile analysis and intraoral findings, before beginning with appliance therapy. Lack of space for the maxillary incisors to erupt is the most common cause of anterior dental crossbite.<sup>15</sup>

Various treatment modalities for correction of anterior crossbite include tongue blade therapy, reverse stainless steel crown, inclined plane, removable appliance with finger spring, bonded resin-composite slopes and Bruckl appliance.<sup>6, 16, 17</sup>

In a young child, the best method for tipping maxillary and mandibular anterior teeth out of crossbite is a removable appliance using fingersprings.<sup>18</sup> Treatment with removable appliances will help in the maintenance of good oral hygiene.<sup>3</sup> They reduce chairside time. However, the success of therapy depends on good patient co-operation. The tongue blade therapy is indicated in case of erupting crossbite and is successful only with patient cooperation, and there is no control on the amount and direction of force applied.<sup>5</sup>

The catalan's appliance is a fixed appliance which uses resin slopes for the correction of anterior crossbite and works on the newton's third law of motion. It is rapid and easy alternative method, but disadvantage of this appliance are difficulty in speech, mastication, frequent loss of cementation and risk of anterior open bite if the appliance is cemented for more than 6 weeks.<sup>19</sup> The reverse stainless steel crown has shown to be successful, but the main disadvantage is the unaesthetic appearance of the crown form. Furthermore, restrictions of working with an inclined slope that is already formed.<sup>5</sup>

Because of the disadvantages mentioned above, in the first two cases, Hawley's appliance with a double cantilever spring was planned since there was sufficient space for labialisation of incisors and because the crossbite was of dental origin. A posterior bite plane was inserted to allow the crossbite correction. This limits closure and keeps the anterior teeth apart, which allows uninhibited incisor movement.

In the third case, expansion screw was used for the correction of crossbite. The principle of the orthodontic screw is that its ends are threaded in opposite directions

and when it is turned the metal end plates move apart. Since it is rigid, it can only be activated by only a small amount at one time, otherwise the appliance cannot be inserted. The activation is done one-quarter turn which separates the acrylic by about 0.25 mm producing forces ranging from 3 to 10 pounds. This compresses the teeth in the socket by 0.12mm per side, which is within the width of Periodontal Ligament (0.25mm). Such a mild reduction of periodontal ligament space will not interrupt the blood circulation and creates an ideal condition for the tooth movement and bone transformation. More frequent adjustments, of up to one-quarter turn twice a week is sometimes possible, as it was done in our case. But care must be taken not to overdo it as this can cause the appliance to be ill-fitting. Ideally, frequency of opening the screw is done every 3 – 7 days in slow expansion and for children it is twice a week and adults it is once a week.

Some advantages of screws over springs include: Easier to manage; Activated by patients with a key; Lesser tendency to dislodge; More stability; Forces can be well controlled.

## CONCLUSION

The above-mentioned cases describe the acceptable alternative methods for correction of anterior dental crossbite instead of complicated fixed treatment modalities in mixed dentition period. Therefore it is important to realize that early diagnosis and correction may prevent the prospect of any adverse effects upon the growth and development of the child.

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Source of Support: Nil  
Conflict of Interest: Nil