# EARLY INTERVENTION OF CROSS BITE DURING MIXED DENTITION WITH QUAD HELIX APPLIANCE – 2 CASE REPORTS

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ABSTRACT

'Posterior crossbite' occurs when the maxillary posterior teeth bite lingual to mandibular posteriors by obstructing the growth of dento facial complex. Early orthodontic intervention helps in disability limitation and reestablishment of form and function by both banded and bonded appliances. Quad Helix indicated its use in bilateral as well unilateral cross-bites involving primary and transitional dentitions<sup>1</sup>. The Concern over excessive force generation during rapid maxillary expansion led to its development and use in growing children<sup>6</sup>. Correction of cross bite with quad helix appliance in two patients is presented here along with discussion.

#### **Case Report 1:**

A 10 year old girl reported with the complaint of inability to chew on right side. She had no relevant past medical and dental history. On clinical examination she had an exfoliating right maxillary second primary molar. Also, she had unilateral cross bite on the right upper quadrant. The permanent first molar, erupting first premolar and the permanent lateral incisor were in a cross bite relation on the right side.

The painful exfoliating tooth was extracted and the parents were motivated to receive orthodontic treatment for the unilateral cross bite. On acceptance by the parents, it was decided to render correction with a quad helix appliance.

The appliance was bent out of 0.036" stainless steel wire. The active arm of the posterior coil was extended till the permanent lateral incisor on the right side. The appliance was activated at weekly intervals with three-pronged pliers.

Activation was ceased when it was mildly over corrected. The active treatment period was 5 weeks. The appliance was retained for another 12 weeks for retention. The comparative pre operative and post operative changes were appreciable.

A review recall was done after 3 months and there was no relapse of correction.

#### Case Report 2:

A 10 year old boy reported with the complaint of carious molar teeth. He had no relevant past medical and dental history. He had a chronic

irreversible pulpitis on 85, 74 and 75 and grossly carious 84, 54 and 64 and a unilateral cross bite on the left side. The entire quadrant from the central incisor to the permanent molar was in a cross bite relation.

The treatment plan comprised of prophylactic and preventive therapy, pulpectomy and stainless steel crowns on 85, 74 and 75, grossly carious 84, 54 and 64 were extracted. The mixed dentition orthodontic treatment was planned with a quad helix appliance made out of 0.036" stainless steel wire with the anterior active arm extended till the central incisor.

The activations were done at weekly intervals. Mild over correction, that was the objective of treatment, was obtained in 4 weeks. The quad helix appliance was debanded a week later. Now, the maxillary arch required a retainer as well as a space maintainer for the extraction spaces 54 and 64.So both of these objectives were combined to be delivered in a single appliance.

The appliance was a modified Nance-holding arch with 16 and 26 banded (for retention of cross bite correction), spurs holding on 55 and 65 (for space maintenance), acrylic button modified to contact the central incisors (retention and space maintenance)

This combination appliance needs to be modified by making the acrylic button smaller at the later phase, when it would have finished serving the purpose of a retainer.

Case – 1



Fig. 1 – Pretreatment



Fig. 2 – Quadhelix in place



Fig. 3 – Post treatment

Case – 2



Fig. 4 – Pretreatment



Fig. 5 – Appliance in place



Fig. 6 – Post treatment



Fig. 7 – Post treatment retention

The post operative changes were well appreciable with a positive transverse relation maintained anteriorly as well as posteriorly for the entire quadrant.

## **Discussion**

The correction of posterior crossbite is more complex than it appears. To develop an appropriate treatment plan, it is first necessary to determine if: (1) there is a functional jaw shift on closing; (2) the crossbite is unilateral or bilateral; (3) it is dental, skeletal, or a combination of both; and (4) it is related only to the maxilla or both jaws<sup>3</sup>.

The evidence from literature suggests that removal of premature contacts of the baby teeth is effective in preventing a posterior crossbite from being perpetuated to the mixed dentition and adult teeth<sup>7</sup>. When not identified at the early stage, in mixed dentition various banded and removable appliances have been advocated for the correction of posterior cross-bites.

The use of cross elastics as long as the space is adequate<sup>2</sup>, however if the posterior cross bite involves multiple teeth, Courier and Austerman (1993)<sup>4</sup> proposed the use of quad helix. He indicated its use in bilateral as well unilateral cross-bites involving primary and transitional dentitions. Skeletal cross bites and single tooth cross-bites are contraindications for the use of quad helix appliance.

The quad helix appliance comprises of four helices bent on 0.036" wire attached to bands. Activation of posterior coils give anterior arch expansion and activation of anterior coils give posterior arch expansion. Porter's W appliance comprises of a 'W' shaped wire bent out of 0.036" stainless steel wire attached to bands on primary/permanent molars. It can be used for unilateral / bilateral posterior cross bites. However it lacks the precision on activation and this makes it difficult to manipulate precisely<sup>2</sup>.

Frank SW and Engel GA <sup>5</sup> studied the effects of maxillary quad-helix appliance expansion on measurements cephalometric in growing orthodontic patients. Their results showed a mean increase in the maxillary intermolar width of 5.88mm, a mean increase in the average frontal molar relation of 2.95mm and a mean increase in the maxillary intercanine width of 2.74mm. the orthopedic changes accounted for 0.92 mm increase in the maxillary width and an increase in maxillomandibular width average the of 0.89mm.they concluded that these changes were associated with little relapse tendencies and orthodontic mild moderate expansion and

orthopaedic expansion were consistently demonstrated.

Petren S, bondemark L et al<sup>8</sup> systematically reviewed early orthodontic treatment of unilateral posterior cross bite . They concluded that there is no scientific evidence available to show that none of the treatment modalities- grinding, quad helix, expansion plate or rapid maxillary expansion is the most effective. They also concluded that most of the studies had serious problems of lack of power because of small sample size, bias and deficient or lack of statistical methods. They also suggested that future studies should also include assessment of long – term stability as well as analysis of costs and side effects of the interventions.

### CONCLUSION:

Early intervention of malocclusions establishes the proper form of the arch, normal function and acceptable aesthesis to the patient. Total correction of unilateral posterior cross bite in mixed dentition is mandatory if the etiology is dental or functional and the treatment is relatively quick if it is planned with banded appliances. At the interim post operative period, on attainment of desired postoperative results without any relapse, the conclusions drawn are

- Active treatment of unilateral posterior cross bite with banded appliances is relatively quick( 4-6 weeks)
- Anterior cross-bites can also get simultaneously corrected with the same banded appliance used for unilateral posterior cross bite, if the anterior arm is modified.
- 3. Short term retention phase (3 months) is mandatory for the correction of posterior crossbites. This can be accomplished with the same appliance, or a removable acrylic plate or can be coupled with a space maintainer(if space maintenance is also required)
- 4. none of the three cases required adjunctive bite opening

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