

Case report

“WATCH THEM YOUNG – TEACH THEM GROW” MANAGEMENT OF DEVELOPING ANTERIOR CROSS BITE IN MIXED DENTITION PERIOD USING VERSATILE 2X4 APPLIANCE

Abstract:

The primary care of the paediatric dentist is guidance of the child's developing dentition, in line with the stage of orofacial growth and development [1]. Anterior dental crossbite is a malocclusion resulting from the lingual position of the maxillary anterior teeth in relationship with mandibular anterior teeth [2]. In any type of crossbite correcting appliance, the practitioner must be able to delineate whether crossbite is of dental origin or skeletal origin [3, 4-6]. Crossbite of dental origin involves the localized tipping of a tooth or teeth, does not involve the basal bone [7]. In case of simple anterior dental crossbite, the patient displays a normal skeletal pattern with abnormalities presenting in the axial inclination of the affected teeth [5]. According to Profitt, first enough space needs to be opened to bring the displaced tooth or teeth across the occlusion into its proper position, in case of anterior dental crossbite correction [8]. Certain malocclusions should be corrected during the mixed dentition period which aids in the normal growth of jaws and surrounding structures. This article describes successful management of anterior segmental cross bite case treated using 2 x 4 appliance. The 2 x 4 appliance is a partially fixed orthodontic appliance that is used in children in a mixed dentition period to correct simple malocclusions associated with permanent anterior teeth.

Keywords: 2 x 4 appliance, Interceptive orthodontics, anterior crossbite, Mixed dentition, Children, Malocclusion, decreased overjet and reduced overbite.

Introduction

Crossbite is one of the most common dental conditions seen in the mixed dentition period with a significant prevalence rate of 4-5% [9, 10]. Group of factors which result in anterior crossbite includes palatal eruption path of the maxillary anterior incisors; a repaired cleft lip; trauma to the primary incisor resulting in lingual/ palatal 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; arch length inadequacy; upper lip biting habit [6,7,9-12].

The consequences of anterior dental crossbite are abnormal enamel abrasion of the mandibular incisors, dental compensation of mandibular incisors leads to thinning of labial alveolar plate, and/or gingival recession [3, 4-6].

Earlier treatment of anterior dental crossbite prevents anterior teeth mobility and fracture, periodontal pathosis and temporomandibular joint disturbances. [4,6,12,13].

The problems of anterior crossbite in permanent dentition shows progression in severity, so that early intervention aim at stimulating well balance growth and occlusal development is necessary [14].

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 differences in gender as well – girls are keener for treatment than boys [15].

Various techniques have been used to achieve this goal, such as transforce appliance, tongue blade therapy, composite inclined planes, reversed stainless steel crowns, removable acrylic appliances with lingual springs and fixed appliances [16,17]. However, the purpose of these appliances should not only be aimed to correct anterior dental crossbite, but additionally it should be economical, do not

cause any damage to the associated soft tissues, and appliances should also be effortlessly placed, removed and easily tolerated by the patient [18,19].

Any dental appliance or prosthesis should be always aimed to improve the normal function like mastication and phonation. It should not disturb regular oral hygiene maintenance. The variables such as communication, mastication, pain or discomfort, oral hygiene and compliance rate can be collectively referred to as comfort equation. However, these comfort equations inevitably depend on the time duration of the corrective procedure.

Considering all the above-mentioned aspects, three most used appliances to correct developing anterior crossbite in early mixed dentition period [6,7,11] are fixed, removable, myofunctional appliances.

The partial fixed appliance is indicated when more tooth movement is required and to correct the crowded and rotated teeth. Also, it is indicated in patients who exhibit minimal overbite that may require extrusion of the upper or lower anteriors to get adequate overbite at the end of the treatment [20,21].

The Present study describes management of anterior segmental crossbite in mixed dentition phase using 2x4 appliance.

CASE DESCRIPTION:

A 9 yearold boy was referred to the Department of Pedodontics regarding irregularly placed teeth with spacing in upper and lower front teeth region leading to unaesthetic appearance and bullying amongst his peer groups due to irregular teeth. He presented with a class 3 incisor relationship on a skeletal Class I base with an average maxillary mandibular planes angle (figure -1). He was in the early mixed dentition phase, both the upper and lower arches were spaced with reduced overjet

and negative overbite. (figure-2). Patient also had dental caries in relation to 84 which was restored.

Pre-operative photographs and impressions were taken and model analysis was done. Mixed dentition analysis inferred, excess space in the mandibular arch which can be utilized for alignment of 31,32,41,42. A 2x4 appliance with bondable buccal tubes on first permanent molars and brackets on the incisors along with bite raising composite was planned for simultaneous retraction and alignment of lower anteriors and proclination of upper anteriors to achieve optimal overjet and overbite. (figure-3) Initial aligning has been started with 0.014 nickel titanium wire. The archwire sequence was 0.014 nickel titanium, 0.016 nickel titanium followed by closure of spaces using e-chain. (figure-4) Active treatment time involved five visits over an 6-month period. After achieving minimum overjet and overbite debonding of the appliance has been done and a fixed bonded retainer has been given. (figure-5)

Discussion:

The most important objective in paediatric dentistry is to maintain or improve arch integrity to allow permanent teeth to erupt and prevent the development of malocclusion. Condition of anterior dental crossbite is considered as primarily aesthetic and functional concern to children, parents and that seldom corrects itself [18].

However, early orthodontic intervention may need for developing Class III patients with moderate to severe anterior crossbite and deep bite [22].

Early interception of developing anterior single tooth crossbite results in better correction that can be established. Treatment may become more complicated, if the treatment is postponed to a later developmental stage [23,24].

Eight to eleven years is the ideal age to treat developing anterior tooth crossbite, as this is the period when the root is being formed and the tooth is in the active stage of eruption [25].

Interceptive orthodontics should be more of a passive guidance procedure rather than an active procedure. Anterior dental crossbite can be habitual or due to ectopic eruption, single tooth or segmental, which may lead to skeletal discrepancy resulting from functional forward shift of the mandible on closure [10]. During the early mixed dentition stage, the incidence rate of anterior dental crossbite is 4-5% [9,10].

It is a critical role for a clinician to decide whether it is skeletal or dental, profilometric analysis and intra oral findings are required for management of developing anterior crossbite (Fixed, Removable, Myofunctional appliance therapy) [26].

Tongue blade therapy reversed stainless steel crown, lower anterior inclined plane (Catlan's Appliance), removable appliance with finger spring, bonded resin composite slopes and Bruckl appliance are the alternative treatment modalities for correcting anterior dental crossbite [6,7,11].

Lee BD suggested three basic factors for the case selection and appliance design for the success of the treatment-

- 1.adequate space in the arch to reposition the tooth,
- 2.sufficient overbite to hold the tooth in position following correction
- 3.class I molar relation [4].

McNamara et.al stated that anterior crossbites in the early mixed dentition are believed to be transferred from the primary to the permanent dentition and can have long-term effects on the growth and development of the teeth and jaws. Valentine and Howitt stated that anterior crossbite may lead to abnormal enamel abrasion or

proclination of the mandibular incisors, which, in turn, leads to thinning of the labial alveolar plate and/or gingival recession.²⁷

CONCLUSION:

The main advantage of early treatment of anterior crossbite is the opportunity to influence the process of growth in the upper jaw with quite simple and not expensive appliance as well as to avoid in many cases orthognatic surgery in future. It is possible to correct several dentoalveolar anomalies if you start to treat early. Therefore, it is possible to prevent development of severe anomalies and shorten the orthodontic treatment time in permanent dentition [6].

The main emphasis needs to be placed on the diagnosis and evaluation of the malocclusion. This is a competence of a dentist who then refer the patient to the orthodontic specialist for future treatment.

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figure 1 – Pre operative intra oral photograph showing class 3 incisor relation



Figure 2 – showing spaced dentition in relation to 31,32,,33,34



Figure 3 – bite raising done using composite and bonding of 2x4 appliance.



E-chain in mandibular arch



Figure 4 – closure of spaces using



UNDER

Figure 5 – Post operative after 6 months showing closure of spaces and attainment of positive overjet and minimal over bite

UNDER PEER REVIEW