

Boon's appliance- A modified nance appliance for cross-bite correction.

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Abstract

Space management is a crucial factor in prevention of malocclusion. Premature loss of primary teeth can cause undesirable drifting and loss of space. Anterior crossbite is a major esthetic and functional concern to the parents during developmental stage of a child. Various removable and fixed appliances can be used. Presented in this article is a case report in which anterior crossbite correction and space management are done simultaneously by an appliance consisting of nance palatal arch with z-spring and posterior bite plane.

Keywords: Nance palatal arch, z-spring, anterior crossbite, space management.

Introduction

One of the greatest challenges in Paediatric dentistry is the management of space loss due to untimely loss of primary teeth. If the arch integrity is disrupted by early loss of primary teeth, problems may arise that affect the alignment of the permanent dentition. Opposing teeth can

supraerupt, more distal teeth can drift and tip mesially and more forward teeth can drift and tip distally^[1]. Altered tooth positions may include space deficiency with loss of arch length, blocked or deflected eruption of permanent teeth, unattractive appearance, food impaction areas leading to increased incidence of caries and periodontal diseases, etc. The altered occlusal relationships may evidence traumatic interference and jaw relationship. When primary tooth loss occurs due to caries, maintenance of space is needed. This can be achieved by placement of passive space maintainers, active space regainers or combination of both.

Anterior crossbite is a major esthetic and functional concern to the parents during developmental stage of a child ^[2]. Anterior crossbite is a condition in which one or more upper teeth erupting lingual in relation to the lower teeth which they should occlude when the mandible is in maximum intercuspation^[3].

Case Report

A 7 year old male patient reported to the Department of Pediatric and Preventive Dentistry, Kalinga Institute of Dental Sciences, with a chief complaint of missing teeth in the left and right, upper and lower teeth region with a history of grossly decayed teeth for which the teeth were extracted in a private clinic 4 months back. Patient had no relevant medical history. Intra-oral examination revealed Angle's class 1 molar relationship bilaterally, absence of maxillary and mandibular left and right primary molars and maxillary left central incisor was in crossbite relation with mandibular left central incisor [Fig 1,2,3]. There was adequate space for correction of crossbite.

Teeth present

16 15 13 12 11 21 22 24 26

46 42 41 31 32 36

15 is actively erupting

Treatment objective is maintenance of arch length and width till eruption of permanent teeth and correction of anterior crossbite simultaneously. Thus, modified nance palatal arch with z-spring and posterior bite plane was fabricated [Fig.8,10]. Lingual arch space maintainer for the mandibular arch was also fabricated for space maintenance as all the four permanent mandibular teeth were erupted [Fig.12].

Fabrication of the appliance

Maxillary permanent molars were banded with banding material of thickness and a saddle was prepared with 21 gauge wire on it. An omega shaped wire of 19 gauge was fabricated and soldered to the palatal surface of molar bands and to the saddle on one end[Fig.4]. The Z-spring made up of 23 gauge wire was soldered to the omega loop[Fig.5]. Posterior bite plate was fabricated with acrylic resin, covering the occlusal and palatal surface of maxillary molars [Fig.6]. The retentive arm of the z-spring and part of the wire component were embedded

into acrylic button. A mark/indentation was placed at the point of attachment of retentive arm with the omega loop. Boxing of the z-spring with free active arm on palatal surface of maxillary incisor i.e. 21 was done. [Fig 6,7].

The patient was kept under periodic follow up on every 7 days and the helical loops of the z-spring were opened to activate the appliance every 15 days. After 5 weeks, z-spring had tipped the maxillary incisor labially correcting the anterior crossbite. The posterior bite planes were detached from the band on both sides and z-spring was detached from the acrylic button [Fig.10,13]. A tapered fissure bur was used to cut at the mark given at the retentive arm of z-spring. Thus, the nance palatal arch was left on the maxillary arch for space maintenance.

Discussion

Incidence of anterior crossbite is 4-5% and is mostly evident in the mixed dentition^[4]. It may result from various factors like- lingual eruption path of maxillary anterior teeth due to over-retained primary maxillary anterior teeth, cleft lip and palate, trauma to primary anterior teeth which can drift the permanent tooth germ lingually, supernumerary teeth, odontomas, crowding in the anterior teeth region due to inadequate arch length, habits like upper lip biting, sclerosed bony or fibrous tissue barrier caused by premature loss of primary tooth etc.^[5]. The period of mixed dentition provides greatest opportunity for development of crossbite which if not corrected immediately can lead to abnormal enamel abrasion of the lower incisors, thinning of labial alveolar plate with gingival recession, mobility, fracture of tooth, periodontal pathosis and temporomandibular joint disturbance^[6]. It should be intercepted and treated at an early stage because it is a self-perpetuating condition which if not treated early, has the potential of growing into skeletal malocclusion^[1].

Space maintainers can be removable or fixed, unilateral or bilateral, functional or non-functional. Drawbacks of the removable appliance are retention and patient's compliance. Fixed appliances include- band and loop, nance palatal arch, lingual arch and distal shoe. Nance palatal arch is indicated when there is bilateral premature loss of the primary maxillary teeth. Various modifications can be incorporated in the nance palatal arch to satisfy a particular situation. These include nance palatal arch with anterior bite plane [7], open coil springs [8], anterior prosthesis[9], z- spring [6]etc.

There are various treatment modalities for the correction of anterior crossbite like- tongue blade therapy, lower inclined plane, palatal spring appliance like z-spring, removable hawley type retainer modified with auxiliary springs, labial edgewise archwires, reverse stainless steel crown, bonded resin composite slopes, Bruckl appliance and clear aligner^[2,5]. Fixed appliance such as 2x4 appliances can also be used^[10].

Double cantilever spring or Z-spring is most commonly used appliance for the correction of anterior cross-bite. It has two helical loops each of diameter 2mm, closing from passive spring positioning that approximates the incisal edges of the contacted tooth. When activated, the active arm tips the teeth labially, correcting the cross-bite.

In this present case, we have used palatal arch with z-spring and posterior bite plane for the correction of developing anterior cross-bite and maintenance of space in the maxillary arch and maintaining the space in the mandibular arch with lingual arch space maintainer.

Deciding for the treatment of pediatric patients with orthodontic appliances is crucial. Removable appliances work well in respect to maintaining the oral hygiene, thus preventing deposition of plaque and microfloras. However, chances of breakage, losing the appliance, patient compliance and supervision of parents are few

drawbacks of removable appliances^[2]. The advantages of fixed appliances over removable type is significant. It has better patient's compliance, bodily tooth movement, lesser bulk, and better control. However, the chair side time is comparatively higher than removable type[5].

In this case, double cantilever spring with nance palatal arch is fabricated which maintains the space for the prematurely extracted primary teeth as well as increases the stability and rigidity of the appliance. This enhances the directed forces towards the centre of rotation leading to bodily movement of the incisor.

Conclusion

The presented appliance has the advantages of correction of anterior crossbite and space maintenance as well as improved patient compliance.

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Legends Figures



Figure 1



Figure 2



Figure 3

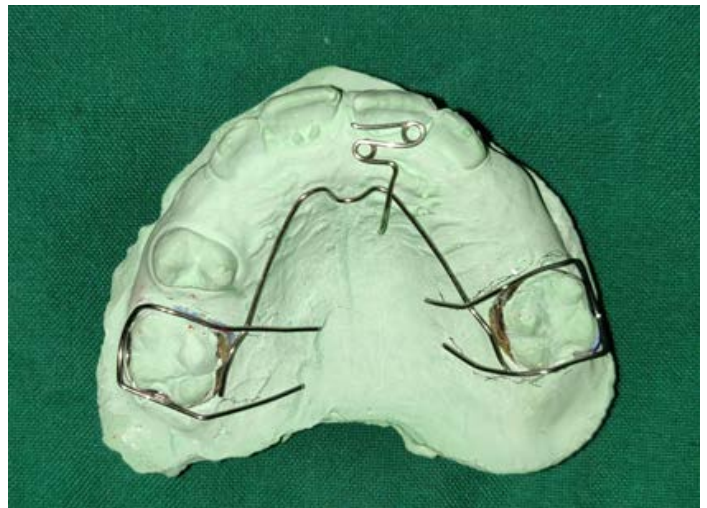


Figure 4



Figure 5



Figure 6

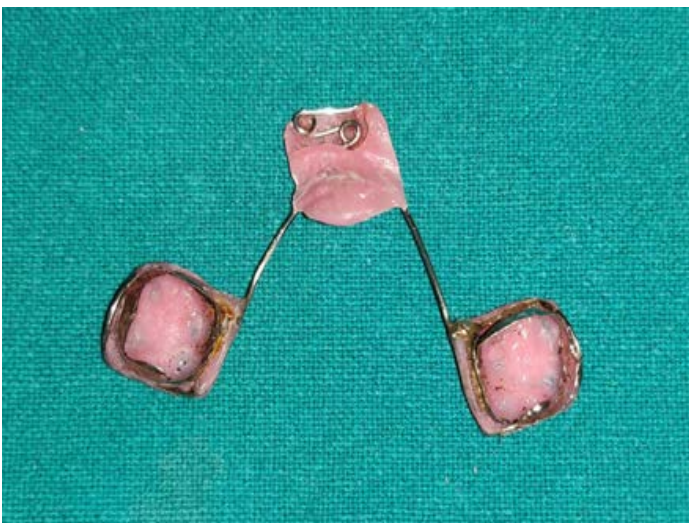


Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13