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Innovative use of modified aligners as bite blocks in correction of anterior crossbite in children

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Abstract

Discrepancy in the transverse relationship of the upper and the lower teeth is referred to as a crossbite. Crossbite can be dental or skeletal in origin or a combination of both and can be anteriorly or posteriorly placed. An anterior crossbite is when one or more primary or permanent maxillary incisors are lingual to mandibular incisors. There are a variety of methods employed for the correction of crossbite which includes, fixed appliances, removable acrylic appliances with springs, anterior inclined planes, tongue blades etc. One of the major drawbacks of these treatment modalities include the dietary restrictions because of posterior bite blocks and hence the reduced patient compliance. In addition, there might be molar intrusion, lingual rolling in of lower molars and TMJ discomfort with use of posterior bite blocks. Through this article we are presenting a case report with a newer, innovative way of correction of anterior crossbite in early permanent dentition without the use of a posterior bite block.

Keywords: Anterior crossbite, posterior bite block, aligners

Introduction

In a normal occlusion the maxillary teeth overlap the mandibular teeth, vertically to create an overbite and horizontally an overjet. Any abnormality in the transverse plane is referred to as a crossbite [1]. In a normally growing mandible, crossbite should be treated as early as possible for the normal growth and development of the dental arches and TMJ [2]. Anterior dental crossbite has shown a prevalence of 4-5% and is usually due to the palatal malposition of maxillary anterior teeth [3]. Various other etiological factors include crowding in the incisor region, trauma to the maxillary tooth buds causing its displacement palatally, over retained deciduous teeth, habit of biting the upper lip, odontomas etc.

Anterior crossbite, may also lead to movement of lower incisors labially through the labial supporting tissues resulting in gingival recession. In such cases early treatment is advisable to eliminate unwanted gingival effects [4]. The main goal of treatment of an anterior crossbite is to labially tip the maxillary incisors to achieve a non-traumatic acceptable overjet.

There are a variety of methods employed for the correction of crossbite which includes fixed appliances, removable acrylic appliances with springs, composite inclined planes, tongue blades etc. [5, 6] Major drawbacks associated with most of the conventional techniques include:

- Dietary restrictions due to a large posterior bite block.
- Molar intrusion or lingual rolling
- Tmj discomfort
- Speech problems again due to bite block.
- Less patient compliance

Through this case report, a simple and innovative patient compliant technique without the need for a posterior bite block in the correction of anterior crossbite using a modified aligner will be discussed.

Case Report

A 13-year-old male patient reported to the department of Orthodontics, Coorg Institute of

Dental Sciences, Virajpet with a chief complaint of forwardly placed lower front teeth and desired to get it corrected.

Diagnosis and Etiology

The patient had a straight facial profile with average clinical FMA. (Fig.1) On Intra oral examination he had Angle's Class I malocclusion with a Class III Incisor relationship and anterior crossbite wrt 11, 41 and 21, 31. The oral hygiene was fair. All teeth from the permanent first molars have erupted in both the upper and lower arches. Patient exhibited an overjet of -1 mm and an overbite of 8mm with and anterior cross bite. (Fig.2).

The amount of incisor exposure at rest was 0mm and during speech the amount of incisor exposure was found to be 5mm of lower incisors. Incisor exposure during smile which was 7 mm of lower incisor. TMJ evaluation revealed No Clicking, No Pain or Mandibular deviation.

Treatment objectives

The treatment was started with the following objectives

1. Correction of anterior crossbite.
2. Reducing patient discomfort thereby increasing patient compliance.
3. Avoiding deleterious effects of posterior bite block.
4. Achieving a pleasing profile

Treatment Alternative

Crossbite correction using fixed appliance and posterior composite bite block.

Treatment Rationale

Treatment involved the use of a Modified aligner as bite blocks to correct the crossbite, achieve class I incisor relationship and simplify the fixed appliance stage. Furthermore, there is theoretical advantage of improving the patient's profile by causing a small skeletal change.

Composite bite blocks were first placed on 36, 46. Alginate impression was made and casts poured. Then a modified aligner of 1.5 mm thickness was fabricated on this cast. The bite blocks were removed after the fabrication of the modified aligner.

A 2 X 4 appliance with pre adjusted edgewise MBT brackets with 022 X 028 slot was bonded in the upper arch and 0.012 CuNiTi placed. Patient was asked to wear the modified aligner in the lower arch at all times except while eating and brushing. The patient was asked to report after 3 weeks.

Treatment Progress

Following 3 weeks it was decided to continue with 0.012 CuNiTi for another 3 weeks. One and half month after

beginning of treatment 17 X 25 NiTi RCS was used for Proclination and intrusion of the upper anteriors. The aims of the treatment were achieved successfully due to excellent patient compliance within 3 months. (Fig 3 & 4).

Result

1. The anterior crossbite correction achieved with good patient compliance in a shorter duration.
2. The anterior crossbite correction achieved without any deleterious effects of posterior bite blocks.
3. The profile of the patient has improved after the treatment.

Discussion

Grabner has stated 'Interceptive orthodontics as that which "intercepts" a malocclusion that has already developed or is developing, and the goal is to restore a normal occlusion'.^[7] Clinically, an anterior crossbite is expressed as a reverse overjet in which one or more maxillary teeth are positioned palatal to the mandibular incisor teeth when the patient closes his mouth into centric occlusion. Patients with an anterior crossbite will benefit from an interceptive treatment.

Anterior crossbite, having poor aesthetics, has been hypothesized that if the disease is left untreated, it may result in^[4]:

1. Attrition to the teeth in the crossbite.
2. Gingival recession and loss of alveolar bone support to the lower incisors.
3. Temporomandibular dysfunction, related with early crossbites in children^[2].
4. Potentially harmful effects on the growth of the mandible and the maxilla, involving skeletal system in addition to teeth and alveolar processes.

Following the detection of crossbite, the treatment should ideally involve a technique which is simple, non-invasive, involving less chairside time, requires minimal patient cooperation and gives rapid correction of the crossbite.

The treatment of crossbite can be accomplished using a variety of techniques, such as fixed appliances, removable acrylic appliances, composite inclined planes, tongue blades, etc.^[8-12] The majority of conventional treatments have several significant downsides including dietary restrictions, speech issues, less patient compliance in addition to the drawbacks of using posterior bite blocks.^[13] The treatment with the described modified aligner as bite blocks has overcome major drawbacks, as there was no interference in dietary intake since the patient could remove the aligner while eating, making it more patient compliant, with no risks of loosening of the appliance and not causing any ill effects on the TMJ.



Fig 1: A, B, C, D: Pre-treatment extraoral

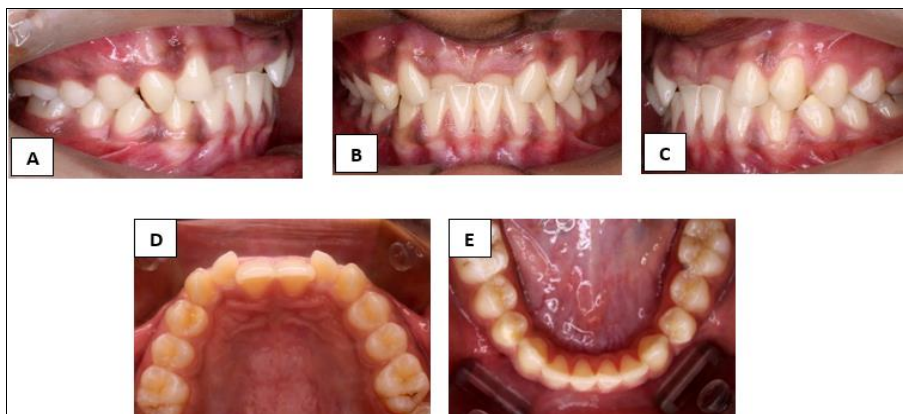


Fig 2: A, B, C, D, E: Pre-treatment intraoral photographs



Fig 3: A, B, C: Mid treatment intraoral



Fig 4: A, B, C: Post-treatment intraoral

Conclusion

To date, even though there is no definitive review regarding the most effective management of anterior crossbites, the treatment should ideally be one which is simpler, efficient and one which is patient compliant. This newer, modified aligner as bite blocks is a simple, non-invasive technique which was used successfully in correcting the anterior cross bite with minimal patient discomfort, rapid correction and no ill effects on the TMJ.

Conflict of Interest

Not available

Financial Support

Not available

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