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From Crossbite To Normal: A Clinical Series On Occlusal Shift In The Anterior Region

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Abstract

Background:

Anterior dental crossbite is a common malocclusion observed during the mixed dentition phase, often resulting from abnormal eruption patterns, retained primary teeth, or space deficiencies. If not addressed early, it can lead to complications such as enamel wear, periodontal issues, and temporomandibular joint dysfunction.

Aim:

To document and evaluate the clinical management of anterior single-tooth crossbite using different interceptive approaches tailored to individual patient needs during the mixed dentition stage.

Methods:

This case series presents three pediatric patients aged 8–9 years, each diagnosed with anterior dental crossbite associated with Angle's Class I malocclusion. Following comprehensive clinical and radiographic assessment, three different treatment modalities were employed:

- *Case 1: Catlan's inclined plane fabricated with light-cure composite*
- *Case 2: Removable Hawley appliance with an expansion screw*
- *Case 3: Tongue blade therapy with occlusal bite-raising using glass ionomer cement*

Treatment outcomes were evaluated based on correction of crossbite, improvement in occlusion, and patient/parent satisfaction.

Results:

All three patients achieved successful correction of the anterior crossbite within 2–3 weeks of initiating therapy. No retention appliances were necessary, and occlusal stability was maintained at short-term follow-up. Each intervention was well-tolerated, with positive esthetic and functional outcomes.

Conclusion:

Early interceptive management of anterior crossbite using conservative and individualized treatment approaches can lead to effective, stable, and non-invasive correction during the mixed dentition phase. The success of these cases highlights the importance of timely diagnosis, appropriate appliance selection, and patient cooperation in achieving favorable outcomes.

Keywords: *Anterior crossbite, Mixed dentition, Pediatric dentistry, Interceptive orthodontics, Catlan's appliance, Expansion screw, Tongue blade therapy, Occlusal correction*

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I. Introduction

The development of dentition and occlusion is fundamental to the overall oral health and well-being of infants, children, and adolescents. According to the American Academy of Pediatric Dentistry (AAPD), early identification, accurate diagnosis, and timely intervention of dentofacial abnormalities are essential components in the management of the developing dentition[(1)]. Among these abnormalities, malocclusion—defined as the misalignment of teeth within or between the dental arches in any plane—is a frequently encountered condition in pediatric populations[(2)].

One such manifestation is the anterior single-tooth crossbite, a relatively common malocclusion observed during the mixed dentition stage. In India, population-based studies have reported the prevalence of anterior crossbite in mixed dentition to range between 4% and 10%, underscoring the clinical significance of

early detection and intervention. If left untreated, anterior crossbite can contribute to a range of adverse outcomes including enamel attrition, periodontal breakdown, and dysfunction of the temporomandibular joint (TMJ)[3].

Crossbites are generally classified based on their location—anterior or posterior—and their etiology, which may be skeletal, dental, or functional in nature. A variety of treatment modalities have been proposed for the correction of single-tooth anterior crossbite, utilizing both removable and fixed appliances. These include Z-springs with posterior bite planes, Catlan's inclined plane, and 2×4 fixed appliances with light continuous archwires, among others.

This paper presents three clinical cases of anterior dental crossbite successfully managed using different treatment strategies: expansion screw appliances, tongue blade therapy, and blue bite light-cure composite build-ups. The outcomes highlight the importance of individualized treatment planning and early intervention in achieving favorable functional and esthetic results.

II. Case Presentation

Case 1

A 9-year-old male patient reported to the Department of Pediatric and Preventive Dentistry, accompanied by his parent, with the chief complaint of irregularly positioned upper front teeth noticed over the past 2–3 months. The medical and family histories were non-contributory, and no deleterious oral habits were reported.

Intraoral examination revealed that the patient was in the mixed dentition stage. Both maxillary central incisors—tooth numbers 11 and 21—were observed to be positioned palatally, resulting in an anterior dental crossbite (Figure 1). The buccal segment relationship was consistent with Angle's Class I malocclusion.After discussing the condition and available treatment options in detail with the patient's parents, informed consent was obtained prior to initiating the corrective procedure.

Treatment Plan

On the first visit, following parents' consent, the pre-treatment records were taken, including intraoral and extraoral photographs (Figure 1A) and alginate impressions of the maxillary and mandibular arches followed by extraction of retained deciduous maxillary central incisors. On the second visit, oral prophylaxis was performed. Catlan's Appliance Fabricated by Blue Bite Light Cure Composite. The patient was seen weekly to check progress. The desired correction of the anterior crossbite was attained (Figure 1.F). A retainer was not found to be necessary after the correction of the anterior crossbite, since cases such as this one usually become stable by themselves. The result effectively addressed the patient's aesthetic needs and alleviated the parents' concerns.

Figure 1. (A)Pre-treatment photograph at centric occlusion. (B) Pre-treatment photograph of maxillary arch. (C)Photograph after Extraction of Retained Primary Central and lateral Incisors (D) Catlan's Appliance Fabricated by Blue Bite Light Cure Composite. (E) Follow up after 2 weeks(F) Follow up after 1 year.

Case 2

An 8-year-old female patient presented to the Department of Pediatric and Preventive Dentistry with the chief complaint of irregularly aligned upper front teeth, first noticed approximately 2–3 months prior. The medical and dental histories were non-contributory, and neither the patient nor the parent reported any history of orofacial trauma.

General and extraoral examinations revealed no abnormal findings. On intraoral examination, the patient was found to be in the mixed dentition stage. Multiple retained deciduous teeth were noted in both the maxillary and mandibular anterior regions, contributing to the irregular eruption pattern and misalignment of the permanent teeth.Further clinical evaluation and radiographic assessment were planned to determine the eruption status and root resorption of the retained deciduous teeth, along with appropriate space analysis for definitive treatment planning.

Treatment plan

On the first visit, following parents' consent, the pre-treatment records were taken, including intraoral and extraoral photographs (Figure 2A toC) and alginate impressions of the maxillary and mandibular arches followed by extraction of retained Deciduous Maxillary left Lateral Incisor and Mandibular All Incisors. On the second visit, oral prophylaxis was performed. Hawleys With Expansion Screw Appliance(Figure 2.D.E) delivered to patient and activation instruction (Quarter turn twice daily for 2 weeks) . The patient was seen weekly to check progress. The desired correction of the anterior crossbite was attained (Figure 2.G.H). A retainer was not found to be necessary after the correction of the anterior crossbite, since cases such as this one usually become stable by themselves. The result effectively addressed the patient's aesthetic needs and alleviated the parents' concerns.

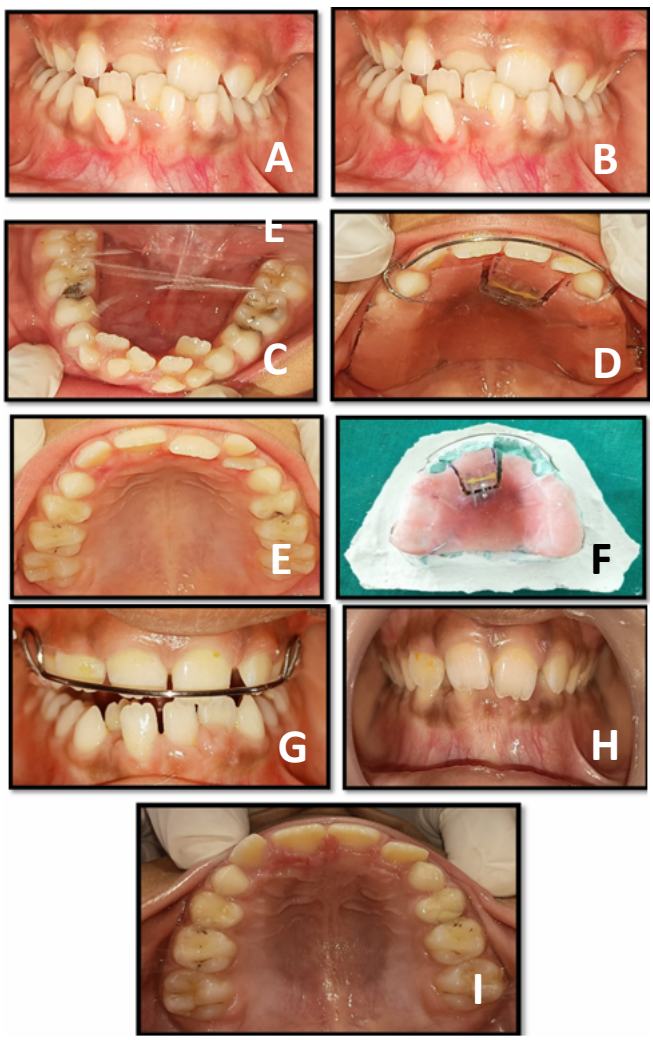

Figure 2. (A)Pre-treatment photograph at centric occlusion. (B) Pre-treatment photograph of maxillary arch. (C) Pre-treatment photograph of Mandibular Arch showing Retained Primary Central and lateral Incisors (D) Fabrication of Hawleys with Expansion Screw Appliance. (E)Intra oral photograph of Hawleys with Expansion Screw Appliance (F) Frontal view of Hawleys with Expansion Screw Appliance (G,H,I) Follow up after 2 weeks.

Case 3

An 8-year-old female patient presented to the Department of Pediatric and Preventive Dentistry with the chief complaint of mobile teeth in the lower anterior region of the jaw, noticed over the past 10–12 days. The medical and family histories were non-contributory, and there was no history of deleterious oral habits.

Intraoral examination revealed that the patient was in the mixed dentition phase. The maxillary right central incisor (tooth 11) was found to be erupting palatally, resulting in an anterior dental crossbite. This abnormal eruption pattern appeared to be associated with delayed exfoliation of the primary mandibular central incisor, potentially disrupting the normal path of eruption. The occlusal relationship was classified as Angle's Class I malocclusion with an anterior crossbite involving tooth 11 (*Figure 3A–C*).After a thorough discussion of treatment options, the patient's parents were fully informed regarding the proposed management plan. Informed consent was obtained prior to the initiation of treatment.

Treatment Plan

At the initial visit, following parental consent, pre-treatment records were collected in the form of intraoral and extraoral photographs, as well as upper and lower arch alginate impressions followed by extraction of lower right Central incisor. At the follow-up visit, oral prophylaxis was performed and bite raised by Glass Ionomer cement applying on permanent molars (Figure. 3D). The patient was then instructed on tongue blade therapy as a non-surgical interceptive treatment to rectify the anterior crossbite (Figure. 3E). She was guided to position the ice cream stick between the right maxillary central incisors, bite hard to exert pressure for five seconds, release, and repeat 20 times, three times daily.

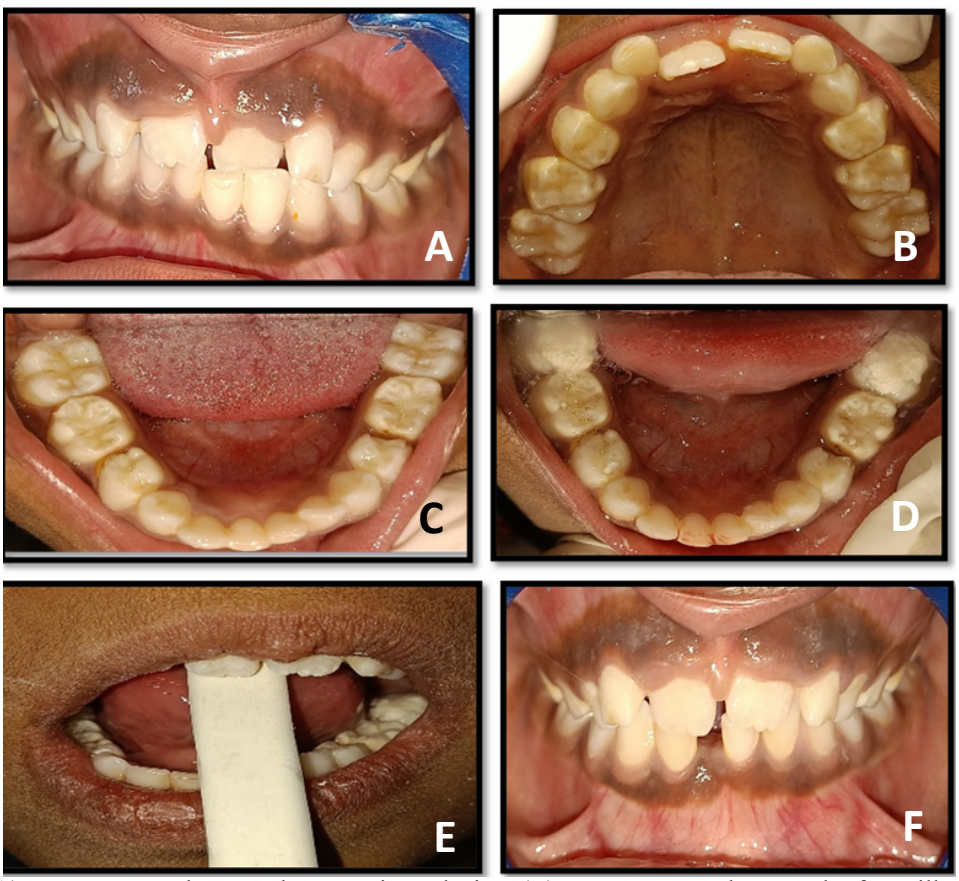

Figure 3. (A)Pre-treatment photograph at centric occlusion. (B) Pre-treatment photograph of maxillary arch. (C) Pre-treatment photograph of Mandibular Arch (D) Bite raised by Glass Ionomer Restorative Cement applying irt tooth no.36,46. (E) Tongue blade therapy (F)Follow up after 2 weeks.

III. Discussion

Anterior dental crossbite is a frequently encountered malocclusion during the mixed dentition period and requires timely diagnosis and intervention to avoid long-term complications. The cases presented in this series demonstrate a range of clinical presentations and successful management techniques tailored to individual patient needs and cooperation levels. Early intervention in these cases prevented the progression to more complex malocclusions and ensured better functional and aesthetic outcomes.

Etiology and Diagnosis

The etiology of anterior dental crossbite is multifactorial and may include factors such as abnormal eruption patterns, retained primary teeth, inadequate arch space, trauma to primary teeth, and habitual behaviors like lip biting [1,2]. In all three cases, retained deciduous teeth and delayed exfoliation were significant contributors to the aberrant eruption paths of the permanent incisors, leading to anterior crossbite.

Clinical examination, radiographic assessment, and occlusal analysis are crucial in differentiating dental crossbite from skeletal or functional crossbites. All three cases demonstrated Angle's Class I malocclusion, suggesting a dental origin rather than skeletal, which guided the choice of simple, interceptive treatments over comprehensive orthodontic therapy.

Rationale for Treatment Modalities

The selection of the treatment modality in anterior crossbite correction depends on factors such as patient age, the number of teeth involved, space availability, the position of erupting teeth, and the level of patient compliance [3,4]. Each of the cases in this series utilized a different therapeutic approach, showcasing the flexibility of treatment options available in pediatric dentistry.

Case 1: Catlan's Appliance with Light Cure Composite

Catlan's inclined plane appliance fabricated directly in the mouth using blue bite light cure composite proved to be a simple and effective intervention. This appliance utilizes a posterior bite block and an inclined anterior surface that facilitates the labial movement of the palatally displaced maxillary incisors during occlusion. Literature supports the success of Catlan's appliance, particularly in compliant patients with mild anterior crossbite and no skeletal discrepancy [5,6].

Case 2: Removable Hawley Appliance with Expansion Screw

In the second case, the presence of crowding and multiple retained teeth necessitated space creation. A removable Hawley appliance with an expansion screw was chosen to gradually move the anterior teeth labially while providing posterior bite opening. Removable appliances offer a conservative and adjustable solution, especially when used in the mixed dentition phase. However, their success largely depends on patient cooperation and appliance wear time [7].

Case 3: Tongue Blade Therapy and Bite Raising

The third case involved minimal malocclusion and was managed with tongue blade therapy, a highly conservative approach appropriate for minor crossbite correction in early eruption stages. Bite raising with glass ionomer cement helped disengage the occlusion and facilitated favorable tooth movement. Though simple, this method is effective only in compliant children and when the displaced tooth is not severely rotated or retroclined [8].

Stability and Retention

In all three cases, post-treatment retention was not deemed necessary. This is consistent with literature suggesting that early corrections during the mixed dentition phase often exhibit stable results as long as the underlying etiology has been addressed [9,10]. The correction coincided with active growth and tooth eruption, thereby allowing the dentition to self-stabilize.

Clinical Implications

This case series reinforces the importance of early diagnosis and the use of minimally invasive, cost-effective methods to intercept malocclusion. A thorough understanding of growth and dental development stages allows pediatric dentists to make well-informed decisions regarding the type and timing of intervention. Additionally, educating parents about the importance of early dental visits plays a critical role in identifying such malocclusions early.

Furthermore, case-specific treatment planning that considers both clinical findings and psychosocial factors such as aesthetics, patient comfort, and cooperation levels is critical. For example, while fixed appliances might be more efficient in some cases, they can be intimidating to young patients or unnecessary for minor dental shifts. The clinician's ability to tailor the modality to the patient's needs is a key factor in successful outcomes.

IV. Limitations And Future Considerations

While the outcomes were favorable in all three cases, the small sample size and short-term follow-up limit the generalizability of these findings. Long-term monitoring is essential to confirm the stability of the corrections. Future studies involving a larger cohort with longer follow-up periods can help validate the effectiveness and stability of these interceptive approaches.

V. Conclusion

The management of anterior dental crossbite during the mixed dentition phase is essential to prevent progression into more complex malocclusion. Early intervention using simple interceptive appliances like Catlan's appliance, expansion screw devices, or even tongue blade therapy can lead to successful and stable outcomes when applied appropriately. These cases highlight the need for individualized treatment planning based on patient-specific clinical presentation, eruption status, and compliance. Pediatric dentists play a critical role in occlusal guidance and must remain vigilant in identifying such conditions early to facilitate effective treatment with minimal intervention.

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