Case Report

Management of anterior crossbite in mixed dentition using sloped composite resin: a case report

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ABSTRACT

Introduction: Dental-type anterior crossbite is a malocclusion involving an individual tooth, in which the maxillary incisor is positioned lingual to the mandibular incisor without skeletal discrepancy. Its most common aetiology is persistence of a primary tooth, which may disrupt the eruption path and lead to palatal eruption of the permanent successor. Sloped composite resin is a simple and effective method for correcting an anterior crossbite. In the cases presented, the dental crossbite was corrected by applying a 3-4 mm bonded resin-composite inclined plane to the incisal edge of the mandibular incisors at an angle of approximately 45° to the long axis of the tooth. This case report aimed to describe the management of dental-type anterior crossbite involving individual teeth using sloped composite resin in children during the mixed dentition period. **Case report:** Three cases of anterior crossbite were managed in three paediatric patients. The first case involved an 8-year-old boy with a crossbite affecting teeth 11 and 21. The second case involved an 8-year-old boy with a crossbite of tooth 21, and the third case involved a 7-year-old girl with a crossbite affecting teeth 11 and 21. All patients had good oral hygiene and no deleterious oral habits. The available arch space exceeded the mesiodistal width of the affected incisors. Sloped composite resin was applied to the antagonist mandibular incisors, either directly or indirectly, at an angle of approximately 45° to the long axis of the tooth. On average, the crossbites were corrected within two weeks. **Conclusion:** This case report demonstrates that direct and indirect sloped composite resin applications can provide rapid and consistent correction of dental-type anterior crossbite during the mixed dentition period. The technique was effective, minimally complex and clinically practical, with an average correction time of two weeks.

KEYWORDS
Anterior crossbite, mixed dentition, sloped composite resin

INTRODUCTION

Anterior crossbite is a reversed relationship between the maxillary and mandibular incisors, in which the maxillary incisors are positioned more palatally than the mandibular incisors, without skeletal involvement. Anterior crossbite may be classified as dental, skeletal or functional. Dental anterior crossbite is typically caused by abnormal axial inclination of the maxillary anterior teeth.[1-3]

In the dental type, the anteroposterior skeletal relationship is normal, and a Class I Angle relationship is observed in centric occlusion. Skeletal anterior crossbite, in contrast, results from skeletal discrepancies involving maxillary retrognathia or mandibular prognathia. Functional anterior crossbite is a pseudo-Class III malocclusion characterised by a forward shift of the mandible from true centric occlusion.[4] Skeletal anterior crossbite is often associated with mandibular

protrusion, maxillary retrusion or midfacial deficiency.[5,6]

Several factors may contribute to the development of an anterior crossbite, including retained primary teeth and supernumerary teeth, both of which may disrupt the eruption path and cause permanent teeth to erupt palatally. Limited arch space, resulting from relatively large tooth size within a narrow arch, may also contribute to palatal eruption. The prevalence of anterior crossbite has been reported to be approximately 4-5%, and the condition is commonly associated with palatal displacement of the maxillary incisors. It frequently occurs in growing patients, particularly during the primary and mixed dentition phases, and may arise from dental, skeletal or functional aetiologies.[6,7]

Deleterious oral habits, such as upper lip biting, may also contribute to dental-type anterior crossbite. If left untreated, anterior crossbite may lead to several complications, including aesthetic concerns, dental crowding, increased susceptibility to caries, gingivitis and calculus accumulation. It may also cause incisal enamel wear of both maxillary and mandibular anterior teeth, labial alveolar bone resorption, lower incisor mobility, gingival recession and temporomandibular joint (TMJ) interference.[7-9] Various techniques have been used to correct anterior crossbite, including tongue blades, reversed stainless-steel crowns, removable acrylic appliances, sloped composite resin, Catlan's appliance and fixed appliances.[10,11]

Sloped composite resin is a simple and inexpensive method that does not require laboratory procedures and relies minimally on patient compliance. Packable nanohybrid composite resin may be used for this purpose. The mandibular inclined plane covers the mandibular incisors and is generally inclined at approximately 45° to the occlusal plane.[11,12] In the present case report, radiographic examination was not performed because case selection was based on clinical criteria, including a Class I molar relationship and favourable overbite. Important considerations in selecting the appropriate treatment include the patient's age, the number of teeth involved, the motivation of the child and parents, and the severity of the overbite.[13,14,15]

Early intervention is essential, particularly during the primary and mixed dentition periods, because delayed treatment may result in more severe malocclusion, including restricted maxillary growth and uncontrolled anterior mandibular growth.[16,17] Effective treatment commonly requires adequate space to guide the affected teeth into proper alignment. This may be achieved by moving the mandibular incisors lingually, the maxillary incisors labially, or both.[18,19]

This case report presents the correction of dental anterior crossbite involving one or more teeth using directly and indirectly applied sloped composite resin during the mixed dentition period. This case report aimed to describe the management of dental-type anterior crossbite involving individual teeth using sloped composite resin in children during the mixed dentition period.

Case report

CASE 1

An 8-year-old boy, accompanied by his parents, presented with the complaint that his maxillary anterior teeth were positioned behind the mandibular teeth during biting. Extraoral examination revealed no abnormalities, with a balanced facial profile and no signs of maxillary or mandibular skeletal discrepancy. Intraoral examination showed good oral hygiene, no evidence of deleterious oral habits, adequate space for labial movement of the maxillary anterior teeth, a Class I molar relationship and anterior crossbite involving teeth 11 and 21, with an overjet of -1 mm and an overbite of 2 mm. Correction of the anterior crossbite was planned using a sloped composite resin technique. Informed consent was obtained from the parents before treatment. Radiographic examination was not performed, as the diagnosis was established based on clinical findings.

The diagnosis was dental-type anterior crossbite involving teeth 11 and 21. Skeletal and functional anterior crossbite were considered as differential diagnoses but were excluded based on the absence of skeletal discrepancy and mandibular shift. The prognosis was favourable because the patient was in the mixed dentition period, with adequate arch space and good oral hygiene. The treatment plan consisted of interceptive correction using a sloped composite resin inclined plane on the mandibular incisors to achieve a positive overjet and a proper incisal relationship.

The procedure involved etching the labial surfaces of teeth 31, 32 and 41, followed by rinsing and drying. A bonding agent was then applied and light-cured for 20 seconds. Sloped composite resin was built up on the incisal edges of teeth 31, 32 and 41 to guide the movement of the maxillary incisors. The occlusal opening was maintained at less than 4 mm to minimise the risk of temporomandibular joint (TMJ) complications. The patient was instructed to follow a soft diet and return for follow-up after one week.

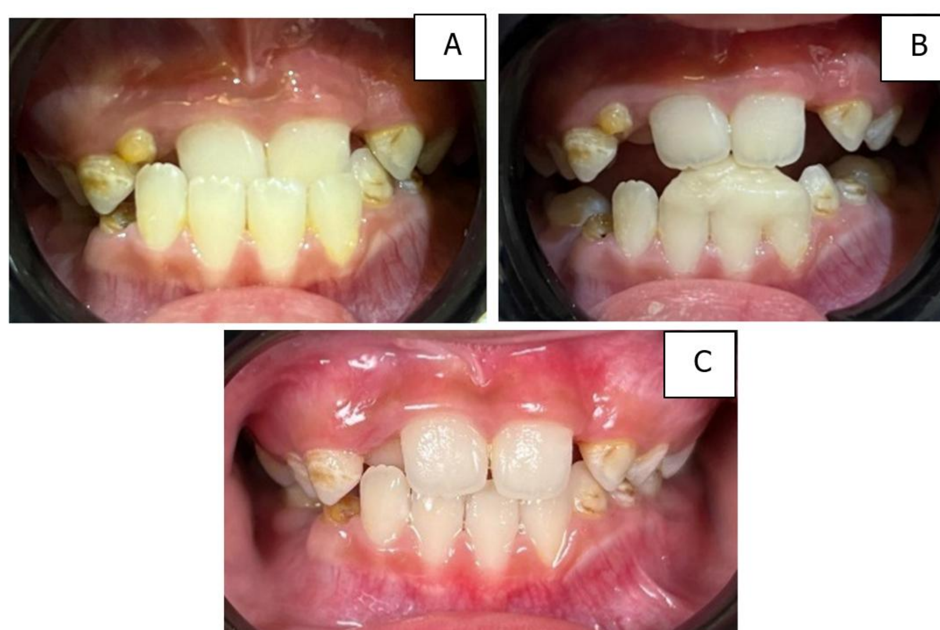

Figure 1. A, Crossbite before treatment. B, composite resin applied layer by layer to teeth 31, 32 and 41. C, corrected crossbite**.**

After two weeks, posterior occlusion had been re-established, and teeth 11 and 21 had moved labially relative to teeth 31 and 41. The composite resin was then gradually removed, followed by periodic follow-up visits to monitor occlusal stability, evaluate potential relapse and ensure maintenance of proper overjet and overbite.

CASE 2

An 8-year-old boy presented with an anterior crossbite involving tooth 21, with an overjet of -1 mm and an overbite of 3 mm. The patient had good oral hygiene, no clinical abnormalities, no deleterious oral habits and a Class I molar relationship. Informed consent was obtained from the parents before treatment. Radiographic examination was not performed, as the diagnosis was established based on clinical findings.

The diagnosis was dental-type anterior crossbite involving tooth 21. Skeletal and functional anterior crossbite were considered as differential diagnoses but were excluded based on the presence of a Class I molar relationship, absence of skeletal discrepancy and absence of mandibular shift. The prognosis was

favourable because the patient was in the mixed dentition period, with adequate arch space and good oral hygiene. The treatment plan involved the use of an indirectly fabricated sloped composite resin inclined plane cemented onto the mandibular incisors.

Sloped composite resin was fabricated on a working model and subsequently applied intraorally. A mandibular working cast was prepared. The materials and instruments used included composite resin, a light-curing unit, cold mould seal (CMS) and a Lecron carver. The area corresponding to teeth 31, 32 and 41 on the working model was coated with CMS and allowed to dry. Composite resin was then applied incrementally to the designated area and light-cured until the build-up reached approximately 3 mm above the occlusal surface. Once completed, the resin build-up was tried intraorally to evaluate its fit, stability and adaptation before cementation. The internal surface of the composite was adjusted to provide space for cement. The appliance was then cemented using zinc phosphate cement. After two weeks, the anterior crossbite had been successfully corrected, and the composite resin was removed.

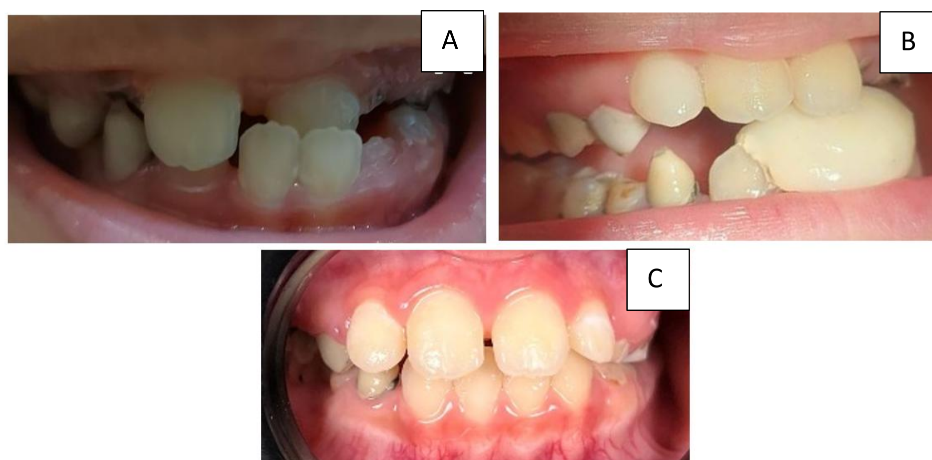

Figure 2. A. Crossbite involving tooth 21. B. Composite resin cemented onto teeth 31 and 41 using zinc phosphate cement. C. Crossbite corrected after two weeks.

CASE 3

A 7-year-old girl presented with concern regarding the appearance of her teeth, which affected her confidence. According to her mother, the malalignment was likely associated with the delayed extraction of the primary teeth. Clinical examination revealed an anterior crossbite involving teeth 11 and 21, with an overjet of -1 mm and a Class I molar relationship. There was sufficient space for labial repositioning of teeth 11 and 21, both of which exhibited distolabiotorsion. As the patient was in the early mixed dentition phase, the prognosis for correction was favourable. Sloped composite resin was selected as the treatment approach and applied to teeth 31 and 41. Informed consent was obtained before treatment. Radiographic examination was not performed, as the diagnosis was established based on clinical findings.

The diagnosis was dental-type anterior crossbite involving teeth 11 and 21. Skeletal and functional anterior crossbite were considered as differential diagnoses but were excluded based on the absence of skeletal discrepancy and mandibular shift. The prognosis was favourable because the patient was in the early mixed dentition period and had adequate arch space. The treatment plan involved a directly applied sloped composite resin inclined plane on the mandibular incisors to achieve a positive overjet and a proper incisal relationship.

The clinical procedure was similar to that used in the previous case. Teeth 31 and 41 were etched, rinsed and dried. A bonding agent was applied and light-cured for 20 seconds. Sloped composite resin was then incrementally built up on

the incisal edges of teeth 31 and 41. The occlusal opening was kept below 4 mm to avoid potential temporomandibular joint (TMJ) complications. The patient was advised to follow a soft diet and return for a follow-up appointment after one week. At the two-week follow-up, the anterior crossbite had been successfully corrected.

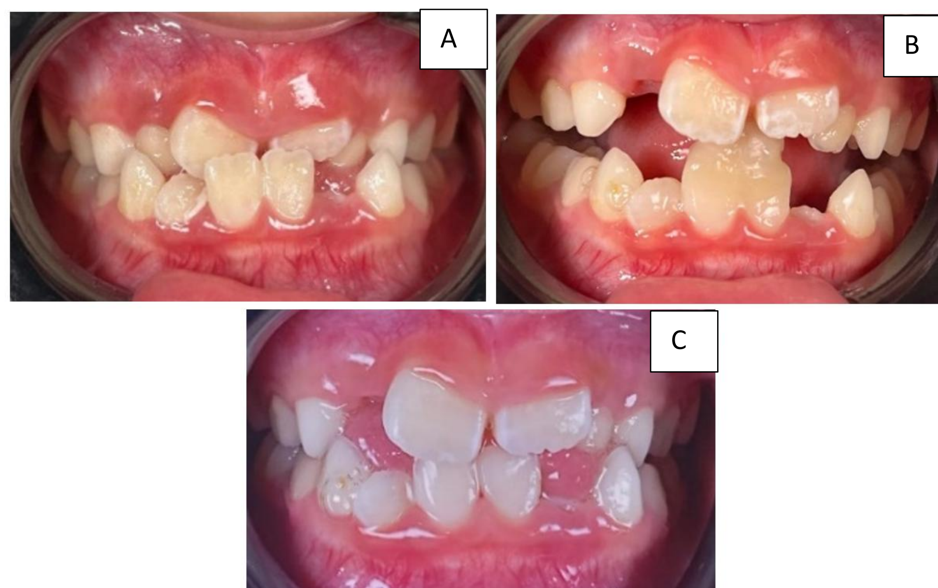

Figure 3. A. Crossbite involving teeth 11 and 21. B. composite resin applied to teeth 31 and 41. C. Corrected anterior crossbite.

DISCUSSION

Malocclusion in the primary dentition may predict the development of malocclusion in the permanent dentition. Anterior crossbite is one of the commonly encountered malocclusions and may involve a sagittal discrepancy that can encourage a forward mandibular shift.[20] The mixed dentition period provides an optimal window for occlusal guidance and interceptive management of malocclusion. Early intervention at this stage may prevent more complex treatment later and may reduce the overall duration of future orthodontic therapy.[20,21] According to De Lira et al., the prevalence of anterior crossbite is approximately 2.14%.[21]

The findings of the present case series demonstrate that sloped composite resin can be an effective approach for correcting dental-type anterior crossbite during the mixed dentition period. In all cases, correction was achieved within approximately two weeks, indicating a rapid treatment response.[22] This outcome is consistent with previous studies reporting that inclined plane appliances can effectively reposition maxillary incisors within a relatively short period when adequate space is available, and no skeletal discrepancy is present.[23] The success of this approach is attributable to the biomechanical effect of the inclined plane, which generates a labial tipping force on the maxillary incisors and a reciprocal intrusive force on the mandibular incisors during occlusion, thereby facilitating correction of the reversed incisal relationship.[24]

Compared with other treatment modalities, such as removable appliances or more complex fixed orthodontic devices, sloped composite resin offers several advantages, including simplicity, cost-effectiveness and minimal dependence on patient compliance.[24,25] These characteristics make it particularly suitable for young patients in the mixed dentition stage, where cooperation may be limited. In the present cases, both direct and indirect fabrication techniques demonstrated comparable clinical outcomes, suggesting that the method can be adapted according to clinical needs and operator preference.[25]

The decision to use this technique was based on specific clinical criteria, including a Class I molar relationship, sufficient arch space and absence of skeletal involvement, which are essential considerations for successful interceptive treatment.[25,26] Potential disadvantages in children include difficulty in maintaining oral hygiene around the resin build-up and the need for careful removal of the composite resin to prevent damage to the enamel surface.[27]
In the three cases described, the height and thickness of the sloped composite resin were adjusted according to each individual case, whereas the slope was set at 45° in all cases. The occlusal opening was maintained below 4 mm to avoid potential temporomandibular joint (TMJ) complications.[27]

Removal of the composite resin should be performed carefully to avoid enamel damage. High-speed rotary instruments may initially be used to remove the bulk of the material. As the instrument approaches the tooth surface, it is advisable to switch to low-speed diamond burs and polishing discs. For easier and safer removal, the use of a composite resin shade that contrasts with the natural tooth colour is recommended.[28]

Similar approaches to anterior crossbite correction using inclined plane appliances or simple interceptive techniques have also been reported in previous case series and clinical studies.[28] In the second case, the indirectly fabricated sloped composite resin could be removed easily using a crown remover, followed by a scaler to eliminate residual cement. After correction in all three cases, an overjet of 1 mm and an overbite of 2 mm were achieved, suggesting that these parameters may serve as practical clinical indicators of treatment success.[29]

From the patient's perspective, the treatment was well accepted because it did not significantly interfere with daily activities and required minimal behavioural adaptation. Improvement in dental appearance after correction also contributed positively to the patient's confidence, particularly in the third case. This is consistent with previous studies reporting that correction of malocclusion can improve oral health-related quality of life in children.[29,30]

However, this case report has several limitations. The observation period was limited, and progress was evaluated only at weekly intervals, making it difficult to determine the exact time required for complete correction. In addition, the absence of long-term follow-up limits the assessment of treatment stability. Further studies with larger sample sizes and longer follow-up periods are recommended to validate the effectiveness and long-term stability of this technique.

CONCLUSION

The sloped composite resin technique was effective in correcting individual-tooth anterior crossbite in the three cases presented, provided that the condition was dental in origin and not associated with a skeletal Class III discrepancy. This technique is simple, affordable, easy to perform and capable of achieving correction within a relatively short period. The findings suggest that early interceptive treatment using sloped composite resin during the mixed dentition period may effectively correct dental-type anterior crossbite, prevent the development of more complex malocclusion and reduce the need for more extensive orthodontic treatment in the future.

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