

Orthodontic Management of Malocclusion with Anterior and Posterior Crossbite: A case Report

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Abstract

Crossbite affects the growth and development of teeth and jaws, temporomandibular joint, and masticatory system. This malocclusion should be corrected when first diagnosed. This case report presents the case of skeletal class II malocclusion with unilateral posterior crossbite as well as anterior crossbite, which were managed with activation of transpalatal arch (TPA) and fixed orthodontic appliance. This case is unique as the management of posterior crossbite with TPA is scarce in the literature. The patient was satisfied as both the anterior and posterior crossbite, and competency of the lip were achieved at the end of treatment.

INTRODUCTION

Crossbite is defined as an abnormal reversed relationship of a tooth or teeth to the opposing teeth in the buccolingual or labiolingual direction.¹ The prevalence of crossbite anterior or posterior is 23.3% in the Nepalese population.² The etiology of crossbite includes heredity, sucking habits, impaired nasal breathing, supernumerary tooth, trauma to the primary predecessor, and tooth size-arch length discrepancy.^{1,3} Crossbites can have long-term effects on the growth and development of the teeth and jaws and also could cause adverse effects on the temporomandibular joints and masticatory system.³ Thus, this malocclusion should be corrected when first diagnosed.³ This case report presents the case of anterior and posterior crossbite malocclusion, which was managed through the activation of the transpalatal arch (TPA) and fixed orthodontic appliance.

CASE REPORT

A 24-year-old female patient presented with the chief complaint of irregular teeth in the upper front region of the jaw. The profile of the patient was convex, facial divergence posterior, and potentially competent lip with an interlabial gap of 5 mm (Figure 1).⁴ Upper dental midline was shifted to the right by 1 mm with respect to (w.r.t.) facial midline. The number of teeth present clinically was 28, with 14, 18, 26, and 36 missing. Crossbites were present with respect to 12, 22, 15, and 16, 35 rotated, and 47 root canal treated (Figure 2 and 3). Molar relation was end-on right side, overjet was 0.5 mm, and overbite was 3 mm /35.3%. Smile analysis showed an average smile line and non-consonant smile arc. The cephalogram showed the patient was in cervical vertebrae maturation stage 5. ANB angle was 5° suggestive of skeletal class II malocclusion with SNA 87° and SNB 82° (Figure 4). Frankfort mandibular

plane (FMA) angle was 25° suggestive of normal growth pattern. The upper incisor to Nasion-point A plane was placed at 23° angle and 5 mm distance and the lower incisor to Nasion-point B plane was placed at 28° angle and 6 mm distance suggestive of a slightly proclined

and forwardly placed upper and lower incisors. Upper and lower lips were placed at a distance of 2.5 mm and 4.5 mm from Steine's S line, respectively, suggestive of protrusive upper and lower lips.

LEGENDS



Fig 1: Pre-treatment extra-oral photographs



Fig 2: Pre-treatment intra-oral photographs



Fig 3: Pre-treatment orthopantomogram

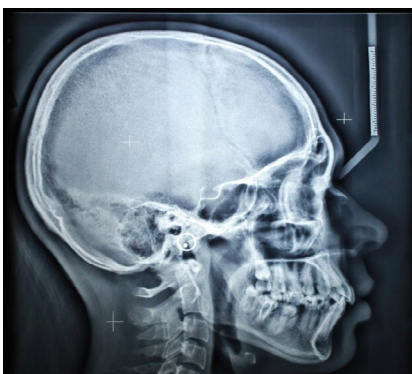


Fig 4: Pre-treatment lateral cephalogram



Fig 5: Transpalatal arch (TPA) for correction of crossbite w.r.t 16



Fig 6: GIC bite block placed in mandibular molar to raise the bite



Fig 7: Orthopantomogram towards the end of orthodontic treatment



Fig 8: Lateral cephalogram towards the end of orthodontic treatment



Fig 9: Post treatment intra-oral photographs

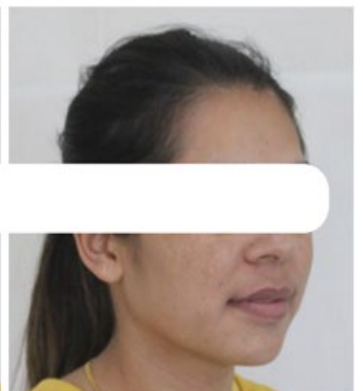
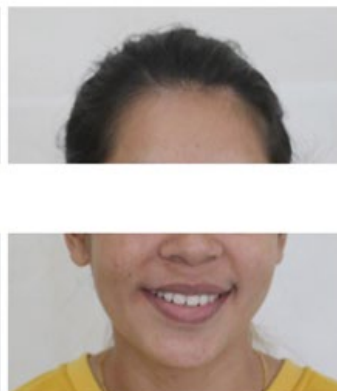
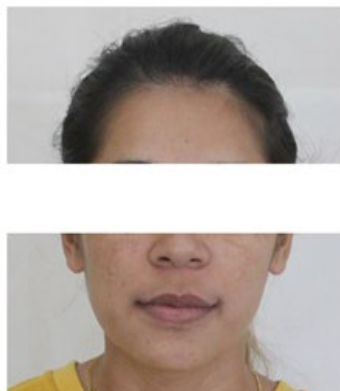


Fig 10: Post treatment extra-oral photographs

The treatment objectives included correction of crowding and anterior and unilateral posterior crossbite. The treatment was done with an MBT bracket of 0.022" slot in the upper and lower arches after extraction of 44. The lingual holding arch (LHA) and TPA were placed in the mandible and maxilla, respectively (Figure 5). Second molar banding w.r.t. 17, 27, and 37 were done. TPA activation was done until the overcorrection that is the palatal cusp of 16 facing the buccal cusp of 46 was achieved. 0.014" Nickel-Titanium (NiTi), then 0.016" NiTi, and finally 0.017" x 0.025" NiTi was placed both in the maxilla and mandible for alignment and leveling. A couple force was applied for the derotation of 35 from 33 on the lingual side and 37 from the buccal side. A glass ionomer cement (GIC) bite block was placed on 46 and 37 to raise the bite anteriorly (Figure 6). An elastic chain was used to bring 12 and 22 into the arch. Initially, 35, 34, and 43 retractions were done in 0.018" stainless steel (SS) archwire, and later incisors retraction were done in 0.019" x 0.025" SS archwire. Posterior box elastics of 3/16" diameter and 4.5-ounce force were used for the settling of occlusion. OPG at the end of treatment showed parallel roots, and the lateral cephalogram showed normal inclination of incisors (Figures 7 and 8). The total active treatment duration was 30 months. The fixed retainer was placed in the maxilla and mandible for retention after debonding of braces (Figure 9).

DISCUSSION

Various approaches for correction of posterior crossbite include Hass type of expander, Hyrax, quad helix, W arch, and removable acrylic appliance with the transverse screw.⁵ Rapid maxillary expansion was not possible in this adult patient. TPA can also be used for dentoalveolar expansion for the correction of posterior crossbite however literature regarding the treatment of posterior crossbite using TPA is scarce. Posterior crossbite in this patient was treated by TPA arch. Activation of TPA for correction of unilateral posterior crossbite was done similarly to the study by Ghorbanyjavadpour F and Rakhshan V.⁶ TPA was activated for the dentoalveolar expansion in combination with buccal root torque on the normal side.⁶ Almeida et al,⁷ treated posterior crossbite through a Haas-type expander. TPA was used in this case as the crossbite was unilateral, which was less severe than the case of Almeida et al.⁷ An adult with severe skeletal class III malocclusion, both anterior and posterior crossbite was treated with Le-fort I osteotomy in the maxilla and bilateral sagittal split osteotomy in the mandible.⁸

A study found anterior crossbite can be successfully

corrected by either fixed or removable appliances with similar long-term stability.⁹ However, this case report was treated with a fixed appliance as comprehensive treatment was planned for this adult patient in permanent dentition but not in mixed dentition. The study by Vasilakos et al,¹⁰ placed resin-modified GIC to raise the bite 1-2 mm anteriorly which resulted in spontaneous correction of anterior crossbite in 2.5 months. This case was different as it was treated in permanent dentition, whereas Vasilakos et al,¹⁰ performed the study in mixed dentition.

The patient was satisfied as the treatment objectives were achieved at the end of treatment. Both anterior and posterior crossbite correction and Class I molar and canine relations were achieved (Figure 9). The smile of the patient was improved from a non-consonant smile to a consonant smile (Figure 10). Competency of the lip and the decrease in the patient's profile's convexity were also achieved. One of the demerits of this case report was the long treatment duration. However, this was unavoidable as proper follow-up was not possible due to the COVID-19 lockdown.

CONCLUSIONS

The satisfactory correction of malocclusion with anterior and posterior crossbite was successfully managed with the activation of TPA and fixed orthodontic appliance.

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