Correction of Unilateral Scissor Bite using Periodontally Accelerated Osteogenic Orthodontics

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ABSTRACT
This article is regarding a case report presenting a true unilateral posterior crossbite in an adolescent patient, a challenging malocclusion to treat. Conventional expansion methods are expected to have some of its shortcomings.

The aim of this paper is to introduce a technique for treating unilateral posterior crossbite in an adolescent or adult patient, advocating Periodontally Accelerated Osteogenic Orthodontics (PAOO)TM as a part of adjunctive protocol in the orthodontic realm. The procedure promises to radically shorten the treatment time.

Methods: PAOO as an adjunctive procedure in orthodontics for treatment of unilateral posterior scissor bite.

Results: Effective unilateral expansion was achieved using PAOO, and functional occlusion was established as well.

Conclusion: Unilateral PAOO presents an effective and reliable technique to treat true unilateral crossbite.

Keywords: Mandibular expansion, Unilateral scissor bite, PAOO.

INTRODUCTION
A scissor bite is defined as buccal displacement of a maxillary posterior tooth, with or without contact between the lingual surface of the maxillary lingual cusp and the buccal surface of the mandibular antagonist’s buccal cusp. A complete buccal crossbite, known as a Brodie bite, is caused by a combination of excessive maxillary width and a narrow mandibular alveolar process, although the width of the mandibular base is usually normal or it can be limited to one quadrant which is seen in this present case. It is a rare type of malocclusion found in primary and mixed dentition. It not only affects chewing and muscle functions, but also impairs normal growth and development of the mandible. Early treatment with expansion appliance can be used to treat this anomaly in younger patients, whereas in adults, the conventional nonsurgical method of slow expansion or a segmental surgical intervention proves to be a problematic, limited and inefficient method, which takes a long time and might compromise periodontal health if done beyond a few millimetres.

Suya (1991) reported corticotomy-assisted orthodontic treatment of 395 adult Japanese patients. Suya contrasted his technique with conventional orthodontics in being less painful, producing less root resorption, and exhibiting less relapse. He believed that the tooth movements were made by moving blocks of bone using the crowns of the teeth as handles. Completing tooth movement in 3 to 4 months was recommended, after which time the edges of the blocks of bone would begin to fuse together (Suya 1991). The development of corticotomy-assisted orthodontics has provided new solutions to many limitations in the orthodontic treatment of adolescents and adults.

DIAGNOSIS
A 14-year-old male patient presented with the chief complaint of proclination in the upper anterior teeth, unable to approximate lips on closure and unesthetic smile.

On clinical examination, the frontal view of the patient revealed a mild asymmetry with chin deviated to the right side. The profile view revealed convexity with a retrusive chin and low mandibular plane angle. Observation showed the presence of incompetent lips and an everted lower lip along with an average mentolabial sulcus (Figs 1A to C).

On functional examination, TMJ was asymptomatic. On smile, he revealed 8 mm of incisor exposure. The severity of the scissor bite also caused an occlusal prematurity, owing to which the patient had a deflection on complete closure.

On intraoral examination, the upper arch was wide ‘U-shaped’ and the lower revealed a square-shaped arch form presenting a dentoalveolar deformity on the right lower posterior segment with teeth lingually tipped. The interarch relationship showed a Class I canine relationship and Class I molar relationship on the left side and on the right side.
showed a unilateral scissor bite distal to the canine extending to the second molar. Proclination of the maxillary anterior teeth with deviation of the upper midline to the right side and mild to moderate crowding in the mandibular anterior teeth was observed (Figs 2A to E).

Casts analysis revealed a tooth-size arch length discrepancy which indicated extraction treatment protocol.

Cephalometric analysis verified a Class II skeletal base with proclination of the maxillary and mandibular teeth on a low mandibular plane angle. On examination of OPG, the posterior teeth exhibited mesial inclination and all the third molars were present and were in favorable positions (Figs 3 and 4).

The treatment objectives were to:
- Address the scissor bite initially
- Correct the vertical relationship
- Correct proclination and crowding
- Correct the midline
- Provide good functional occlusion
- Improve esthetics

Extraction of all four first premolars was planned to correct the midline deviation and proclination of upper and lower anteriors.

**TREATMENT PROGRESS**

Planning was critical in correcting the scissor bite in the right posterior quadrant, as the lower buccal teeth showed severe lingual tipping along with an alveolar deformity.
A surgical intervention with periodontally accelerated osteogenic orthodontics was planned to aid in the process of correction as the mandibular cortical bone is resistant to conventional orthodontic forces (Fig. 5). Corticotomy-assisted expansion is an optimal way to treat mild to moderate maxillary or mandibular transverse deficiency in adults with greater stability without compromising periodontal health. Although corticotomy is an old technique dating back to the early 1900s, it was not properly introduced until Wilcko developed the patented technique named Accelerated Osteogenic Orthodontics (AOO), also called Periodontally Accelerated Osteogenic Orthodontics (PAOO)™. This technique was originally designed to enhance tooth movement, subsequently reducing treatment time via inducing cortical bone injury through linear cutting (corticotomy) and then performing orthodontic treatment.

Following the surgical procedure, the orthodontic treatment commenced after 10 days. 0.022" MBT preadjusted appliance was bonded in the upper arch with double tubes banded on the upper molar and single tube banded on the lower left molar and bands were cemented, which were welded with lingual attachments for elastic engagement.

Bilateral posterior bite plate with left bite block, sufficiently increased to relieve the right lower segment completely, was cemented to the upper arch so that it served as an anchor segment while engaging cross elastics to the lower segment. This prevented untoward extrusive and buccal movement of the upper posterior teeth (Figs 6A to C). The scissor bite correction was carried on for a period of 7 months.

Extraction of lower first premolars was performed to aid in optimum aligning, leveling and correction of the arch form under the influence of the bite plate. This prevented any occlusal interference in the transverse correction. After a reasonable arch form was achieved in lower, extraction of upper first premolars was carried out.

It was observed that upper right second molar continued to be in scissor bite and the mandibular shift persisted owing to its interference. Hence, after assessing the status of the right upper third molar, the right upper second molar was extracted.

0.018" SS wire followed by 0.016" × 0.022" SS with an offset bend distal to the canine was placed in the right lower segment to aid in maintaining the expansion achieved (Figs 6A to C and 7A to C).

Space closure was done with the help of a tear drop loop in both the upper and lower arches. Cross elastics was given throughout the treatment. Banding of right upper third molar was done to align it in the position of the second molar.

**TREATMENT RESULTS**

The posterior scissor bite was corrected and the ideal occlusal and esthetic goals were met. Contact between the
16 and 18 could not be established due to the position of the antrum preventing the mesial movement of the third molar completely, thereby maintained it as self-cleansing. The upper incisor proclination and the lower crowding were corrected. Class I canine and molar relationships were achieved, along with ideal overjet and overbite. A more favorable incisor to lip position was established at rest and during smile. Functional efficiency was markedly improved [(Figs 8A to C) and (Figs 9 to 11)]. One year review showed good stability of all the corrections achieved (Figs 12A to C) and (Figs 13A to E)].

**DISCUSSION**

Unilateral scissor bite in the posterior segments often leads to a deviated path of closure owing to the premature contacts. If these go undetected in early stages of development it can result in unfavorable teeth positions and change in the alveolar bone contour. Correcting such problems may require bite plates to disocclude the occlusion which cause transient limitation in a function like chewing. Hence, duration becomes the most important factor to be considered in treating scissor bite malocclusions.
Correction of Unilateral Scissor Bite using Periodontally Accelerated Osteogenic Orthodontics.

Periodontally Accelerated Osteogenic Orthodontics as an adjunct was a viable option for this patient to reduce the duration of the treatment in addition to which reduces the time available for the bacterial biofilms to cause any tissue breakdown (periodontopathic) and manifest the ability of enhanced orthodontic tooth movement. Sebaoun et al reported that in selective alveolar decortication, the calcified spongiosa adjacent to the decortication reduced in volume momentarily and PDL activity was observed to be enhanced there by increasing the tissue turnover. This provides the basis for recontouring the alveolar bone altering the shape and volume, thus accommodating the uprighted teeth augmenting the stability factor.
Ferguson et al have suggested that the increased stability provided by PAOO may be due to loss of tissue memory from high tissue turnover of the periodontium, as well as increased thickness of the alveolar cortices from the augmentation grafting.\textsuperscript{12}

**CONCLUSION**

Though treatment associated with periodontally assisted osteogenesis involved a mild invasive procedure with extra surgical cost, it had its following advantages, such as reduced treatment time, less root resorption due to decreased resistance of cortical bone and low relapse rate.

Hence, periodontally assisted osteogenic orthodontics combined with orthodontic procedure proved to be an efficient and rapid method in correcting scissor bite with dentoalveolar deformity.

**REFERENCES**