

A modified TPA for scissor bite correction – Case report

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Abstract - A unilateral scissor bite involving the second molar is a relatively uncommon but significant malocclusion that can lead to functional, aesthetic, and periodontal complications if left untreated. This case report discusses the orthodontic correction of a unilateral second molar scissor bite in a 22-year-old patient. The treatment approach involved Modified TPA combined with fixed orthodontic appliances to achieve proper occlusal relationships. The intervention successfully corrected the scissor bite, improved masticatory function, and enhanced overall occlusal harmony. The treatment duration was approximately 12 months, with stable post-treatment results observed at the 6-month follow-up.

Index Terms - Unilateral scissor bite, Modified TPA, J-hook, bite blocks

I. INTRODUCTION

A Scissor Bite is a condition where the mandibular arch is enclosed within the maxillary arch, primarily due to a disproportionately larger maxillary dental arch in relation to the mandibular counterpart.¹ This condition can manifest unilaterally or bilaterally, often resulting in facial asymmetry and hindrances in lateral excursive movements due to excessive buccal eruption of maxillary posterior teeth and lingual tipping of mandibular dentition.²

Correcting a scissor bite remains a challenge for clinicians. Several treatment modalities have been suggested, including multi-bracket appliances, intermaxillary cross-elastics, lingual arches with intra-maxillary elastics, and Trans Palatal Arch (TPA) with intra-maxillary elastics.³

The buccally erupted maxillary second permanent molar presents one of the most frequently encountered single-tooth posterior crossbites in orthodontic practices. Managing this situation poses a significant challenge.⁴ Intermaxillary cross-elastics are

commonly used to address cases where the upper second molars erupt in a scissor bite. These elastics can exert extrusive forces that push both upper and lower molars outwards, potentially resulting in an open bite and premature contact between the posterior teeth. This could lead to clockwise rotation of the lower jaw. It's important to emphasize that the effectiveness of the treatment largely depends on the patient's cooperation.^{1,5}

In this case study, a proficient alternative treatment approach employing a transpalatal arch (TPA) is illustrated within the context of an adult female patient exhibiting a scissor bite of the left upper second molars.

II. CASE REPORT

A 22-year-old adult female patient presented to the Department of Orthodontics and Dentofacial Orthopedics with the chief complaint of an improper bite. The patient was diagnosed with a skeletal Class I maxillomandibular relationship, featuring an orthognathic maxilla and mandible, a horizontal growth pattern, and a scissor bite on the right side involving the maxillary right 2nd molars and proclined incisors with minor spacing. The patient's face is symmetric with a straight profile and competent lips. Considering the chief complaint, a camouflage treatment was chosen to address the scissor bite on right side.



Fig. 1 Adult female patient with right second molars

in scissor bite before treatment.

III. APPLIANCE DESIGN AND STEPS OF FABRICATION

1. A TPA is fabricated using 19 gauge hard round stainless-steel wire.
2. A wire was soldered to TPA and bent palatally to have a hook-like extension at the end called “J” hook. This helps in engaging the elastomeric module. This wire was curved to prevent impingement on soft tissues.



Fig. 2 Modified transpalatal arch (TPA) fabricated on model

3. The posterior bite plate is fabricated both sides. This helps in disocclusion of the posterior teeth.
4. The appliance is then cemented intra-orally, and the elastomeric module is attached to the upper second molar tube on the buccal side to the hook of TPA extension palatally.

IV. PROCEDURE

After diagnosing the patient's complaint, a conservative approach was applied to correct the scissor bite and improve the patient's occlusion. MBT 0.022” × 0.028” bracket prescriptions were bonded, and after completing the initial phase of leveling and alignment, 0.019” × 0.025” stainless steel archwires were placed. The upper first molars were banded bilaterally, followed by the fabrication of a fixed Transpalatal Arch (TPA) from 19-gauge stainless steel wire soldered on the palatal aspect of the molar bands, a “J” hook also soldered extending to the distal third of the tooth to be corrected (figure 3a). An elastomeric chain was engaged from the buccal second-molar tube to the hook on the modified TPA. The chain was stretched to twice its normal length to minimize force decay and changed every four weeks. The patient reported no chain breakage during treatment and after seven months, the scissor bite was completely corrected (figure 3b). Treatment result was also retained after 6-month post follow-up (figure 4).



Fig. 3 (a) Pre-treatment at the insertion of appliance, (b) post-treatment after achieving the desired result



Fig. 4 After 6-month follow-up

V. DISCUSSION

The malocclusions typically observed in a scissors bite consist of buccally flared and extruded upper molars, coupled with lingually tilted and extruded lower molars.^{1,2} Conventional orthodontic treatment for correcting a scissors bite has certain drawbacks and limitations. Typically, this involves using a transpalatal arch (TPA) and intra- or inter-arch latex cross-elastics. However, these methods may lead to undesired extrusion of the second molars due to the application of a vertical force vector.⁵

Moreover, the inter-arch elastic can have a reciprocal impact on the molars of the same side of the arch, potentially leading to undesired side effects, particularly when the lower molar is already in an ideal alignment.⁶ Uncontrollable side effects, such as extrusion and tipping of the anchorage teeth, may occur. These effects could also result in undesirable clockwise rotation of the mandible and a decrease in overbite.⁷ Patient cooperation is also imperative, and the outcomes of the treatment may exhibit unpredictability. As a result, the use of cross elastics should be refrained in instances where the second molar has already overerupted, possesses a hanging palatal cusp, or in patients with high mandibular plane angles.⁸

The crucial steps for correcting a scissor bite involve carefully adjusting the position of the affected tooth, entailing the intruding and palatally tipping of the affected tooth when it is both extruded and buccally flared. The force vector direction with the Modified-TPA ensures both the intrusion and palatal tipping, as

depicted in figure 5. Consequently, this approach mitigates the risk of bite opening and clockwise rotation of the mandible. In instances of severe scissor bite, the strategic placement of a posterior bite plane may be necessary.

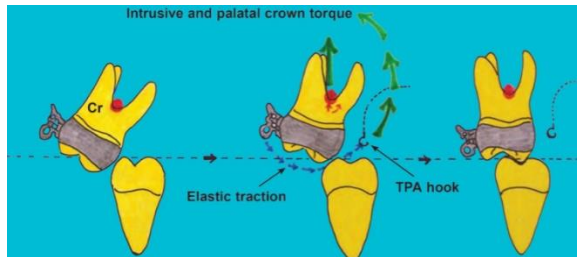


Fig.5 Biomechanics of Modified TPA

VI. CONCLUSION

This modification of a TPA is not only cost effective and efficient, but simpler and less technique sensitive than other procedures commonly used to correct a scissor bite.

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