

Intrusion of Supraerupted Maxillary First Molar Using Modified TPA and TAD's - A Simple, Clinically Efficient Approach.

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Abstract

The orthodontist treating adult patients often encounters a dentition that was neglected after premature loss of posterior teeth. The adjacent teeth tend to tilt and rotate, and the occluding tooth can supraerupt. This early loss of posterior teeth and a delay in replacing the missing teeth results in over eruption of antagonist teeth. Overextrusion of maxillary molars usually results from early loss of antagonistic teeth. The elongated dentoalveolar process may induce problems such as functional disturbances and occlusal interference and cause great difficulty during prosthetic reconstruction.

This case report demonstrates the efficient use of TAD's along with modified TPA in a patient with a supraerupted maxillary first molar in a 23-year-old girl. Treatment objective was to intrude the maxillary 1st molar to facilitate prosthetic replacement of lower 1st molar. The treatment mechanics involved: 0.022 x 0.028 MBT appliance for initial leveling & aligning followed by modified TPA with soldered hook for intrusion of first maxillary left molar. A section of Elastomeric chain was stretched from the mini-implant placed in the left buccal 1st molar region to the soldered hook on the Transpalatal Arch. Activation was done every 21 days. We preferred 150 g force to intrude the molar in this study.

Intrusion was finished when tooth was leveled with the neighboring teeth. Amount of intrusion achieved was 3 mm in a span of 6 months and to avoid root resorption, intrusive force levels was kept optimal.

Key words: *Intrusion, Modified TPA, TAD's*

Introduction

The orthodontist treating adult patients often encounters a dentition that was neglected after premature loss of posterior teeth. The adjacent teeth tend to tilt and rotate, and the occluding tooth can overerupt.¹ This early loss of posterior teeth and a delay in replacing the missing teeth results in over eruption of antagonist teeth^{2,3}. Overextrusion of maxillary molars usually results from early loss of antagonistic teeth. The elongated dentoalveolar process may induce problems such as functional disturbances and occlusal interference and cause great difficulty during prosthetic reconstruction.

Intrusion of the maxillary molars is difficult to accomplish using traditional methods of anchorage as the results can be unpredictable, with side effects such as extrusion and tipping of the anchorage teeth.¹ Molar intrusion is particularly difficult to carryout in adults because of histological changes of alveolar bone, smaller marrow spaces and a reduced blood supply compared with growing patients.³ To avoid these problems, many clinicians prefer to reduce the crown instead of intruding the extruded tooth. However, skeletal anchorage⁴⁻¹⁰ can be used to avoid these problems while obtaining pure intrusion of a posterior tooth.

The size of the envelope of tooth movements using fixed mechanotherapy has been increased with the use of temporary anchorage devices (TADs). Orthodontic mini-implants, a form of TADs, have been successfully used for achieving a variety of tooth movements, such as bodily retraction, extrusion, protraction, and even intrusion of

maxillary molars.¹¹ Micro-implants provide stable intra-oral anchorage and enable the maxillary molars to be intruded without the usual side effects.

This case report demonstrates the efficient use of TAD's along with modified TPA in a patient with an supraerupted maxillary first molar. A 23-year-old girl had a supraerupted maxillary left first molar subsequent to extracted lower 1st molar of left side.. Use of mini-implant anchorage in the left zygomatic process was proposed between maxillary 2nd premolar and 1st molar. Treatment plan included the fixed mechanotherapy for both maxillary and mandibular arch with 0.022" MBT appliance. A modified Transpalatal Arch (TPA) was fixed about 3 mm away from the palate to help in intrusion mechanics and a hook was soldered on the TPA for engaging attachments to intrude the maxillary first molar. Elastomeric chain was used from implant to the hook soldered on modified TPA to aid in maxillary molar intrusion within a span of 4 months.

Case Report

A 23 years old female patient reported to Department of Orthodontics & Dentofacial Orthopaedics with a chief complaint of irregular teeth and hanging upper back teeth (first molar) which led to difficulty in mastication on left side. On Clinical examination, patient has Angle's Class I Molar relation on right side and on left side patient had a extracted mandibular 1st molar and supraerupted maxillary left first molar. Moderate crowding w.r.t. maxillary and mandibular anterior region. Patient's periodontal status was fair.(Fig-1, Fig-2, Fig-3)

Appliance Construction

Treatment objective was to intrude the maxillary 1st molar to facilitate prosthetic replacement of lower 1st molar. The treatment mechanics involved: use of 0.022 x 0.028 MBT appliance for initial leveling and aligning followed by using a modified TPA with soldered hook for intrusion of the first maxillary left molar. TPA was made of 19 gauge dentauram stainless steel wire. Each end of the palatal arch was double backed over for insertion into the lingual sheath welded onto the palatal surface of the maxillary first molar bands.

A section of Elastomeric chain was stretched from the Dentos mini-implant (small head -SM 121, H 6mm) placed in the left buccal 1st molar region to the soldered hook on the Trans-palatal Arch (Fig-4). Activation was done every 21 days. A wire of same dimension was soldered to the TPA for fabricating a hook on the left side of the TPA. (Fig-5)

Although an optimal force has not yet been suggested for intrusion with miniscrews, forces greater than what is generally accepted for intrusion in conventional treatments are reported to be applied with miniscrews and miniplates.¹² Umemori et al¹³ used 500 g, Paik et al¹⁴ used 150 to 250 g, Jeon et al used 400 g,

Erverdi et al used 200 g, Xun used 150 g, Park et al used 200 to 300 g, and Kanzaki et al used 100 g. We preferred 150 g force to intrude the molar in this study.

In 6 months of time, 3 mm intrusion of upper left 1st molar was noted, with no resorption of the root. The amount of intrusion was measured by superimpositions of the cephalograms as shown in Fig-6.

Discussion

Intrusion by conventional methods usually is accompanied by extrusion of the anchorage unit, based on the law of action and reaction. Preventing this side effect is the key of successful intrusion. In contrast to traditional methods, intrusion of molars has been facilitated by inserting miniscrews to minimize extrusion of adjacent teeth.

The most critical factor in the intrusion of maxillary molars is the point of force application. Orthodontic intrusion has been thought impossible to achieve with a force application on one side of the tooth. The center of resistance of a molar is located near the furcation point. For pure intrusion, the line of force should be parallel or pass through the center of resistance. To pass through the center of resistance the force must be simultaneously applied both buccally and lingually.¹⁵

For molar intrusion Melsen and Fiorelli¹⁶ suggested applying buccal and lingual forces together to avoid an undesirable rotation. Chun and colleagues¹⁷ stressed that the most critical factor for molar intrusion was the point of application of the intrusive force. To direct a force through the centre of resistance of a molar, simultaneous buccal and palatal forces should be applied. Unwanted tipping can be prevented by using four micro-implants (two placed palatally and two placed buccally) or a transpalatal bar. Fewer micro-implants are required if a transpalatal bar is used to prevent buccolingual tipping.

Here, with the help of the hook soldered onto the TPA on palatal aspect and TAD's intrusive forces has been applied from both sides enabling the line of force to pass through the center of resistance.

We used a simple approach for molar intrusion with modified TPA and miniscrews, which had some advantages over other methods for posterior intrusion using miniscrews like no resorption of root reported by this technique.

Intrusion was finished when the tooth was leveled with the neighboring teeth.(Fig-7) Therefore, the amount of intrusion achieved was 3 mm in this case report, which was reasonable considering the different amount of overeruption of teeth in each patient. To avoid root resorption, intrusive force levels should be kept optimal.

Conclusion

A Modified TPA is an inexpensive and effective appliance for the intrusion of supraerupted maxillary first molars.



Fig. 1 - Pre-treatment extra-oral photographs



Fig. 2 - Pre-treatment intra-oral photographs



Fig. 3 - Pretreatment Models



Fig. 4 - Mid treatment intraoral photographs



Fig. 5 - Modified TPA with soldered hook and Dentos mini-implant placed for intrusion of overerupted maxillary left first molar.

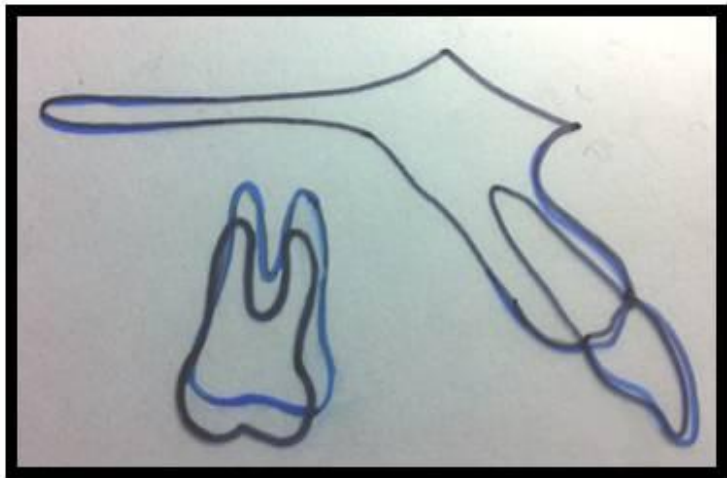


Fig. 6- Superimposition



Fig. 7 - Post-intrusion Models

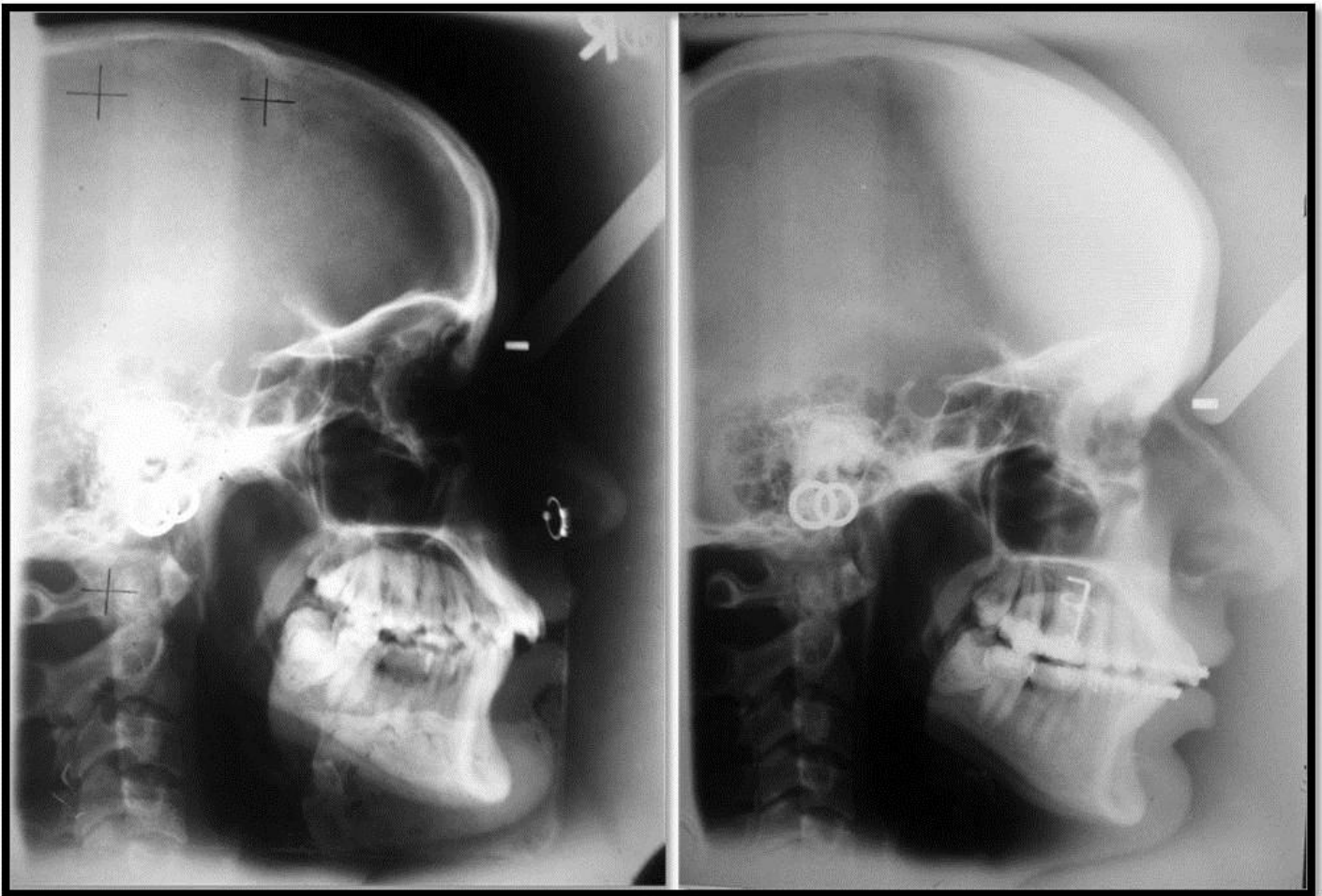


Fig. 8 - Right: Pre-treatment Cephalogram, Left: Post-treatment Cephalogram



Fig. 9 - Post-treatment extra-oral photographs

It helps to apply isolated forces on the supraerupted maxillary first molars, without disturbing anchorage teeth and without causing any ill side effects on the dentition.

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