Over-Erupted Maxillary First Molar And Unilateral Scissors Bite Treated Efficiently Using Orthodontic Mini-Implants – A Case Report.

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Abstract

Over-erupted maxillary molars present unique challenges to the orthodontist, causing occlusal and functional disturbances, as well as a canted occlusal plane, apart from compromised periodontal health. This case report demonstrates the use of mini-implants in a 20 year old male patient requiring re-treatment who presented with an over-erupted permanent left maxillary first molar and unilateral scissors bite. A new method of applying elastic force from the mini-implants to the molar tooth for affecting their intrusion is described. The over-erupted molar was successfully and efficiently intruded using two mini-implants in 5 months, thus greatly simplifying the correction of the scissors bite.

Key words: Over-erupted molar, scissors bite, intrusion, mini-implants.

Introduction

Over-erupted maxillary molars present unique challenges to the orthodontist, causing occlusal and functional disturbances, as well as a canted occlusal plane, apart from compromised periodontal health.¹ ² Before the introduction of mini-implant based anchorage, leveling of the maxillary posterior occlusal plane often entailed invasive prosthodontic reduction with root canal treatment, surgical impaction or demanding orthodontic therapy requiring extra-oral headgears among other adjuncts, all of which are invariably complex and lead to discomfort for patients and prolonged treatment times.³ Mini-implants seek to eliminate the unwanted side-effects of molar intrusion and ensure a simpler, shorter, less-invasive as well as a more economic procedure due to their ability to provide absolute anchorage for the desired tooth movement.⁴ Since their introduction to orthodontics, a number of case reports have reported the use of skeletal anchorage via mini-implants for intrusion of over-erupted molars.¹ ² ³ ⁴

This case report demonstrates the use of mini-implants in a case requiring re-treatment which presented with an over-erupted maxillary first molar and unilateral scissors bite. A new method of applying elastic force from the mini-implants to the molar tooth is also described.

Case description

A 20 year old male patient presented with the chief complaint of mal-aligned teeth. Past dental history included previous orthodontic treatment limited to the upper arch 4 years before, which involved extraction both the upper first premolars. The patient’s medical history was not significant.

Diagnosis & etiology

Pre-treatment facial photographs (Fig. 1) showed a convex profile with protrusive and incompetent lips, a retrusive chin as well as relatively longer lower anterior face height.
Patient had a complex type of smile with full maxillary and mandibular incisor crown exposure as well as a flat smile arc.

Pre-treatment intra-oral photographs (Fig. 2) and dental casts showed an end-on molar relationship on left side and an end-on canine relation bilaterally. Maxillary left second premolar as well as both the permanent maxillary left first and second molars were in scissors bite which caused them to be over-erupted as well. Upper midline was shifted to the right side by 2 mm while the lower midline was shifted to the left side by 1 mm. There was spacing of 5 mm in the upper arch and crowding of 3 mm in the lower arch. Over-jet was increased to 5 mm and overbite was increased to 4 mm. Patient has generalized dental fluorosis.

Panoramic radiograph (Fig. 3) showed an over-erupted maxillary left first molar.

Analysis of the lateral cephalogram (Fig. 4) showed skeletal class II jaw relationship (ANB = 5°), a horizontal jaw pattern (Go-Gn to SN= 28°) with proclined upper (U1-SN = 115°) and lower teeth (IMPA = 106°).

**Treatment objectives**

1. To reduce the profile convexity.
2. To achieve lip competence.
3. To intrude the permanent maxillary left first molar.
4. To correct the scissors bite.
5. To consolidate spaces in the upper arch.
6. To de-crowd the lower arch.
7. To correct the midline discrepancy.
8. To achieve a class I molar and canine relation bilaterally.
9. To achieve ideal overjet and overbite

**Treatment plan**

The patient was presented with a non-extraction line of treatment using fixed orthodontic appliances which would involve:

- Intrusion of supra-erupted teeth using mini-implant anchorage.
- Correction of scissors bite
- Up-righting the lower left posterior occlusion
- Leveling and alignment of upper and lower arches
- Opening the bite
- Consolidation of upper spaces.
- Correction of midlines.
- Re-evaluation for further intervention to correct the frontal and profile esthetics.

**Treatment progress**

The maxillary and mandibular arches were bonded with 3M Unitek™ Gemini metal brackets with MBT™ prescription, 0.022 slot, cuspid hooks and 0° torque cuspids (3M Unitek, Monrovia, California). Attachments were placed on all the teeth except permanent maxillary left first and second molars. In the upper arch 0.016” Niti and in the lower arch 0.014” Niti wire was placed initially. (Fig. 5)

As an aid in the correction of the scissors bite, a removable upper anterior bite (Fig. 5A) to dis-occlude the posterior teeth and a fixed lower lingual arch (Fig. 5D) was used from permanent mandibular first molar to first molar.

Two orthodontic mini-screws (Abso Anchor; Dentos Inc., Korea), 1.4 mm in diameter and 8 mm in length, were placed in the maxillary buccal dento-alveolar region and palatal slope. (Fig. 6) The buccal mini-implant was inserted between the second premolar and the first molar, at the level of the muco-gingival junction. The palatal mini-implant was inserted on the palatal slope, between the first and second molars. A supra-periosteal injection using 2 % Lignocaine with 1:80,000 adrenaline was used while placing both the mini-implants.

The mini-implants were immediately loaded with 200 g of intrusive force (Fig. 5) using a closed elastic power chain (Rocky Mountain Orthodontics Inc, Denver, CO).

At the next routine re-call visit it was observed that the elastic chain had slipped and landed in the contact between the permanent maxillary left first and second molars. To prevent this from re-occurring, the first molar was banded and molar tube as well as a lingual sheath was welded on to the band so that the elastic chain could be tied on to these for facial and palatal aspects, respectively. (Fig. 7) This is a novel and previously un-reported method to apply intrusive force to a molar from skeletal anchors. The elastic force was re-activated every 4 weeks.

After 5 months of treatment, the patient presented with the first molar at the level of maxillary occlusal plane. Upper and lower 0.019”x0.025” stainless steel wires with hooks were placed and an active tieback was placed from the buccal mini-implant to consolidate the spaces in the upper arch. A passive tie-back was placed on the contra-lateral side.

Presently the patient is in upper and lower 0.021”x0.025” stainless steel wires. The occlusal intercuspation is class II on the right side and end-on on the left side. (Fig. 8)

His further treatment is being planned keeping in view the convexity of his profile, increased overjet and overbite, asymmetric occlusal inter-cuspation as well as the deviation that is present in the lower third of face to the left side.

**Discussion**

In this patient, permanent left first molar was considerably over-erupted and was in a scissors bite relation to the opposing teeth, which were tilted lingually. Orthodontic mechanics using two mini-implants were proposed for intrusion of the said molar.

The locations for the placement of the mini-implants were based on the bony anatomy of the palate while being the most advantageous from the mechanical stand point. Consideration was also given to the fact that
Fig. 1 - Pre-treatment extra-oral photographs

Fig. 2 - Pre-treatment intra-oral photographs
Fig. 3 - Pre-treatment lateral cephalogram

Fig. 4 - Pre-treatment OPG
Fig. 5 A - Mini-implant placed on palatal slope between permanent left maxillary first and second molars
Fig. 5 B - Mini-implant placed buccally between left maxillary second premolar and permanent first molar.

Fig. 6 - Upper and lower arches with the appliances in place.
Fig. 7 - New method of attaching elastic force from the mini-implant for molar intrusion

Fig. 8 - Present stage intra-oral photographs

Fig. 9 - Comparison between pre-treatment and present left buccal segment occlusion
the largest amount of maxillary inter-radicular bone in the mesio-distal direction is between the second premo-
lar and first molar, both buccally and palatally.5

The quantum of force used has been variously reported from 100 grams to 300 grams.2,3,6 A relatively heavy force of 200 grams was used in this case which was re-activated every 4 weeks. The initial use of an e-chain stretched across the occlusal surface of the tooth between the two implants was not found to be successful owing to the constant slippage and subsequent lodgement in the inter-dental region distal to the first molar. A new method was used where the e-chain segments were tied directly to the buccal and palatal attachments welded onto the band on the first molar. These e-chain segments were then stretched onto the implants to provide the necessary intrusive force. With this method the problem of slippage was totally eliminated.

During intrusion, the patient was continuously monitored for any periodontal problems, buccal or palatal tilt, and root resorption, none of which were apparent. It has been previously reported that the amount of resorption after molar intrusion with skeletal anchorage was not clinically different from control groups treated without intrusion mechanics.7

During the scissors bite correction, an upper anterior bite plane was used to prevent occlusal interlocking which would have impeded buccal-lingual tooth movement.7 In addition, a fixed lower lingual arch was used to supplement the outward force of the arch wire in the lower arch for correcting the bucco-lingual inclination of the lower posterior teeth on the side of the scissors bite.

The total time for intrusion was 5 months, after which the mini-implants were used to stabilize the intruded tooth. An active tieback from the buccal mini-implant was used to close the residual spaces in the maxillary arch, so that the intruded tooth is not taxed to provide anchorage for retraction.

Based on the patient’s convex profile, increased overjet and overbite, asymmetric occusal inter-cuspidation as well as deviated lower third of face (to the left side), a surgical treatment plan involving a bilateral sagittal split osteotomy (BSSO) and an asymmetric mandibular advancement is being considered, subject to patient’s acceptance.

Conclusion
The over-erupted molar was successfully and efficiently intruded using two mini-implants, thus greatly simplifying the correction of the scissors bite.

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References