

An Innovative Approach For Intrusion Of Maxillary First Molar-A Case Report

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Abstract

Natural or premature loss of the permanent mandibular first molar can lead to extrusion of an opposite permanent first maxillary molar. This along with the lateral occlusal interferences leads to inadequate space for restoration. This case report describes the fabrication and biomechanics of a simplified spring to intrude the permanent maxillary first molar.

Keywords- Molar Extrusion, Intrusion, Orthodontic spring.

Introduction

As per several statistical data, maxillary and mandibular permanent first molars are the most commonly found missing teeth in young adolescent population. As a result of this, the antagonist teeth tend to be supraerupted.¹ Over eruption of these molars can lead to functional disturbances and difficulty during prosthetic restoration.²

True molar intrusion has been difficult to achieve. For decades, various treatment strategies and modalities have been developed for intrusion of the permanent molar teeth, ranging from non-surgical and minimally invasive to surgical approaches, by utilizing various appliances considering patient's compliance.

Several methods of molar intrusion along with their biomechanics have been showcased in literature using innovative methods,¹ but recently the temporary anchorage devices (TAD) have become popular. However, as placing TADs is minimally invasive procedure, and for the same, patient's compliance is must. In some cases, due to an inadequate space it is not possible to place TADs between the posterior teeth due to root morphology and soft tissue for true orthodontic molar intrusion.

Thus, this case report elaborates a method to intrude the permanent maxillary first molar using simple spring mechanics.²

Materials Required for fabrication of spring

Pre-fabricated permanent maxillary first molar stainless-steel bands, stainless-steel band material for the premolars, 0.19" × 0.25" beta titanium wire, and weldable maxillary first premolar brackets with Edgewise Appliance (0.022) slot.

Procedure

As shown in the figure 1, the maxillary arch had severe



Figure 1: Pre-treatment intra-oral right occlusal view

crowding and an extruded right maxillary first molar. To relieve the crowding, extraction of bilateral first premolars was planned. After the extraction was done, bonding of all the present teeth was done. Excluding the maxillary first molars, all other three molars were banded using the pre-fabricated band.

Band pinching was done on right maxillary first molar using stainless-steel band material. Weldable premolar brackets were welded on buccal and palatal aspects on right maxillary first molar band. The bracket was also bonded on palatal surface of the right second premolar. Impression was recorded, and these bands along with impression were transferred in the working models.

Spring design and fabrication

The intrusion springs were made using 0.19 x 0.25" beta-titanium wire and were ligated both on buccal and palatal to achieve intrusion of maxillary first molar. Spring design specifically consisted of one active and one retentive arm along with single or double helix. This was used for activation. The former was made longer as compared to the

retentive arm to increase flexibility as shown in figure 2.

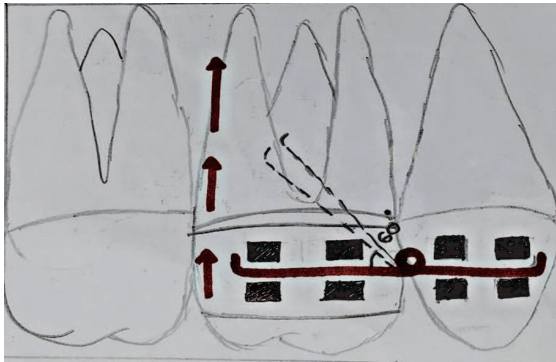


Figure 2: Schematic diagram represents an intrusion spring in passive form and its activation. Initial passive form of the spring is shown by red colour and the activated form is shown by intermittent black lines. The activation of the spring is done by compression of helix at 60 degrees. The line of force of an intrusion spring is towards the apex.

The spring was constructed following the Bauschinger principle that is, increasing the coil-support distance progressively led to a significantly higher load deflection rate.

Position, activation protocol and clinical application of spring

Molar intrusion spring was clinically positioned on both buccal and palatal aspect on maxillary right first molar. The shorter retentive portion of the device was ligated in the second premolar bracket for increasing anchorage. The active arm in maxillary first molar bracket was welded on molar band for its intrusion. A 60° activation bend was done through coil on both buccal and palatal sides for the true intrusion force. (Figure 3)

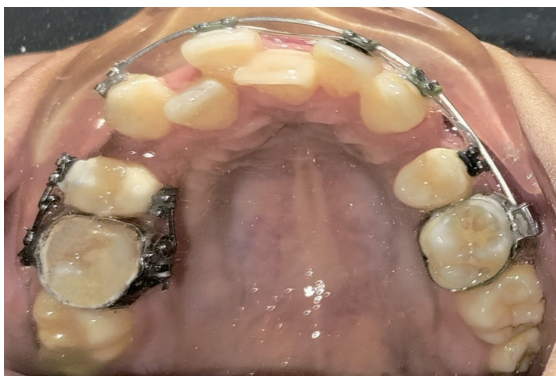


Figure 3: Intrusion spring fabricated from 0.19 x 0.25" beta-titanium wire. The spring is placed buccally and palatally. A rigid continuous arch-wire is placed from left first molar and right canine.

The means of activation was through compression of a helix or by bending the active arm gingivally direction both buccally as well as palatally by 60 degrees. In this case after active therapy for 11 weeks, a significant true intrusion of the maxillary first right molar was noticed without buccal tipping of the molar (Figure 4a, 4b)



Figure 4a: Pre intrusion molar occlusion



Figure 4b: Post intrusion molar occlusion

Discussion

True orthodontic intrusion earlier defined by Nikolai⁽²⁾ said that it is “a translational or bodily form of the tooth movement that acts apically and parallel to the long axis of the tooth”, whereas on the other side Burstone⁽³⁾ has defined it as “apically directed movement of the geometric center of the root of tooth or group of teeth in respect to the occlusal plane or a plane based on the long axis of the tooth or group of teeth.”

True orthodontic intrusion of single tooth or group of teeth with an orthodontic modality often constitutes an active phase of treatment to improve Sagittal and vertical incisor relationships, interincisal angle and gingival contour to restore the esthetics.⁽⁴⁾ While discussing about true orthodontic intrusion, one can also include orthopaedic intrusion mechanics⁽⁵⁾. For many years, dental or orthodontic intrusion was tag lined as a complex procedure due to its association with numerous side-effects like root resorption⁽⁶⁾. However, due to several advancements in clinical practices various modalities have been documented for successful orthodontic intrusion that are considered safe. The only

concerning thing along with this procedure is the magnitude and direction of forces should be carefully monitored.^{7,8}

In this clinical study, a simpler and non-invasive method of true intrusion is elaborated well with its biomechanics, design, and fabrication. Several documentations also conclude that to achieve absolute true intrusion, TADs is the go-to method. But in patients with systemic diseases, excessive soft tissue coverage and bony defects, the usage of TADs may be contraindicated.

The main advantages of using a simple intrusion spring over TADs consists that it can be used in cases where TADs placement is difficult and contraindicated. This is a segmental approach and can be used on both, palatal and buccal side for molar intrusion. Hence it can be used with an adjuvant therapy.

Conclusion

Thus, it can be concluded that-

- These simple intrusion springs can be utilized for true orthodontic intrusion of maxillary permanent molars.
- They are very easy to fabricate and activate with high patient compliance.
- Can be used segmentally without full strap-up of the

patient.

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