

Molar Intrusion for Prosthetic Rehabilitation: An Interdisciplinary Approach

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ABSTRACT

Background: Loss of mandibular first molar often leads to supra-eruption of maxillary molars leading to inadequate space for replacement of missing mandibular molars (door wedge effect¹) as well as less periodontal support and functional disturbances. For successful prosthetic rehabilitation of severe cases requires multidisciplinary approach. A combined orthodontic –prosthetic treatment involves creating space for replacement of teeth and straightening of teeth axes. This case report presents with successful maxillary molar intrusion using orthodontic mini-screws in patient and thereafter replacement of mandibular molars while maintaining periodontal health.

Keywords: Supra-erupted molars ,maxillary molar intrusion, orthodontic mini-screws.

INTRODUCTION

Intrusion is a bodily movement of tooth partially into the bone. Intrusion in orthodontics is done to relieve anterior deep bite or for the correction of the supra-erupted posterior teeth with the opposing tooth missing¹. Intrusion can be done in many ways and consists of many different types. In orthodontic history intrusion was initially considered problematic and was known to root resorption and recession. However, in mid 1950s intrusion with light continuous forces was demonstrated. Charles J. Burstone defined intrusion to be "the apical movement of the geometric center of the root (centroid) in respect to the occlusal plane or plane based on the long axis of tooth"².

Loss of mandibular first molar often leads to supraeruption of maxillary molars leading to inadequate space for replacement of missing mandibular molars (door wedge effect¹) as well as

less periodontal support and functional disturbances^{3,4}. So as an orthodontist we can intrude the maxillary molars and provide enough periodontal support and provide enough room for replacement⁵.

Modern dentistry demands interdisciplinary approach in solving severe clinical cases and for successful prosthetic replacement a number of prior manipulation is required^{6,7,8}. A combined orthodontic–prosthetic treatment involves creating space for replacement of teeth and straightening of teeth axes. This case report presents with successful maxillary molar intrusion using orthodontic miniscrews in patient and thereafter replacement of mandibular first molars.

CASE REPORT

The 18 year old female patient presented with chief complaint of irregularly placed teeth and difficulty

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in chewing. No relevant medical history and past dental history of extraction with 36 and 46 because of caries and tongue thrusting habit.



Fig 1: Pre-treatment extraoral photograph.



Fig 2: Pre-treatment intraoral photograph.

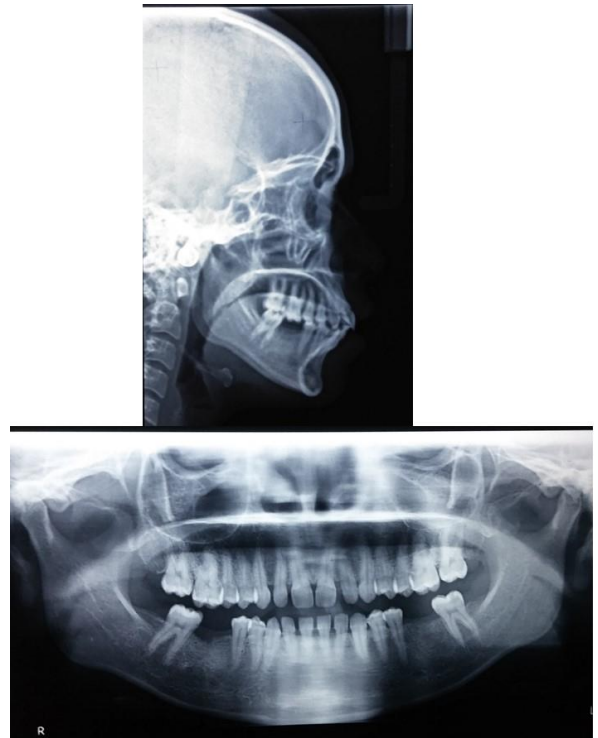


Fig 3: Pre-treatment lateral ceph and orthopantomogram.



Fig 4: Mid treatment photograph.



Fig 5: Molar intrusion using miniscrews.



Fig 6: Stabilization of intruded molars.



Fig 7: Space maintenance in lower arch using coil spring.



Fig 8: Prosthetic Implant placement and IOPA.



Fig 9: Post-treatment extraoral photograph.



Fig 10: Post-treatment intraoral photograph

Diagnosis and etiology

The patient presented with mesoprosopic face form, convex profile, incompetent lips, and acute

nasolabial angle on extraoral examination. Intraorally patient has class I canine relation on both side with 3mm overjet and 30% overbite with missing 36 and 46 and supra-erupted 16 and 26.

Lateral cephalogram reveals class I skeletal base with increased lower anterior facial height and vertical growth pattern. Orthopantogram shows all the third molars missing along with missing 36 and 46.

The treatment objective was to;

- 1) Intrude maxillary first molars
- 2) Level and align
- 3) Upright mandibular 2nd molars
- 4) Prosthetic replacement of missing 36 and 46

TREATMENT PLAN:

Non-extraction with maxillary first molar intrusion and replacement of mandibular first molar was planned. The MBT 0.22 slot brackets were bonded in upper and lower arch. In upper arch, segmental mechanics was used initially as continuous wire could not be placed because of supraerupted molars. Two orthodontic miniscrews (1.3×8mm manufactured by B.K Surgicals), were placed in the maxillary buccal dentoalveolus and palatal slope and two buccally between first and second maxillary molar at mucogingival junction (figure 4) under local anesthesia. The palatal miniscrew was inserted between the second premolar and first molar.

The miniscrews were immediately loaded with 100 - 150 g of intrusive force using a closed elastic power chain (figure 4). Force was carefully measured to ensure that it did not exceed the desired force level. Active intrusion was carried out for period of 4 months. To stabilize the intrusion ligature was passed microimplants through the occlusal surface of maxillary first molars (figure 5).

After achieving some amount of intrusion continuous wire was placed in upper arch. In lower arch adequate space is prepared for missing molars by uprighting lower second molars using open coil spring (figure 6). Patient underwent successful replacement of both the mandibular first molars with prosthetic implant of dimension 4.2×10mm and 3.75×11.5mm manufactured by ADIN dental implant (figure 7) thereafter brackets were

removed and fixed retainer was given for the upper and lower dentition.

RESULT

After orthodontic treatment with orthodontic miniscrews and upper and lower appliance the supra-erupted molars were successfully intruded into the bone providing adequate vertical space for replacement of missing mandibular molars with endosseous implants and improving the functional efficiency of the patient. Cephalometric superimposition showed significant molar intrusion when comparison was done between the pretreatment records and post treatment records.

DISCUSSION

Intrusion by conventional mechanics usually is accompanied by extrusion of anchorage unit. Preventing this side effect is the key to successful intrusion, to overcome these problems skeletal anchorage systems has become popular now including miniscrews and miniplates, because of their ability to provide absolute anchorage⁹.

The ideal location for placement of a palatal miniscrew is in the midline suture or the paramedian region. The palatal midline is typically composed of thick cortical D1 bone covered with 1-mm thin attached gingiva¹⁰. To allow for equal buccal and palatal intrusive force, an extension arm is needed to reach the palatal slope⁹. Placement of miniscrew directly within the palatal slope may increase risk of nerve involvement and stationary anchorage failure due to presence of thin d3 type of cortical bone and thick tissue overlying it^{10,11} and thin d4 bone in posterior maxilla^{12,13,14}. In the case presented, the miniscrew was placed in the palatal slope rather than the paramedian region to eliminate the need for an extension arm.

To intrude the supraerupted maxillary molar, one miniscrew was placed in the buccal dentoalveolus between the first and second molar at the level of the mucogingival junction; the second was placed in the palatal slope between the second premolar and first molar. The palatal miniscrew was placed mesial to the first molar to avoid the greater palatine foramen¹⁵. Adequate interradicular room and attached gingiva was present distal to the first molar to allow for placement of a buccal

miniscrew^{16,17,18}. Once the intrusion is achieved e-chain should be removed to avoid periodontal risk^{19,20,21}.

Ari-Demirkaya et al²² reported that clinically the amount of resorption after molar intrusion with skeletal anchorage was same as that of control groups treated without intrusion mechanics. Daimaruya et al²³ intruded maxillary second premolars into the nasal floor of six beagle dogs and reported only 0.18 ± 0.18 mm (mean $\pm$ SD) of apical root resorption after 7 months of intrusion. The sinus floor membrane was lifted into the nasal cavity, and a thin layer of newly formed cortical bone covered the root apex of intruding teeth. Park et al²⁴ reported two cases of successful maxillary molar intrusion using skeletal anchorage, without notable root resorption.

So stability of molar intrusion was evaluated using skeletal miniplates in nine adult open bite patients by Sugawara et al²⁵. Molar intrusion without root resorption is controversial^{26,27,28}. The authors reported an average relapse rate of 30% for the lower first and second molars. In the near future, further long-term follow up studies will be needed to determine the relapse potential of molars intruded with skeletal anchorage.

CONCLUSION

The chances of success in the recovery treatment for patients with multiple problems of the masticatory apparatus have considerably increased with an orthodontic pre-treatment preparation. From an aesthetic and functional point of view the results were good and patient was satisfied with the results.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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