

## Molar intrusion (Which way forward?): A case report

Halwai HK<sup>1</sup>, Sharma D<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, UCMS-CODS Bhairahawa, Nepal.

### Abstract

Overeruption of maxillary molar(s) because of loss of the opposing teeth creates occlusal interference and functional disturbances. To restore proper occlusion, intrusion of the overerupted molars becomes essential before reconstruction can be initiated. A plausible procedure is orthodontic intrusion which demands calibrated anchorage support from intraoral multiunit teeth and from headgear wear. In this report, we present a simplified and localized version of the orthodontic appliances in conjunction with mini-implants to intrude the overerupted molars. The purpose of using implants as skeletal anchorage was to eliminate the need for patient compliance for headgear wear and to overcome the difficulty resulting from the shortage of anchor teeth. The results showed that the biological responses of the teeth and the surrounding bony structures to the intrusion appeared normal and acceptable.

### Introduction

The over eruption of maxillary molars usually results from early loss of antagonistic teeth. The elongated dentoalveolar process may cause problems of occlusal interferences and functional disturbances and may result in great difficulty during prosthetic reconstruction. Generally, several conventional options are available to increase occlusal clearance. Coronal reduction often requires crown restorations at the expense of tooth vitality. Another alternative is a posterior segmental osteotomy of the maxilla to impact the elongated segment, but patients must undergo the risk of general anesthesia and high cost associated with this procedure<sup>1</sup>.

To intrude over erupted maxillary molars, orthodontic anchorage could be prepared by incorporating multiunit teeth, adding extraoral headgear wear, or using newly adopted mini-implants as bony anchorage. High-pull headgear may achieve intrusion of maxillary posterior teeth, but the treatment result depends heavily on patient compliance. Recent reports have demonstrated the clinical efficiency of mini-implants in providing sufficient anchorage against orthodontic forces. The advantages of using mini-implant as orthodontic anchorage include ease of application, minimal patient compliance needed, and the ability to immediately load after initial wound healing<sup>2</sup>.

The surgical procedure for inserting or removing the mini screw is simple, with minimal unfavorable complications. In contrast, miniplates require flap surgery often done by oral surgeons<sup>3</sup>. Here, we report a case with overerupted upper left first and second molars, treated by intrusion using a fixed appliance in conjunction with mini-implants such as titanium miniscrews for skeletal anchorage. Subsequently, the occlusal clearance was sufficient to rebuild the posterior occlusion by an implant prosthesis placed in the area of the missing antagonistic tooth. Because the intraoral strap-up was minimized, the patient was able to follow oral hygiene instruction and, furthermore, was pleased with the simplified mechanical devices<sup>4</sup>.

### Case report

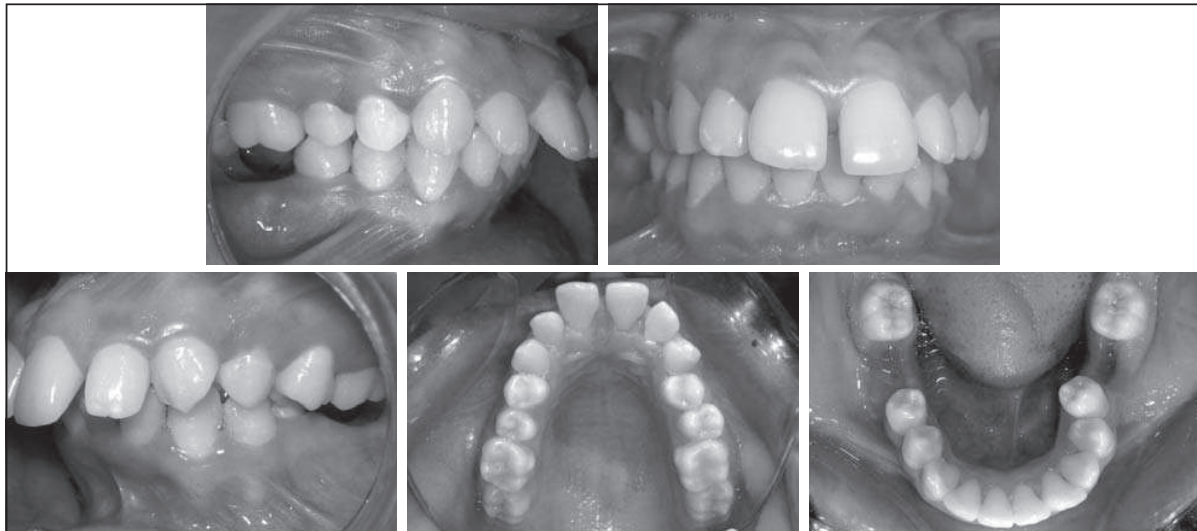
A 21 year old female patient presented with extracted lower right and left 1st molar and supra erupted upper right and left 1st molar in the extraction spaces. Patient presented with a Class II malocclusion on underlying class II skeletal bases. Dental condition revealed increased overjet and overbite, mild maxillary and mandibular anterior spacing, over erupted maxillary left first and second molars. Judging by the marginal ridge discrepancy, the maxillary first molar had over erupted 3 mm occlusally, encroaching upon the antagonistic missing dental space and leading to the occlusal interference upon mastication (Fig 1).

### Correspondence

Dr. Hemant Kumar Halwai, Assistant Professor, Department of Orthodontics and Dentofacial Orthopedics, UCMS-CODS Bhairahawa Nepal, E-mail: drhemantkhalway@gmail.com

**Table 1:** showing changes in the cephalometric values

Parameter	Pre Rx	Post intrusion	Difference
Sn-op(degree)	9	11	2
Sn-pp(degree)	7	7	0
U6-RP (mm)	93	90	-3
U6-RP (degrees)	110	117	7



**Fig 1:** Pretreatment intraoral photographs. (A) Right buccal view. (B) Frontal view. (C) Left buccal view. (D) Upper occlusal view (E) Lower occlusal view.

**Pretreatment Study Models**



**Fig 2:** Right buccal view



**Fig 3:** Light buccal view

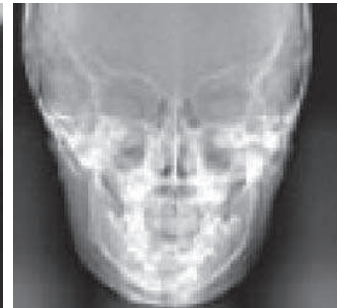
**Pretreatment Radiographs**



**Fig 4:** Pretreatment panoramic radiograph



**Fig 5:** Pretreatment lateral cephalometric radiograph



**Fig 6:** Pretreatment frontal cephalometric radiograph

Templates were Made to Mark the Site of Miniscrew Placement

Mini-screws were tied to Molar Tube By Means of Elastics

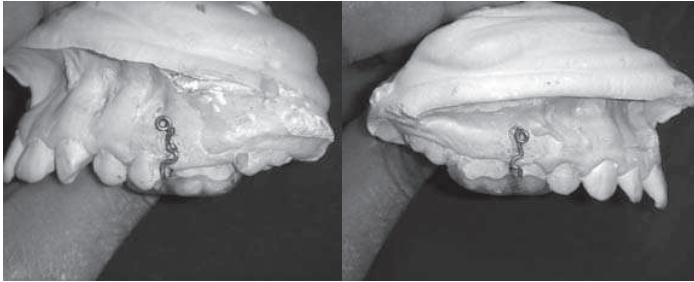


Fig 7: Templates for placement of implant

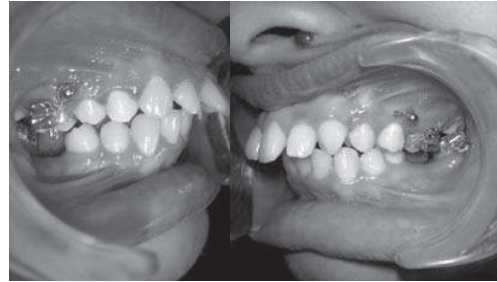


Fig 8: Miniscrews in place between premolar and molar

Pre and Post Treatment Models



Fig 9: Pre treatment right side



Fig 10: Post intrusion right side



Fig 11: Pre treatment left side



Fig 12: Post treatment left side

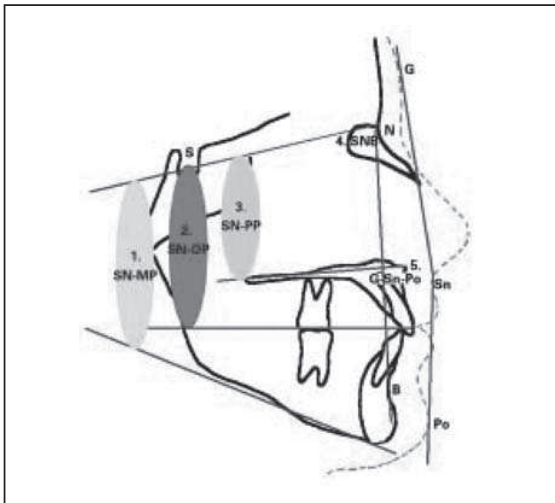


Fig 13a: Measurements on anteroposterior radiograph

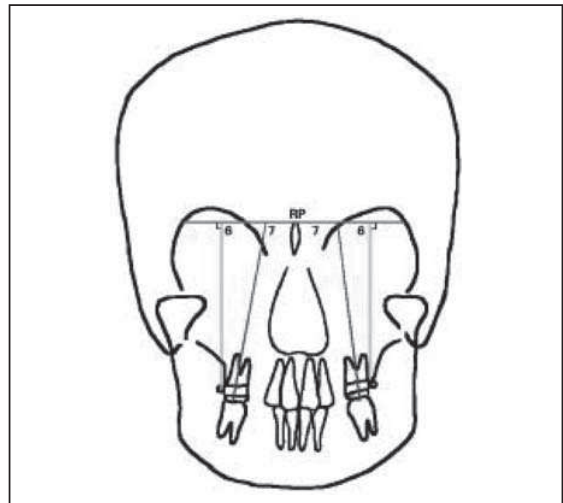


Fig 13b: Measurements on frontal radiograph

Rp reference plane, U6-RP, perpendicular distance from the buccal tube of the maxillary

U6-RP, inner angle between the reference plane and the axial inclination of the maxillary first molars.

## Discussion

Anchorage control plays an important role in orthodontic mechanics. During conventional orthodontic treatment for intruding overerupted molars, it is difficult to avoid the side effect of extrusion of the anchorage teeth. Some appliances such as high-pull headgears could be used for molar intrusion, but the patient's compliance is essential. In contrast to traditional orthodontics, the molar intrusion facilitated with the mini-implants causes minimum extrusion of the adjacent teeth. Incorporation of mini-implants can achieve a significant amount of maxillary molar intrusion and is an excellent alternative to traditional method<sup>5</sup>.

The results of cephalometric analysis of this patient show that intrusion of molars took place by 3 mm (U6-RP difference 3 mm) Table 1. As well as molar tipped buccally by 7 degree (U6-RP, inner angle between the reference plane and the axial inclination of the maxillary first molars). There were no changes seen in the SN-PP angle in the base of maxilla. To quantify the amount of intrusion, digital caliper were used to measure the movement of cusp tips of specific teeth relative to the stable structures on the dental casts. The superimposition of lateral cephalometric radiographs may provide us information about molar intrusion, but the image of posterior teeth is often blurred and buccal-palatal crown tipping cannot be assessed<sup>6,7</sup>.

Panoramic radiographs offer a better alternative because no image overlapping of contra lateral posterior teeth occurs. Recently, panoramic radiographs were used to identify pure molar intrusion with miniplates anchorage. Contrary to analysis using 2D images, the 3D approach could quantify the tooth movement by analyzing spatial data from the serial models<sup>8</sup>.

Intrusion of molars by only applying an apically directed force to the buccal tooth attachment will tip molars to the buccal side. There are several ways to counteract the buccal tipping moment produced by the intrusive force applied from buccal aspect<sup>9</sup>. Most commonly a transpalatal arch is used to help minimize the tendency of buccal tipping. This appliance should be kept well away from the palate to avoid soft tissue impingement. A second option for minimizing buccal tipping is the use of a constricted overlay arch wires.

Kanomi et al used an overlay round archwire to provide a counterbalancing moment and control the buccal crown tipping<sup>10</sup>. However, the most efficient control may result from simultaneous application of intrusive force from buccal and palatal aspects. With the miniplate and miniscrew anchorage system, the intrusive force can be applied by elastic chains between the buccal miniplate

and attachment on first molar band, and between the palatal miniscrew and the cleat of the molar attachment. The levels of buccal and palatal force need to be closely monitored to minimize the tendency for crown tipping, which is usually not desirable. In this case, the palatal cusp responded faster and the intrusive movement occurred earlier than that of buccal cusp. The interradicular septum between the two buccal roots may partly explain the different rate of intrusion in the buccal and palatal cusps.

## Conclusions

- This case report revealed that the average intrusion of maxillary molars was more than three to four mm.
- A combination of mini-implants and fixed appliances is a predictable and effective procedure to achieve maxillary molar intrusion.

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