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A new method for the assessment of changes in molar inclination during RME

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Abstract

The authors show a simple technique to evaluate the changes in molar inclination during rapid maxillary expansion.

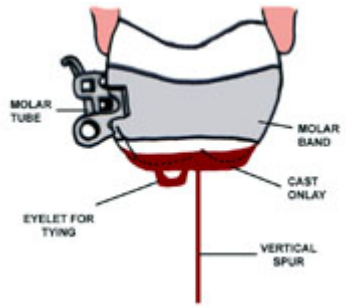
1. Introduction

The contemporary trends in the practice of orthodontics have moved toward the principles of dentofacial orthopedics and non-extraction treatment modalities (1-4). The use of headgear and functional appliances has demonstrated orthopedic effects mostly in the sagittal and vertical dimensions. One of the most impressive orthopedic procedures is the transverse separation of the maxilla through rapid palatal expansion. This procedure has lately been the subject of renewed interest in orthodontic treatment mechanics because of its potential for increasing arch perimeter to alleviate crowding in the maxillary arch without adversely affecting facial profile. In addition, it assists in the correction of disharmonies in the transverse plane between the maxillary and the mandibular arches. (1, 5-8)
During RME, tipping of the anchorage teeth is usually realized along with the skeletal changes. This undesirable side effect can take place due to a number of factors including type of the appliance used, mode of activation, resistance of the surrounding skeletal tissues, and degree of maturation. Precautions had to be taken to overcome this undesirable effect. There is no consensus on these precautions, however, more rigid devices said to hold the anchor teeth upright can be used, mode of activation can be changed or resistance of the surrounding bony tissues can be weakened with surgery. Whichever method is used, it is always critical to be able to measure the amount of dental tipping particularly for the PA cephalometric studies of RME. This is needed for differentiating the amount of skeletal separation of the maxillae from that of dental arches. As it is a challenging experience trying to find the molar teeth contours on the PA

radiographs due to superimpositions of bony structures, different methods have been advocated to measure the molar tipping occurred during RME. (9-12)
The aim of this presentation is to introduce a new auxillary and method of measurement for the assessment of changes in molar torque value on PA radiographs.

2. Fabrication

Cr-Co casts onlays, which cover the occlusal surfaces of the left and right upper 1st molars are prepared by the dental laboratory on the pretreatment working models. This onlay has a vertical spur that is 0.9 mm thick and 10 mm long, which is prepared as vertical as possible to the occlusal surface of the molar tooth. Occlusal onlays also have eyelets that will be used for tying with dental floss during oral application to avoid accidental swallowing or aspiration (Figures 1-3). Note on Figure 1 that presence of a molar band to not inhibit the placement of the auxillary.



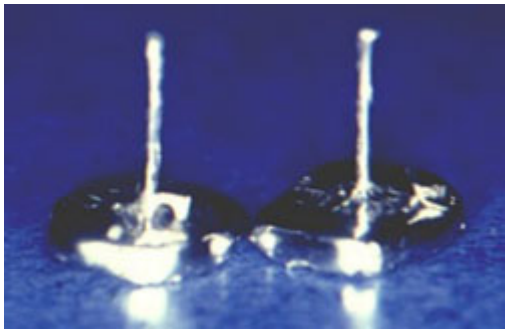


Fig. 1a - 1b
Schematic drawing of the occlusal onlay. Please note that onlay does not interfere with the molar band.

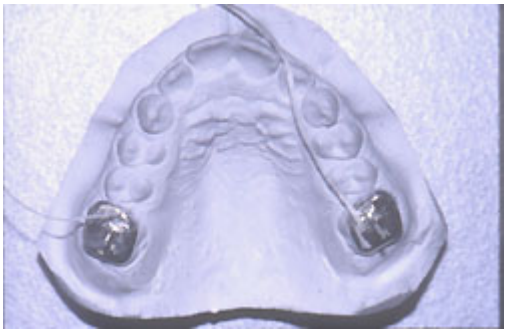


Fig. 2
Occlusal cast onlays.

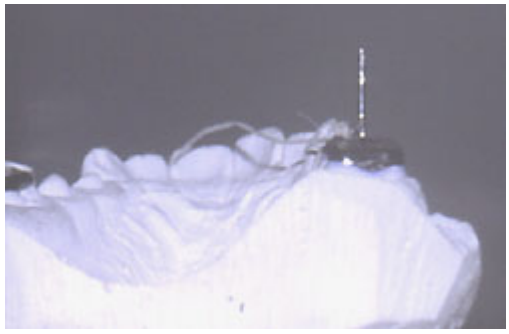


Fig. 3
Onlays are being tried-in on the dental cast.

Please note that the two onlays are tied to each other with a piece of dental floss.

Immediately after delivery from the dental laboratory, inner faces of the onlays are inspected carefully with a magnifying glass to find out if there are any metallic bubbles, which can adversely affect the adaptation of the cast to the tooth. Any formation of that kind is ground away with hand-piece to make sure perfect fit of the onlay to occlusal surface and this is followed by the disinfectioning of the onlay.

3. Oral Application

Before try-in, casts are tied with dental floss and then cemented temporarily on the

occlusal surfaces of the corresponding molar tooth using polycarboxylate luting cement (Figure 4) and the patient is taken to radiology. Patient is instructed not to bite down until the PA cephalograms are taken. Following positioning in the cephalostat the film is exposed.
After the exposure, the onlays are removed from occlusal by little force from the occlusal surface, possible cement remnants are removed and the onlays are kept with patient's dental models until RME is completed. When the RME procedure is completed, stored onlays are recemented to repeat the above procedure is repeated with or without removing the RME device if using a Hyrax type expander. However the appliance should be removed first if the orthodontist is using a cap type expander.

Fig.4
Onlays are cemented to the molars. Please note that the onlays are tied with a dental floss during oral application to avoid accidental swallowing or aspiration.

4. Radiographic Evaluation

The radio-opaque image of the vertical spur is clearly visible on the pre and post-RME posteroanterior radiographs, occlusal to the molar region (Figures 5A and 5B). This image represents the long axis of the molar tooth and its inclination changes with the tipping of the molar tooth that itis cemented on. Thus, changes in the inclination of this image can be used to assess the treatment changes in the tipping of upper molar tooth.

Fig. 5a

Posteroanterior x-ray taken with the onlays in place before RME treatment. Note that images of the spurs are clearly visible on the film.

Fig. 5b

Posteroanterior x-ray taken with the onlays in place after RME procedure is completed.

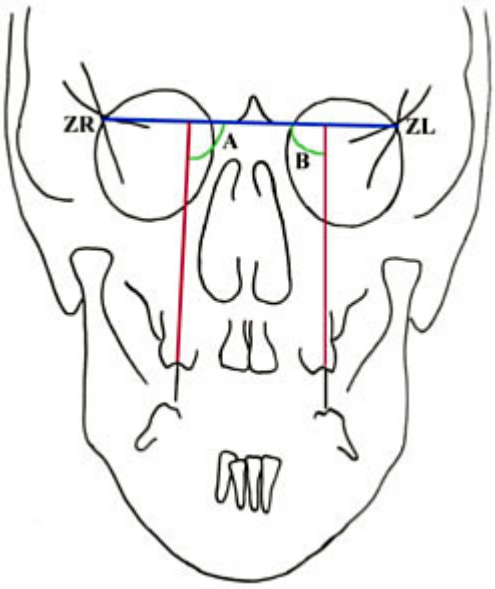


Fig. 6a

Dotted lines are constructed using the images of the spurs and provides a baseline to assess the inclination changes.

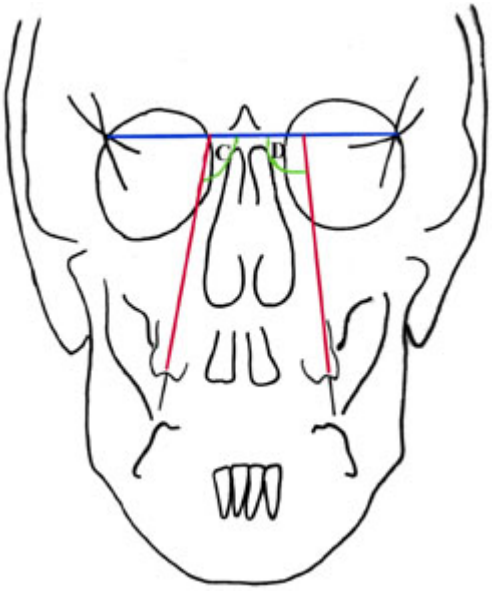


Fig. 6b

The difference between the angles A-C and B-D correspond to the change in the inclination of molar teeth.

Lines supposed to represent the molar long axis can easily be constructed using the clear images of the spurs on the cephalometric tracings. The changes in the relation of these two lines to any reference line of the individual orthodontist's choice can be

measured easily and reflect the changes in molar torque value. In figures 6A and 6B, dotted lines are constructed using radiographic images of the vertical spurs.
In this presentation, ZL-ZR line (the line constructed between the left and right intersections of the orbits with the zygomatico-frontal sutures) is used for demonstration (Figure 6 A and B). Angular changes can easily be calculated and evaluated by measuring the angles of A, B, C and D seen on Figures 6A and 6B.

5. Conclusion

This simple and easy to use technique was originally developed for our RME study. For the posteroanterior cephalometric studies of rapid maxillary expansion and any other orthodontic mechanics, which may cause tipping of teeth, this technique is very useful and precise. The clear radio-opaque image of the metal spur will be visible even on the most superimposed area allowing more sensitive tracing or digitizing thus producing more accurate and reliable results. If needed, the dental technician can easily construct same kind of a capped onlay for any other tooth that needs to be studied. Furthermore, the technique can be used on lateral cephalograms to evaluate the mesiodistal tipping of teeth.
The main drawbacks of the procedure can be considered as extra laboratory work and need for an extra PA radiograph.

References

1. **Haas AJ**. Just the beginning of dentofacial orthopedics. Am J Orthod 1970;57:219-55.
2. **Harvold EP.** The activator in interceptive orthodontics. St. Louis: CV Mosby, 1974.
3. **Pancherz H.** Treatment of Class II malocclusions by jumping the bite with the Herbst appliance: a cephalometric investigation. Am J Orthod 1979;76:423-41.
4. **Subtelny JD.** Oral respiration: facial maldevelopment and corrective dentofacial orthopedics. Angle Orthod 1980;50:147-64.
5. **Bishara SE, Staley RN.** Maxillary expansion: clinical implications. Am J Orthod Dentofac Orthop 1987;91:3-14.
6. **Haas AJ.** Rapid expansion of the maxillary dental arch and nasal cavity by opening the midpalatal suture. Angle Orthod 1961;31:73-90.
7. **Haas AJ.** The treatment of maxillary deficiency by opening the midpalatal suture. Angle Orthod 1965;35:200-17.
8. **Haas AJ.** Long-term post treatment evaluation of rapid palatal expansion. Angle Orthod 1980;50:189-217.
9. **Adkins MD, Nanda RS, Currier GF.** Arch perimeter changes on rapid palatal expansion. Am J Orthod Dentofac Orthop1990; 97:194-9.
10. **Handelman CS.** Nonsurgical rapid maxillary alveolar expansion in adults: A clinical evaluation. Angle Orthod 1997;4:291-308.
11. **Asanza S, Cisneros GJ, Nieberg LG.** Comparison of Hyrax and bonded expansion appliances. Angle Orthod. 1997;1:15-22.
12. **Ingervall B, Göllner P, Gebauer U, Fröhlich K.** A clinical investigation of the correction of unilateral first molar crossbite with a transpalatal arch. Am J Orthod

Dentofac Orthop 1995;107:418-425.