Miniscrews supported lingual arch for distalization in the maxilla

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DEDICATION

To my parents, brothers and sisters.

To my professors

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INTRODUCTION

In planning treatment for a Class II patient, consideration must be given to incisor proclination, space requirements, vertical dimension, transverse relationship, and overall facial esthetics, in addition to the interarch molar relationship.

Contemporary edgewise extraction treatment (upper premolars or upper and lower premolars) almost always results in forward displacement of the maxillary molars as the molar relationship is corrected. In contrast, edgewise non-extraction treatment predictably results in distal displacement (bodily movement and/or tipping) of the maxillary molars.

For a variety of reasons such as profile oriented and achieving faster treatment, the orthodontic treatment in the past few decades has tended toward non-extraction treatment. At the present, practitioners have at their fingertips a variety of techniques and inter-arch and intra-arch arch appliances that can be employed to distalize maxillary molars.

A common strategy to treat Class II malocclusions by a non-extraction protocol is to initially distalize the maxillary molars to create a Class I relationship. Various concepts, biomechanics, and appliances have been routinely used, including extraoral traction, removable appliances with springs, and Class II intermaxillary elastics. Since the patients' compliance is a presupposition for the effectiveness of these modalities, the development

and use of techniques and appliances that minimize the need for patient cooperation provides a reliable and more predictable treatment alternative. Noncompliance mechanics include a variety of intramaxillary appliances such as Jones jig, distal jet, pendulum appliance, Keles slider, repelling magnets, compressed coil springs and molar distalizing bows.

A fundamental characteristic of these appliances is that they are tooth supported. This implies that the distalization force applied to the molars produces a reaction force on the anterior teeth with subsequent mesialization of these teeth and anchorage loss. Additional loss of anchorage occurs during active retraction of the premolars and anterior teeth after molar distalization, even when distalization was accompanied by marked distal inclination of the molars.

Although these methods often achieve acceptable results, anchorage loss is unavoidable and the mechanics are often difficult to control precisely.

Skeletal anchorage devices are used to overcome the compliance problems and to provide maximum anchorage. They came in different shapes, lengths and dimensions. Which can be either stabilized by being osteointegrated within the bone as endosseous implants or mechanically stabilized like TADs.

With the help of these absolute anchorage systems, various successful methods of distal molar movement have been reported. However, most of them have limitations, such as complicated surgical implantation, the need

for additional laboratory procedures, difficult manipulation, and/or patient discomfort. Of the various temporary anchorage devices, miniscrews have several advantages. They are relatively easy to place, inflict less trauma on the oral tissues, are stable if the optimal force exerted, and can be loaded immediately after placement. Moreover, miniscrews are relatively inexpensive and have few limitations regarding implantation sites.

The current study was designed to evaluate the efficiency of using the TADs (Temporary Anchorage Devices) in distalizing the maxillary molars and their ability to overcome the problems that are encountered with traditional distalizing appliances which use teeth as anchoring units.

Review of literature

Nonextraction treatment of Class II malocclusion usually requires distalization of maxillary molars. Beginning in the 1980s, intraoral appliances, such as repelling magnets, super elastic NiTi coil springs, pendulum, Jones-jig, and distal-jet, have been introduced to distalize molars with minimal patient compliance. Intraoral distalization appliances have been designed to deliver a continuous reciprocal force on the maxillary first molars. Any action to move molars distally produces a mesial reaction force on the anchoring teeth. As a consequence, if the premolars or incisors or both are the anchoring teeth, they move mesially, the incisors protrude, and overjet increases. However, this effect is in contradiction with the main objective of Class II treatment. Furthermore, the distalized molars are questionable anchors for the retraction of premolars and incisors, despite attempts (headgears, Nance appliance,…etc) that have been made to maintain them in their new positions. Recently, researchers have tried to overcome these major problems by designing new intraoral systems involving rigid skeletal anchorage, by using either tooth born appliances supported with TADs or bone appliances that completely relay on TADs for distalization.

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The review of literature will cover three subjects:

I. TADs (Temporary Anchorage Devices).
II. Tooth borne appliances for molars distalization.
III. Miniscrews supported appliances for molars distalization.

- **TADs (Temporary anchorage devices)**

Giuliano et al (2002) they performed this study to describe and illustrate the use of a two-part osseointegrated implant that was placed in the palate to serve as anchorage. After implant placement and osseointegration, the implants were connected to the teeth by means of transpalatal bars. When molar stabilization was necessary during premolar, canine, and incisor retraction, the transplatal bar was placed on the molars. When molar distalization was required, the transpalatal bar was connected to the first premolars. They founded that during premolar, canine, and incisor retraction the implant-supported molar position was stable. During molar distalization, the implant-supported premolar position remained stationary. They concluded that Implants provided the ability to establish stable, or "absolute," anchorage with no patient cooperation.

Miyawaki et al (2003) performed this study to examine the success rate and to find the factors associated with the stability of titanium miniscrews placed into the buccal alveolar bone of the posterior region. The sample of