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CASE REPORT

Journal of Clinical Case Reports and Reviews

New design for unilateral upper molar distalization with bone anchorage system

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Abstract

Molar distalization is considered as a good approach for creating space. Conventional methods were depended on patient compliance but with use of mini screw, tooth movement are done more rapidly, easily and non-compliance. Our design is useful for unilateral upper molar distalization by modified power arm that is connected to mini screw by elastic chain.

Keywords: *distalization, miniscrew, unilateral, power arm*

Introduction

In order to obtaining unilateral space in orthodontic treatment, possible options are included unilateral extraction or unilateral molar distalization. Unilateral extraction creates great space that needs extra time to close; in addition, most patients don't desire to lose their teeth. Moreover, unilateral extraction can cause to arch skewing or midline displacement [1]. The criteria of ideal modality for molar distalization include: minimal patient compliance, mild or no anterior anchorage loss, bodily molar distalization, minimal chair side time for placement and reactivation [2]. Although there are various treatment modalities for unilateral distalization, most of them depend on patient's cooperation specially headgear. Conventional Intraoral distalizing appliances such as pendulum lead to patient discomfort, palatal tissue irritation, and increased treatment time and anchorage loss [3,4].

In recent years, due to importance of control of anchorage, studies directed toward the use of osseointegrated implant [1,2,5-13], on plant [14] and intraosseous screw [1,5,6,9,15-17] as anchorage units. Greekmore and Eklund [18] used vitallium screw for upper incisor intrusion. Park et al. [19] have used maxillary mini screw for open bite treatment. Liou et al. [120] and Park et al. [8] used mini screw as an anchorage foe en mass upper and lower posterior teeth distalization. Gelgor et al. [6] carried out bilateral molar distalization by an intraosseous screw.

The aim of this presentation is to introduce a modified design using of mini screw for unilateral upper molar distalization.

Case presentation

TA 16-year-old female was referred to the orthodontic department with a chief complaint of upper anterior teeth irregularity. On clinical examination she presented good relationship with straight profile (Figure 1). A full complement of permanent teeth was presented (Figure 2). In centric occlusion, she had angel's class I canine relation at left and mild molar and canine class II canine relationship in the right side (Figure 1). Maxillary arch exhibited moderate space deficiency and right lateral incisor was trapped at palatal side but mandibular arch had aligned teeth (Figure 1). She had unaesthetic smile and 1mm upper midline displacement to right. Oral hygiene was good.

Treatment objectives:

1. To establish class I canine relationship at right side.
2. To align maxillary arch include midline.
3. To constitute a good aesthetic smile.

The criteria for unilateral molar distalization were included:

- Skeletal class I, unilateral molar or canine class II relationship.
- Skeletal class I, unilateral molar or canine class II relationship.
- Minimal or no crowding in the mandibular arch.
- Existence of bilateral 1st and 2nd premolar teeth.
- Rejection of headgear wear.
- Good oral hygiene.

Intraosseous screw and insertion procedure

In this study we used miniscrew (Jell Medical Corporation, Korea) with 2mm diameter and 10mm length. Before initiating distalization, upper right third molar was extracted. After local anesthesia, intraosseous screw was placed at palatal side between roots of 2nd premolar and first molar at right side. The insertion procedure just took 5-7 minutes and a mucoperiosteal flap was not needed.

Figure 1. Pretreatment documents.

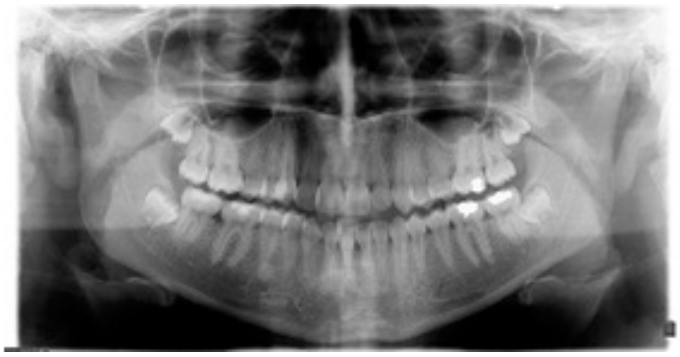

Figure 2. Pretreatment panoramic radighraph.

Figure 3. Pretreatment lateral cephalometry

Fabrication of distalizing appliance

Upper right molar band that had 0.018-inch bracket and 0.030-inch tube was fitted to the tooth; then an alginate impression was taken and a plaster model was prepared. A 0.036-inch (0.9mm) stainless steel modified power arm (Figure 4) was fabricated and soldered to molar band on palatal side. The band was cemented to right molar and the modified power arm was connected to mini screw by close elastic chain with force of 240gr. Left first molar was banded and other teeth were bonded with standard 0.018 × 0.025 inch slot brackets and NiTi wire inserted to all brackets instead of right lateral incisor; this tooth was connected to the wire with steal ligature. The patient was seen every 3 weeks and elastic chain was changed. When upper right first molar was distalized to super class I relationship approximately 2mm, the distalization was ended (Figure 5). Initial leveling and alignment was carried out during distalization.

Result

Maxillary right molar was distalized successfully approximately 2mm and it took 4.6 months. The screw insertion was quick and simple and during insertion and distalization patient reported no pain. The screw was stable after insertion and distalization too. We had proclined upper incisors in order to obtain proper overjet and overbite.

Discussion

The noncompliance intraoral molar distalization methods have been a good choice for patients who reject to wear headgear. Most of the intraoral distalizing appliance such as pendulum [3,3] distal jet [4,21,22], jones jig [4,23] had been shown anchorage loss with significant maxillary incisors proclination and increased over jet. However previous studies reported good results about the amount of maxillary first molar distalization such as: 4.2mm with repelling magnets [24], 3.2mm with NiTi coil spring [25], 4.8mm with distal jet [26], 5.2mm with intraoral bodily molar distalizer [27] and 5.7mm with Pendulum appliance [28], but we have to consider that

Figure 5. Post-treatment documents.

in all of this studies anchorage loss in form of mesial movement of premolars and incisors was happened.

In recent years, to eliminate this side effect most orthodontists prefer to use skeletal anchorage. With use of skeletal anchorage in addition to resolve anchorage loss problem, due to skeletal anchorage position relative to occluso-gingival height of tooth, forces have intrusive nature (just like standard pendulum appliance); so prevent bite opening and increasing vertical dimension particularly in adult subjects [7].

In this study, we used mini screw as an anchorage unit to distalize right upper molar in order to prepare space for right palatally lateral incisor without unilateral premolar extraction. To facilitate first and second right maxillary molars we extracted right third molar. Easy and quick insertion, no need of patient compliance, no pain and complication during screw insertion and distalization and consequently reduced treatment time are some of advantages of this method.

Result of this study is in agreement with other studies such as Sar et al. [16] Suzuki et al. [9], Gelgor et al. [15], Yao et al. [17], Prasad and Sreevalli [2], Chung et al.[1], Park et al. [7] and Sugawaral et al. [29]. Beside successful result for distalization with skeletal anchorage but some studies have limitations. Chung et al. [1] used partially osseointegrated implant that need 4 weeks of healing before loading. Sar et al. [16] distalized upper molars on both sides with Mini screw Implant Supported Distalization System in one group and Bone-Anchored Pendulum Appliance in another group but they found no significant difference for all parameters between two groups.

In some studies [1,2,15] they have used mini screw for unilateral distalization but the modified power arm that we used in this study was simple, effective, occupied less space in palate and patient was comfort because in contrary to other studies that they reinforced intraoral appliances with intraosseous screw, we just used intraosseous screw without other intraoral appliances; this design is more comfortable and hygienic for patient. So in this method there was no anchorage loss such as incisors protrusion and increased overjet during distalization stage.

References

1. Chung KR, Kim SH, Chaffee MP, Nelson G. Molar distalization with a partially integrated mini-implant to correct unilateral Class II malocclusion. *Am J Orthod Dentofacial Orthop.* 2010; 138:810-819.
2. Prasad MB, Sreevalli S. Unilateral molar distalization: a nonextraction therapy. *Case Rep Dent.* 2012:846319.
3. Hilgers JJ. The pendulum appliance for Class II non-compliance therapy. *J Clin Orthod.* 1992; 26:706-14.
4. Kinzinger GS, Eren M, Diedrich PR. Treatment effects of intraoral appliances with conventional anchorage designs for non-compliance maxillary molar distalization: a literature review. *Eur J Orthod.* 2008; 30:558-571.
5. Choi YJ, Lee JS, Cha JY, Park YC. Total distalization of the maxillary arch in a patient with skeletal Class II malocclusion. *Am J Orthod Dentofacial Orthop.* 2011; 139:823-833.
6. Gelgor IE, Buyukyilmaz T, Karaman AI, Dolanmaz D, Kalayci A. Intraosseous screw-supported upper molar distalization. *Angle Orthod.* 2004; 74:838-850.
7. Park HS, Kwon TG, Sung JH. Nonextraction treatment with microscrew implants. *Angle Orthod.*2004; 74:539-549.
8. Park HS, Lee SK, Kwon OW. Group distal movement of teeth using microscrew implant anchorage. *Angle Orthod.* 2005; 75:602-609.
9. Suzuki EY, Suzuki B. Maxillary molar distalization with the indirect Palatal miniscrew for Anchorage and Distalization Appliance (iPANDA). *Orthodontics (Chic.).* 2013; 14:e228-e241.
10. Byloff FK, Karcher H, Clar E, Stoff F. An implant to eliminate anchorage loss during molar distalization: a case report involving the Graz implant-supported pendulum. Int J Adult Orthodon *Orthognath Surg.* 2000; 15:129-137.
11. Roberts WE, Arbuckle GR, Analoui M. Rate of mesial translation of mandibular molars using implant-anchored mechanics. *Angle Orthod.*1996; 66:331-338.
12. Roberts WE, Marshall KJ, Mozsary PG. Rigid endosseous

implant utilized as anchorage to protract molars and close an atrophic extraction site. *Angle Orthod.* 1990; 60:135-152.

13. Wehrbein H, Diedrich P. Endosseous titanium implants during and after orthodontic load--an experimental study in the dog. *Clin Oral Implants Res.* 1993; 4:76-82.
14. Block MS, Hoffman DR. A new device for absolute anchorage for orthodontics. *Am J Orthod Dentofacial Orthop.* 1995; 107:251-258.
15. Gelgor IE, Karaman AI, Buyukyilmaz T. Use of the intraosseous screw for unilateral upper molar distalization and found well balanced occlusion. *Head Face Med.* 2006;2:38.
16. Sar C, Kaya B, Ozsoy O, Ozcirpici AA. Comparison of two implant-supported molar distalization systems. Angle Orthod.2013; 83:460-467.
17. Yao CC, Lai EH, Chang JZ, Chen I, Chen YJ. Comparison of treatment outcomes between skeletal anchorage and extraoral anchorage in adults with maxillary dentoalveolar protrusion. *Am J Orthod Dentofacial Orthop.* 2008; 134:615-624.
18. Creekmore TD, Eklund MK. The possibility of skeletal anchorage. *J Clin Orthod.*1983; 17:266-269.
19. Park YC, Lee SY, Kim DH, Jee SH. Intrusion of posterior teeth using mini-screw implants. *Am J Orthod Dentofacial Orthop.* 2003; 123:690-694.
20. Liou EJ, Pai BC, Lin JC. Do miniscrews remain stationary under orthodontic forces? *Am J Orthod Dentofacial Orthop.* 2004; 126:42-47.
21. Bolla E, Muratore F, Carano A, Bowman SJ. Evaluation of maxillary molar distalization with the distal jet: a comparison with other contemporary methods. *Angle Orthod.*2002; 72:481-494.
22. Ngantung V, Nanda RS, Bowman SJ. Posttreatment evaluation of the distal jet appliance. *Am J Orthod Dentofacial Orthop.* 2001; 120:178-1.
23. Brickman CD, Sinha PK, Nanda RS. Evaluation of the Jones jig appliance for distal molar movement. *Am J Orthod Dentofacial Orthop.*2000; 118:526-534.
24. Bondemark L, Kurol J. Distalization of maxillary first and second molars simultaneously with repelling magnets. *Eur J Orthod.*1992;14:264-272.
25. Bondemark L, Kurol J, Bernhold M. Repelling magnets versus superelastic nickel-titanium coils in simultaneous distal movement of maxillary first and second molars. *Angle Orthod.*1994; 64:189-198.
26. Carano A, Testa M. The distal jet for upper molar distalization *J Clin Orthod.* 1996; 30:374-380.
27. Keles A, Sayinsu K. A new approach in maxillary molar distalization: intraoral bodily molar distalizer. *Am J Orthod Dentofacial Orthop.* 2000; 117:39-48.
28. Bussick TJ, McNamara JA, Jr. Dentoalveolar and skeletal changes associated with the pendulum appliance. *Am J Orthod Dentofacial Orthop.* 2000; 117:333-343.
29. Sugawara J, Kanzaki R, Takahashi I, Nagasaka H, Nanda R. Distal movement of maxillary molars in nongrowing patients with the skeletal anchorage system. *Am J Orthod Dentofacial Orthop.* 2006; 129:723-733.

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Rec: Jan 21, 2018; Acc: Feb 08, 2018; Pub: Feb 12, 2018

J Clin Case Rep Rev. 2019;2(1):30
DOI: gsl.jccrr.2018.000030