ejpmr, 2023, 10(3), 298-301

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Case Study

ISSN 2394-3211

EJPMR

MOLAR DISTALIZATION WITH PENDULUM APPLIANCE: A CASE REPORT

Dr. Bina Nandi*

MDS (Orthodontics and Dentofacial Orthopedics), Prafulla Chandra Sen Medical College and Hospital.

***Corresponding Author: Dr. Bina Nandi**

MDS (Orthodontics and Dentofacial Orthopedics), Prafulla Chandra Sen Medical College and Hospital.

Article Received on 21/01/2023 **Article Revised on 10/02/2023** **Article Accepted on 01/03/2023**

ABSTRACT

Nonextraction treatment is gaining in popularity away the orthodontic Community since the second half of the 20 th Century. The careful selection of patients and timing of treatment are essential to the success of nonextraction treatment. The use of so called distalization mechanics to correct class II malocclusions is a common treatment modality. The case report presented here discuss molar distalization of a 14 year old girl with the help of Pendulum Appliance.

KEYWORDS: arch perimeter, molar distalization, Pendulum Appliance.

INTRODUCTION

Hilgers[1] first introduced pendulum appliance which provides the clinician with the ability to distalize molars unilaterally and bilaterally. The Pendulum Appliance is a hybrid appliance that uses a large Nance acrylic button in the palate for anchorage, along with .032" TMA springs that deliver a light, continuous force to the upper first molars without affecting the palatal button. Thus, the appliance produces a broad, swinging arc or pendulum of force from the midline of the palate to the upper molars. This type of mechanotherapy typically is used in patients with maxillary skeletal and /or dentoalveolar protrusion. Molar distalization also can be initiated when extraction of maxillary teeth is not indicated and the mandibular arch –size / arch perimeter relationship does not permit mesial movement of the lower molars.

DIAGNOSIS: A 14 years old girl reported to our clinic with chief complain of irregular teeth and unpleasant smile.

Extraoral examination shows.

- Mesocephalic headform and Mesoprosopic facial form.
- Lips are competent.
- No Incisor display is at rest.
- Full incisal display with 1-2mm of gingiva at smile.
- Smile arc is non consonant.
- Profile is convex.
- Posteriorly divergent face.
- No history of congenital diseases or anomaly recorded.

  Intraoral examination
- Maxilla mandibular relationship shows end on molar on right side and class I molar on left side. And canines are out of arch end on right side and class I on left side.
- Overjet of 0mm.
- Overbite of 3mm.
- Rotated both upper centrals and lateral incisors.
- Curve of spee 2.5mm in both side.

Study model analysis – Carey's analysis shows arch perimeter and total tooth material discrepancy of 8mm on maxillary arch and of 5 mm on mandibular arch.

Bolton' s ratio shows 1.5mm of mandibular tooth material excess in anterior region and 1mm of maxillary tooth material excess in posterior region.

Ashley Howe's analysis indicates basal arch width 40%.

Cephalometric analysis revealed skeletal class I with ANB of 02 degree and FMAof 23 degree.

MANAGEMENT

Treatment plan: Molar Distalization using Pendulum Appliances followed by fixed mechanotherapy with preadjusted edgewise mechanics following MBT prescription while holding the molars indistal position by Nance button.

Table 1: Pre-treatment and post-treatment parameters.

Parameters	Pre-treatment	Post-treatment
SNA	79 degree	81 degree
SNB	77 degree	78 degree
ANB	2 degree	3 degree
FMA	23 degree	25 degree
IMPA	91 degree	91 degree
1 to NA	20 degree/2mm	25 degree/4mm
1 to NB	18 degree/1.5mm	20 degree/ 2mm
Distal to pterygoid vertical	19 mm	17 mm
Facial angle	85 degree	86 degree

Figure 1: Pre-treatment extra-oral photographs.

Figure 2: Pre-treatment intra-oral photographs.

Figure 3: Intra-oral photographs with Pendulum appliance.

Reactivation of Appliance

Although the Pendulum springs can be activated intraorally, it is much more efficient to preactivate them before appliance placement. If significant distal molar movement is required, the springs should be bent parallel to the midline of the palate (or perpendicular to the body of the appliance). The molar bands are cemented without the springs engaged, and the anterior portion of the appliance is then cemented in place. If the appliance is to be bonded rather than banded, a syringe can be used to dispense the adhesive over the rests on the appliance, and the Nance button can be held in place with finger pressure while the adhesive sets. The patient was seen about every three weeks so the spring pressure can be checked. If reactivation is needed, the spring is removed from the lingual sheath. The centre of the helix was then held with a bird-beak plier, and the spring is reactivated by pushing it distally toward the midline.

It is then reinserted in the sheath. Once the molars have been moved distally, they must be stabilized in their new positions or they will rapidly drift back mesially.

DISCUSSION

This case report only discuss the 1st phase of treatment. At the end of the first phase molars were in super class I relation. Molar and incisor position was measured by radiograph. The purpose of the study by Acacio Fuziy[2] was to evaluate the skeletal and dental changes in patients who underwent distalization of their maxillary molars with pendulum appliances. The sample consisted of 31 patients (initial mean age, 14.58 years) with Angle Class II molar relationships and all permanent teeth up to the second molars. The maxillary molars were distalized with pendulum appliances for a mean period of 5.87 months. The pendulum appliance produced symmetrical expansion, with a rate of 1.04 mm per month on the right and 1.10 mm per month on the left. The pendulum appliance is effective for distalization of the maxillary molars and the establishment of a Class I molar relationship in a relatively short time. However, caution is needed to control collateral effects, including mesial movement of the first premolars and distal tipping of the molar crowns.

The prospective clinical study by Fernanda Angelieri et al[3] analyzed the distalization of maxillary molars achieved by the pendulum appliance and its effect on the anchorage teeth during and after fixed orthodontic treatment. The pendulum appliance moved the maxillary molars distally, but with significant distal inclination, protrusion of the anterior teeth, and increase in lower anterior facial height (LAFH) due to the clockwise mandibular rotation. After fixed orthodontic treatment, the maxillary incisors and the maxillary first premolars and first molars were returned to their pre-treatment anteroposterior positions. Thus, at post-distalization, there was 2.1 mm of protrusion of the maxillary first molars, despite the anchorage reinforcement (Nance button and cervical headgear worn at night during fixed appliance therapy). However, at the end of treatment, all patients had Class I molar relationships. The pendulum appliance followed by fixed orthodontic treatment corrected the Class II sagittal relationship, especially due to the dentoalveolar changes secondary to the spontaneous mandibular growth in the anterior direction during fixed appliance treatment.

To obtain an effective and compliance-free molar distalization without an anchorage loss, Kircelli et al[4] 2006 designed the bone-anchored pendulum appliance (BAPA). The aim of this study was to evaluate the

stability of the anchoring screw, distalization of the maxillary molars, and the movement of teeth anterior to maxillary first molars. A conventional pendulum appliance was modified to obtain anchorage from an intraosseous screw instead of the premolars. The screw was placed in the anterior paramedian region of the median palatal suture. Skeletal and dental changes were measured on cephalograms, and dental casts were obtained before and after distalization. The premolars tipped significantly distally. No anterior incisor movement was detected. The BAPA was found to be an effective, minimally invasive, and compliance-free intraoral distalization appliance for achieving both molar and premolar distalization without any anchorage loss.

CONCLUSION

There are a number of options for intentional molar distalization, an effective method of treatment for class II malocclusions characterized by maxillary dentoalveolar protrusion. Both extra and intraoral appliances require patient compliance, which may sometimes create difficulty. Intermaxillary appliances that use the mandibular arch as anchorage may have protrusive effects on the mandibular teeth. All investigations that have evaluated intraoral arch noncompliance appliances for molar distalization have come to surprisingly similar conclusions on the behaviour of both the distal segment and the anterior anchor unit. The intramaxillary arch appliances that have gained in popularity because they do not require patient compliance to distalize molars, show loss of anchorage whereby the premolars move mesially with concomitant protrusion of the maxillary incisors. This suggests that no matter which intraoral appliance is used, it behoves the clinician to avoid round tipping in retraction of maxillary anterior teeth. Headgear is perhaps the most useful appliance for maxillary molar distalization if used in the early treatment of class II malocclusions. The Temporary Anchorage Device[5] is a new and viable modality for distalizing maxillary and mandibular molars because it uses stable and strong anchorage units. It enables not only single molar distalization but also en-masse movement of the maxillary or mandibular buccal segments with only minor surgery for placing the titanium anchor plates at the zygomatic buttresses or at the anterior border of the mandibular ramus or the mandibular body.

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