MAXILLARY FIRST MOLAR DISTALIZATION WITH THE FROG APPLIANCE: A CASE REPORT

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ABSTRACT

Traditional upper molar distalization techniques require patient co-operation with the headgear or elastics. Recently, several different intraoral procedures have been introduced to minimize the need for patient co-operation. Distalizing maxillary first molars is often an objective in treatment plans involving Class II malocclusions and is sometimes indicated for non-extraction treatments with maxillary crowding. Patient compliance becomes a factor in choosing effective orthodontic appliances. In recent years various appliances that do not require patient compliance have been developed to drive maxillary molars distally. Some of these appliances produce unwanted tipping of the maxillary molars and a tendency to create crossbites if not properly adjusted. Therefore, we want to present a case that presented in the clinic of Orthodontics and dento-facial orthopedics in the Ambulatory Pediatric Dentistry in Iasi. L.S., patient aged 12 years presenting for aesthetic and functional disorders. On examination extraoral facial changes occur hyperdivergent profile. Clinical examination reveals intraoral Angle Class I molar malocclusion, anterior deep bite, mesial inclination of the lower left permanent molar. Upper canines teeth are erupting buccally, due to lack of space. OPT examination and anamnesis revealed reduction the space for the lower left second premolar and for the lower right canine probably due to premature loss of second primary molar and primary canine. Indicate a slight lateral cephalometric skeletal Class II (∠ABN inv. = 5.040) with a hyperdivergent profile ∠GoGn/SN=360. We wanted a non-extraction treatment except the 3rd molars. The treatment plan included distalization of the upper first molars bilaterally followed by a palatal expander and a full fixed appliance therapy. For the lower arch we applied a lip-bumper for moderate arch expansion and for lower molars distalization. For the upper molar distalization, a new system, the Frog Appliance, was constructed and applied. Lateral cephalometric radiographs were used to evaluate the treatment results. It was obtained an over distalization of the first molars after 10 months of treatment because the patient missed the subsequent checks. The lower lip-bumper was not carried. According to the results of the cephalometric evaluation, a nearly bodily distal molar movement was attained. It was reapplied lip bumper and a palatal expander. The patient is still in treatment. In conclusion, the Frog Appliance was found to be effective, non-invasive appliance for achieving bilateral molar distalization, but the patients should be more motivated to come to check up.

Keywords: Frog appliance, molar distalization

INTRODUCTION

Traditional upper molar distalization techniques require patient co-operation with the headgear or elastics. Recently, several
different intraoral procedures have been introduced to minimize the need for patient co-operation [1].

Distalizing maxillary first molars is often an objective in treatment plans involving Class II malocclusions and is sometimes indicate for non-extraction treatments with maxillary crowding [2]. **Patient compliance** has become a factor in choosing effective orthodontic appliances. In recent years various appliances that do not require patient compliance have been developed to drive maxillary molars distally. Some of these appliances produce unwanted tipping of the maxillary molars and a tendency to create crossbites if not properly adjusted [3].

Intra-oral distalization techniques such as pendulum appliance, Jones Jig, and distal jet are frequently used in this fashion. Many clinical studies substantiated the effectiveness of these appliances [4-14]. A new system - Frog Appliance, Forestadent, Pforzheim, Germany- for upper molar distalization has been developed. The purpose of this article is to present a clinical situation of this system in the treatment of maxillary crowding.

**CLINICAL CASE**

Therefore we want to present a case that presented in the clinic of Orthodontics and dento-facial orthopedics in the Ambulatory Pediatric Dentistry in Iasi. L.S. patient aged 12 years presenting for aesthetic and functional disorders.

The extra-oral examination (fig. 1) revealed an oval shape of the face, a mesocephalic head shape, a mesoprosopic face, a mild convex profile. Facial changes occur hyperdivergent profile and an acute naso-labial angle. The smile was unaesthetic. The patient showed a good range of mandibular movements and no temporomandibular-joint symptoms.

![Figure 1. Extraoral aspect - before treatment](image)

**Clinical examination** (fig. 2) reveals intraoral Angle Class I molar maloclusion, anterior deep bite, mesial inclination of the lower left permanent molar. Upper canines teeth are erupting bucally, due to lack of space.

The space for the canine alignment was decreased. Both upper and lower arches were asymmetric. The discrepancy in the upper arch was **9 mm** and in the lower arch was **11 mm**.

**OPG examination and anamnasis** revealed reduction the space for the lower left second premolar and for the lower right canin probably due to premature loss of second primary molar and primary canine. Also, are seen only wisdom tooth in quadrant IV (fig. 3).

**Cephalometric measurements** of the patient indicate a slight skeletal Class II (Δ
ANB inv. = 5.040) with a hyperdivergent profile $\angle$GoGn/SN=360 (Fig. 3).

Figure 2. Intraoral aspect- before treatment

Figure 3. OPG and Cephalometry- before treatment

TREATMENT ALTERNATIVES
The patient’s chief concern was the upper and the lower arch crowding. There were two treatment alternatives for this case because the patient did not want to wear an extraoral appliance: (1) distalization of upper and lower molars using an intraoral appliance [15] or (2) extraction of four first premolars, and fixed orthodontic treatment [16].

Figure 4. Intraoral aspect- after application of orthodontic appliances
The patient accepted a non extraction treatment except the 3rd molars. The treatment plan included distalization of the upper first molars bilaterally followed by a palatal expander and a full fixed appliance therapy. For the lower arch we applied a lip-bumper for moderate arch expansion and for lower molars distalization. For the upper molar distalization, a new system, the Frog Appliance (fig. 4) was constructed and applied.

**RESULTS**

After 10 months of treatment it was obtained an over distalization of the first molars because the patient missed the subsequent checks. Lip bumper was not worn enough as it was lost.

Basically the patient returned to the clinic because of the 25 composite fell. In the upper arch has been obtained as a surplus of $+2.2 \text{ mm}$. In the lower arch space deficiency reached at $-9.1 \text{ mm}$ (fig. 5).

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**Figure 5. Intraoral aspect - after 10 months of treatment**

**Figure 6. OPG and Cephalometry - 10 months of treatment**

**Figure 7. Intraoral aspect - after 10 months of treatment**
Lateral cephalometric radiographs were used to evaluate the treatment results. After distalization, cephalometric analysis using Onyx CephR software revealed that the maxillary first molars were moved 3.09 mm (according to PTV) and tipped 30° (according to ANS/ PNS) distally. As for anchorage loss, the upper central incisors exhibited a mesial movement of 2 mm, associated with a proclination of 5° (Table 1, fig. 6).

It was reapplied lip bumper and a palatal expander. A segmentar fix orthodontic was applied. The patient is still in treatment (fig. 7).

**DISCUSSIONS**

Several methods exist for the correction Class I with crowding or Class II malocclusion. It was therefore made a classification appliances according to the degree of acceptance by the patient—compliance or noncompliance applitances-. Compliance-dependent appliances such as headgear or removable plate appliance were traditionally used for upper molar distalization in treatment of Class II malocclusions [17].

For over a decade, various innovative noncompliance intraoral molar distalization appliances have been described. These appliances derive their anchorage in an intramaxillary manner and act only in the maxillary arch to move molars distally: eg, the pendulum appliance, the sectional jig assembly, the distal jet, the Keles slider[4-14].

One of the important goals of molar distalizing therapy is to obtain bodily tooth movement of the molars with minimal rotation and distal inclination [18]. The Frog
appliance was positioned approximately 10 to 12 mm apically to the occlusal surface of the maxillary molar with parallel orientation to the occlusal plane in our case. In this manner, a vector of effective force passing through the centre of resistance of the first molar was obtained [19].

In the current case, the correction of the Class I molar with crowding originally wanted the permanent molars distalization thus obtaining the necessary space arch alignment of ectopic canines. In the lower arch still opted for molars distalization using lip-bumper. However, the patient presented proved noncompliant, missing the routine checks-up. It obtained a distalization 3 mm and 3 degrees of distal tip of upper first molars [20].

Previous studies have indicated that the pendulum appliance produces a molar distalization between 3.14 and 6.1 mm and the distal jet appliance a molar distalization of 2.1 - 3.2 mm. The distal jet produces a molar distal tip of 1.8 – 5 degrees far away from pendulum whose distal tip varies from 8.4 to 15.7 degrees [3,4,11,13].

And in terms of loss of anchorage results are similar. In the case presented was obtained a loss of anchorage translated by mesialization of the upper incisors by 2 mm-and a tip forward of 5 degrees. Mehmet Bayram in his previous article obtained similar results - an incisors mesial movement of 2 mm, associated with a proclination of 4 degrees [21].

CONCLUSION
In conclusion, the Frog Appliance was found to be effective, non-invasiv appliance for achieving bilateral molar distalization, but the patients should be more motivated to come to check up, not transforming thus a non compliance-dependent appliances in an ineffective one.

REFERENCES
13 Gulati S, Kharbanda OP, Parkash H. Dental and skeletal changes after intraoral molar distalization