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Use of pendulum for molar distalization: Case report

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Abstract

A 16-year, old female patient, presented with the chief complaint of highly placed canines and irregular teeth. On examination and analysis of relevant records, he was diagnosed as an Angle's Class II malocclusion on an underlying Class I skeletal base, severely crowded maxillary arch with high labially placed canines. She was treated with a nonextraction treatment plan that involved bilateral maxillary molar distalization using Hilgers pendulum appliance followed by fixed mechanotherapy. The posttreatment results were highly satisfactory showing improvement in facial esthetics and occlusal traits as well as good long-term stability.

Keywords: Pendulum, distalization, fixed mechanotherapy

Introduction

Pendulum appliance was described in 1992 by Dr. James Hilgers as an appliance aimed at correcting certain malocclusions with minimal help from the patient. The use of intraoral appliances has been developed since the 80's^[1] as an alternative to extraoral^[2-6] and removable appliances^[7-9]. An option for creating space or correcting class II relationships in the maxillary arch is to move the molars distally. It is important to bear in mind that due to its own characteristics, mouth opening is performed on the condylar axis, so that if we need to distalize one or several molars we must consider the following effects:

- Distalization produces a downwards and backwards mandibular rotation, in a clockwise direction.
- It increases facial convexity angle.
- It increases anterior facial height, particularly the lower third.
- Distalization increases the mandibular plane angle with respect to the base skull.

These effects may be extremely favorable in those patients with deep bite but counterproductive in patients with open bite so these factors have to be carefully considered when performing distalization. Careful study of the characteristics and growth patterns in young patients has to be performed when planning the case.

Indications for performing unilateral or bilateral molar distalization are very specific^[10]:

- Class I with crowding and slight or non-severe protrusion
- Dental Class II caused by mesialization of the upper molar due to loss of space either by early loss of the temporary second molar or loss of anchorage during some phase of orthodontic treatment. When deciding on the extraction of the second permanent molar either by caries or by another cause, with anterior crowding and/or ectopic canine^[10].

Case Report

A 16 years old female patient attended Orthodontic Department at the government dental college Srinagar.

Extra-oral examination

- The face was europsopic with straight profile and straight divergence. Her chin was prominent with decreased lower anterior facial height and a low mandibular plane angle. Her smile esthetics was poor.

Intra-oral examination

- The soft tissues were normal with plaque and calculus in the anterior region.
- She had retroclined upper incisors with labially and highly placed upper canines.
- Crowded, asymmetrical and U-shaped maxillary and mandibular arches.
- Molar & premolar relation was Class II on right side and end-on on left side, canine relation was class II on right side and end-on on left side and incisors were in class I relation with an overjet of 1mm. The dental midlines were coincide



Fig 1: Pre treatment photographs

Diagnosis

- Skeletal Class I malocclusion characterized by orthognathic maxilla and orthognathic mandible with ANB angle of 4° with decreased lower anterior facial height and low mandibular plane angle. Straight profile, prominent chin with competent lips.
- Dental Class II malocclusion with crowded upper anterior teeth, labially placed canines.

Treatment Plan

The treatment plan was distalization of upper posterior tooth segments using pendulum appliance to create space for alignment of canines and to relieve crowding, obtain optimum overjet and overbite.



Fig 2: Hilgers Pendulum inserted

Composite Analysis

Table 1: Showing pre and post pendulum parameters

Parameter	Average value	Pre	Post
SNA	82	80	80
SNB	80	76	76
ANB	2	4	4
Up 1 to N-A(mm)	4 mm	3mm	5mm
Up 1 to N-A(angle)	22	17	23
Low 1 to N-B(mm)	4 mm	3mm	4mm
Low 1 to N-B(angle)	25	18	24
Mandibular plane angle	32	23	29
Y-AXIS	53 – 66	58	60
Gonial angle	128 ± 7	128	128
Jarabak ratio	62 – 65 %	63%	65%
Up 1 to SN	102	104	108
Up 1 to palatal plane	70 ± 5	78	75
WITS	1 mm	2mm	1 mm

Soft Tissue

Table 2: Soft tissue parameters

Parameter	MEAN	PRE	POST
S line to upper lip (mm)	0 ± 2mm	3mm	4mm
S line to lower lip (mm)	0 mm	1mm	2mm
Nasolabial angle	90 ± 110	100	110



Fig 3: Post Distalization photographs

Discussion

Byloff and Darendeliler¹ reported that the pendulum performs a movement of 1.02 mm (+ 0.68 mm) per month with an initial strength of 200 to 250 g [^{11, 12, 13}] proving that it is a more simple effective appliance in comparison to headgear traction using a force of 680 to 770 g on each side, in 6 months. In this case it took around 8 months for distalization using force of about 250g with 6 weeks activation.

Conclusions

The pendulum is an effective method for treating mild or moderate class II malocclusions through distalization of upper molars thus avoiding premolar extractions. In this case it was noted that molar distalization occurred in a bodily manner but there was also a slight proclination of the anterior teeth which was corrected during closure of the remaining spaces, with which all the objectives were accomplished.

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