

Management of Class II Malocclusion with Molar Distalization Using Pendulum Appliance: A Case Report

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ABSTRACT

Background: Class II treatment depends on many factors like etiology, diagnosis, age of the patient, severity of malocclusion and compliance of patient. Molar distalization is one of the methods that has been very useful for treating the patient with non-extraction approach. The aim of molar distalization should be maximum bodily movement of molars with minimum patient compliance. Various methods of distalization has been proposed, which includes conventional extra-oral appliances that requires patient compliance or intraoral appliance which require little or no patient co-operation. In this article we are presenting a case report of growing female patient with Angles class II malocclusion which was successfully treated by molar distalization using pendulum appliance.

Keywords: Class II malocclusion, Non extraction treatment, Molar distalization, Pendulum appliance.

INTRODUCTION

In orthodontics, mesial drifting of molars and disproportion between tooth and jaw size are frequently encountered reasons causing crowding and loss of space in maxilla and mandible. A clinician should consider growth patterns, spaces and other features such as facial profile and size of apical bases in planning the treatment. Borderline patients are challenging in orthodontic treatment, where low angle cases and maxillary deficiencies are indications for non-extraction therapy. Molar distalization especially in maxilla can be considered as one of the challenging treatment procedures in orthodontics for which, either one of the conventional approaches such as extra oral anchored head gear device or intra oral appliances like repelling magnets, superelastic NiTi coil springs, Jones-jig and distal-jet can be applied¹⁻⁴.

The traditional approach to distalize molars, especially in maxilla, is extraoral traction. The advantage of this method is stability of extraoral anchorage with fewer side effects on the non-distalize teeth. Historically Angle⁵ used extra oral traction of many designs to distalize the molars, later Tweed⁶ continued same technique but with addition of intermaxillary elastics to resolve the class II situation. In 1970's Bernstein⁷ described ACCO (Acrylic resin cervico occipital) appliance, a cross between removable plate appliance with pendulum springs and cervical or occipital headgear. Wilson appliance⁸ (Rocky mountain orthodontics, Denver) was introduced in 1980's, in which the distalization of the molars was carried out with compression springs and the patient had to wear the class II elastics to prevent loss of anchorage. In spite of successful distalization with these extraoral appliances, they are not much

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Fig 1: Pre treatment intraoral and extraoral photographs.



Fig 2: Pendulum appliance in upper arch and lip bumper in the lower arch.



Fig 3: Post distalization intraoral photographs.



Fig 4: Post treatment intraoral and extraoral photographs.

acceptable for the patients because of esthetic concerns.

Starting from early 1990's, devices and therapeutic approaches focus increased on options for correcting malocclusion where patient co-operation could be almost circumvented. One such method of molar distalization that requires minimal patient co-operation is pendulum appliance system described by Hilgers⁹ in 1992. It is a hybrid appliance that uses a large nance acrylic button in the palate for anchorage, along with 0.32" TMA springs for molar distalization. In this case report we have fabricated pendulum appliance for non-extraction treatment of class II malocclusion with severe crowding of upper anteriors and lip bumper in the lower arch to relieve the lip trap and facilitate the correction of crowding. After successful treatment for a period of 18 months we have achieved an ideal class I occlusion.

CASE REPORT

A 11 year old female patient reported to the Department of Orthodontics and Dentofacial Orthopedics, SVS Institute of dental sciences, Mahabubnagar with chief complaint of irregularly placed upper front teeth. Extra oral examination revealed mesoprosopic facial form, orthognathic profile, potentially competent lips (interlabial gap of 3mm) with lip trap. On smile patient showed 3mm of gingival display whereas at rest half of the clinical crown was exposed with short upper lip (18mm). Intraoral examination exhibits bilateral class II molar relationship, labially erupting upper canines, lower anterior crowding with retained lower left deciduous second molar (Fig 1). Cephalometric analysis showed skeletal class I jaw basis (ANB 2°, Witts appraisal of 2mm) with normodivergent growth pattern (FMA, 26°; Go-Gn-SN, 34°), upright upper incisor (UI-NA, 25°/5mm; UI-SN, 102°) and mild retroclination of lower incisors (LI-NB, 21°/3mm; IMPA, 88°). All the second molars were erupting. Skeletal maturity indicators showed the peak of the growth spurt.

Diagnosis & Treatment plan

Patient was diagnosed as Angles class II malocclusion with upper and lower anterior crowding on skeletal class I jaw basis with normodivergent growth pattern, having potentially

incompetent lips with short upper lip. Treatment objectives for this patient were (1) to achieve bilateral class I molar and canine relationships, (2) relieve crowding of upper and lower anteriors, (3) to achieve coinciding midline, (4) to obtain ideal overjet and overbite. Considering the growth status of the patient, clinical and cephalometric analysis the treatment plan was decided as non-extraction therapy, i.e. distalization of molars using Pendulum appliance in upper arch and lip bumper to relieve the lip trap and to allow the correction of lower crowding.

Treatment progress

The treatment began with placement of pendulum appliance in the upper arch for bilateral molar distalization and lip bumper in the lower arch (Fig 2). Activation was done for a period of 6 months until super class I molar relation was achieved on both sides (Fig 3). Upper and lower pre-adjusted appliance (MBT 0.022"X0.028") was used to level and align the arches using 0.014 NiTi, 0.016 NiTi. During the fixed appliance phase bands on the premolar teeth were removed and the rest of the pendulum retained as it serves the function of TPA. A canine extrusion spring (0.017" X 0.025" TMA wire) was used for extrusion and retraction of maxillary right canine for a period of three months. Finishing and detailing was done with 0.014" SS wire using red elastics in triangular fashion. Upper and lower fixed retainers were given. Post treatment results showed bilateral class I molar and canine relationships, coinciding dental midline with ideal overjet and overbite (Fig 4). Cephalometric analysis and superimposition revealed that mild proclination of upper incisors (UI-NA, 28°/6mm; UI-SN, 110°), uprighted lower incisors (LI-NB, 26°/6mm; IMPA, 98°) and mild increase in the lower anterior facial height (Table 1). Bilateral molar distalization of 5mm (Ptm-U6) was achieved in upper arch on both sides, whereas in lower arch molars became upright.

DISCUSSION

Case report presented in this article gives an idea that the pendulum appliance is effective in moving the maxillary first molars distally to obtain a class I molar. Many clinical studies¹⁰ and documented case reports¹¹ in recent years have showed successful clinical application of various

Table 1: Pre and Post treatment cephalometric values.

Parameters	Normal	Pre-Rx	Post -Rx
SNA	82°	74°	75°
SNB	80°	72°	72°
ANB	2°	2°	3°
AO to BO	0-1 mm	2mm	1mm
F-M-A	25°	26°	28°
Go-Gn-SN	32°	34°	36°
UI-NA °/ mm	22°, 4mm	25°, 5mm	28°, 6mm
UI-SN	102°	102°	110°
LI- NB °/ mm	25°, 4mm	21°, 3mm	26°, 6mm
LI-MP (IMPA)	90°	88°	98°
LI-FH (FMIA)	65°	60°	48°
Ptm-U6	Age+3mm	16mm	11mm
Nasolabial angle	102°	102°	100°

pendulum appliances. It is readily adapted to a phase I mixed dentition treatment plan to regain space lost by premature exfoliation of deciduous second molar. General dento-alveolar changes observed with pendulum appliance consisted of maxillary molar extrusion with significant distal crown tipping, distal movement of molars¹², an increase in overjet and decrease in overbite. Some studies have detected increase in facial height where as others detected little or no increase¹³. Lip bumper was used in the mandibular arch to not only increase the mandibular dental arch perimeter through lip pressure causing molar distalization but also to eliminate pressure from lip and cheek musculature, resulting in anterior movement of permanent incisors and expansion of dental arch. Other uses of this appliance include anchorage, correction of lip habits and improvement of retention and stability.

As the patient was in growing phase (mixed dentition with permanent canines and premolars in erupting stages), 5 mm of maxillary molar distalization was successfully carried out in the span of approximately six months, as previously reported in recent studies⁸. Second molar in the budding stage acts as a fulcrum during the distalization of the mesial tooth and it was proved in previous studies¹⁴ that tipping of the first molar was much more pronounced in such situation. Moreover there were studies conducted by Byloff et

al⁸, Gosh and Nanda¹⁵ showing little importance of position of second molar in the distalization of first molar. Even though the nance button was used for anchorage purpose an increase in overjet and proclination of the upper incisors was noticed, in this patient (UI-SN: 110°). No significant difference was found in sagittal and vertical skeletal relationships between pre and post treatment. Overall the desired results were obtained in the patient without opting the extraction therapy using pendulum appliance for distalization of molars.

CONCLUSION

Patient cooperation is crucial to the success of most orthodontic therapies. Pendulum appliance is one of the best compliance free method of molar distalization in young patients. As this patient showed ideal indications of molar distalization, it was successful treating the patient with pendulum appliance resulting in ideal occlusion.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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