

Molar Distalization with Modified Pendulum Appliance in Treatment of Class II subdivision Malocclusion – A case report

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Abstract : A 13 year old female patient presented with the chief complaint of highly placed canines and irregular upper and lower front teeth. On examination she 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, mild crowding in mandibular arch, with slightly convex profile, and normal nasolabial angle. She was treated with a nonextraction treatment plan that involved bilateral maxillary molar distalization using modified Hilgers pendulum appliance followed by fixed mechanotherapy. The posttreatment results were highly satisfactory showing improvement in facial esthetics and occlusal relations as well as good long-term stability as was evident in the 1-year follow-up.

Keywords: molar distalization, pendulum appliance, class II molar relation.

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I. Introduction

For more than 100 years, soon after the practitioners recognized that orthodontic treatment can influence the patient's profile and esthetics, the extraction of teeth in orthodontics has been a matter of debate. Recent studies of extraction vs nonextraction treatment have focused on the profile effects of these treatments.¹

Nonextraction treatment of class II malocclusion sometimes require distalization of maxillary molars into class I relationship.²⁻⁴ Most traditional approaches for molar distalization include extraoral traction, Wilson distalization arches, removable appliances which require patient compliance.⁵⁻⁷ Another popular appliance for distalization which is intraoral, non-compliant, easy to fabricate, cost effective and can be easily modified is the Hilgers Pendulum.⁸ Introduction of the pendulum appliance by Hilgers in 1992 made it a popular method used for gaining space in the maxillary arch.^{9,10}

The indications for the pendulum appliance are: (1) First phase of orthodontic treatment for unilateral or bilateral distalization of maxillary first molar teeth for correction of Class II molar relationship in non-compliant patients; (2) Space regaining in cases of mesial drift of upper first molars due to early loss of primary molars; and (3) Non-extraction treatment of mild to moderate crowding.¹¹

This case report describes nonextraction treatment of crowded maxillary arch with buccally blocked out canines and class II molar relation by distalization into class I molar relation with pendulum appliance.

II. Case Presentation

A 13 year old female patient, presented with the chief complaint of high labially placed upper canines and irregular lower front teeth. Both medical and dental histories were nonsignificant.

On examination she presented with end on molar relation on left side and class I molar relation on right side on a Skeletal I base, acceptable profile and normal nasolabial angle. Patient exhibited fair oral hygiene and periodontal health. Intraorally all permanent teeth had erupted except the third molars. The upper arch showed crowding with buccally erupted canines, while the lower arch showed crowding of 2mm and a mild curve of Spee. Upper left central incisor was fractured, checked for pulp vitality and was considered for restoration. The relationship of the upper and lower arches showed normal overjet and overbite with upper midline shifted towards left by 1.5 mm (Fig-1).



Fig 1 – Pretreatment Extraoral and Intraoral Photographs

2.1 Radiographic examination

2.1.1 Panoramic radiograph – Panoramic radiographic examination revealed the presence of all the permanent teeth and developing tooth germs of maxillary third molars. The alveolar bone levels and root morphologies of the teeth were normal. Periapical region of lower right first premolar showed radiopacity with normal PDL space. The tooth was asymptomatic clinically with normal pulp vitality, for which patient was informed. Temporomandibular joint space appeared optimal with normal size, shape, and position of condyle heads (Fig-2).

2.1.2 Cephalometric examination – cephalograms were taken at natural head posture and demonstrated a skeletal Class I relationship, normal lower anterior facial proportion and normal maxillary-mandibular plane angle and upper incisors were upright. (Fig-2)

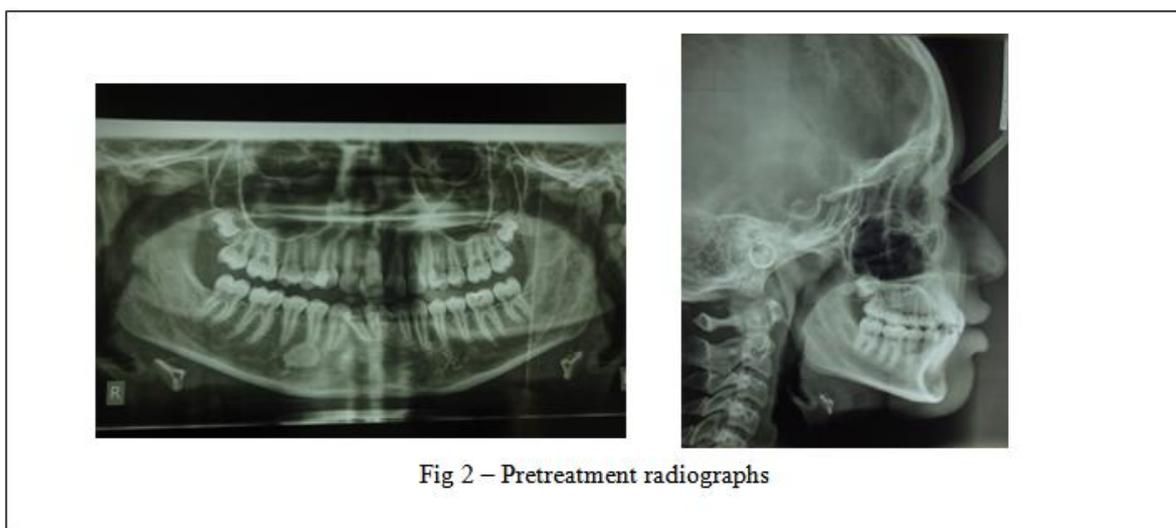


Fig 2 – Pretreatment radiographs

2.2 Treatment Objectives

- To maintain profile and achieve soft tissue balance and harmony
- To correct crowding with upper and lower anteriors
- To establish normal overjet and overbite
- To correct end on molar relation and establish class I buccal segment relation
- To correct midline discrepancy

2.3 Treatment Plan

Considering the patient's willingness to not undergo any extraction, growth status, average growth pattern and acceptable facial profile, it was decided to treat the patient with a nonextraction treatment approach with the help of maxillary molar distalization to open up space for the labially placed maxillary canines and simultaneously correct the end on molar relation. Appliance - Pendex appliance for maxillary molar distalization followed by fixed mechanotherapy with preadjusted edgewise appliance (MBT Prescription, 0.018" slot).

2.4 Treatment Progress

Treatment was started with the maxillary first molars banding followed by alginate impression for the laboratory fabrication of the modified pendulum appliance. After the fabrication of the appliance, it was cemented with the desired activation as suggested by Hilgers. Activation was kept more on left side as compared to right because of end on molar relation on left and midline discrepancy. Molar distalization phase continued for 6 months till Class I molar relation with some overcorrection was achieved (Fig-3). After the completion of the distalization, the pendulum appliance was removed, and a Nance palatal button was given on the next day as anchorage reinforcement. Fixed mechanotherapy was started using preadjusted edgewise appliance, MBT prescription 0.018" slot. After the initial alignment of maxillary teeth, 0.018" special plus Australian archwire was given, with adequate space opening for the maxillary canines, piggyback 0.014" nickel-titanium (NiTi) archwire was used to move the canines occlusally. In the mandibular arch, alignment was started using 0.014" NiTi archwire and after adequate leveling and aligning in both the arches, upper and lower 0.017"×0.025" NiTi archwires were placed followed by 0.017"×0.025" SS archwires. Finally, the settling was done, active treatment lasted for 1.5 years after which fixed appliance was removed (Fig-3,4). Lingual bonded retainer of 0.0175" coaxial stainless steel wires were fixed immediately post debonding. Upper and lower impressions were made, and Hawley's retainers were also delivered. After 1yr of follow up teeth were in good buccal segment relationship with normal overjet and overbite (Fig-6).

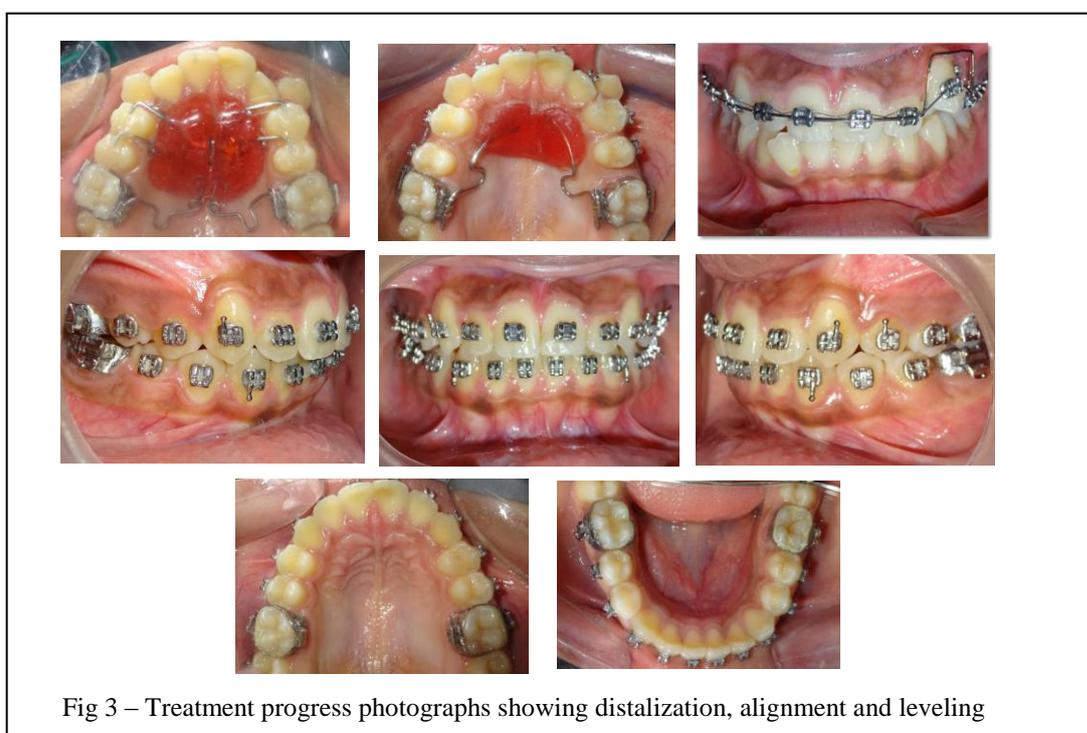


Fig 3 – Treatment progress photographs showing distalization, alignment and leveling

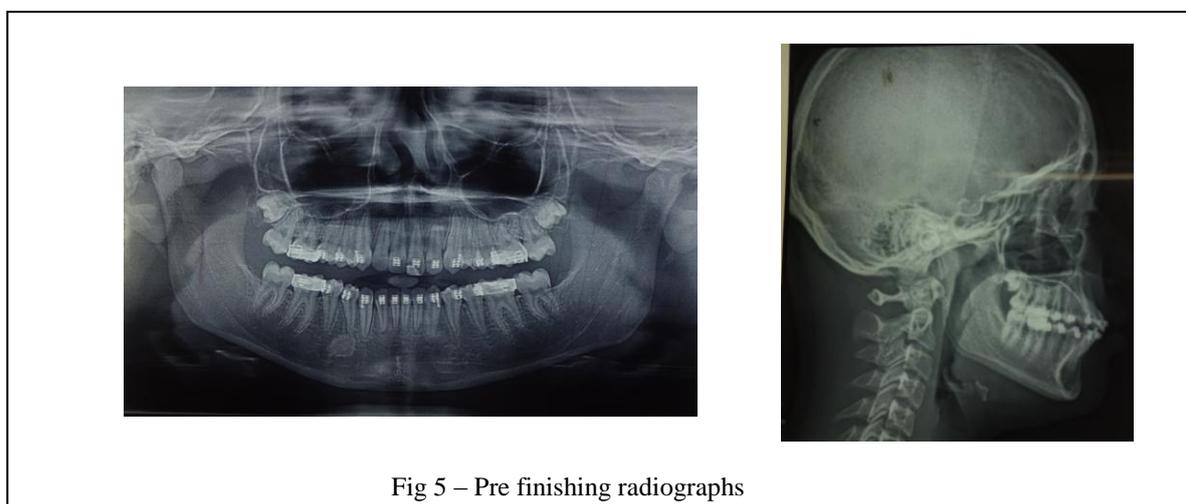
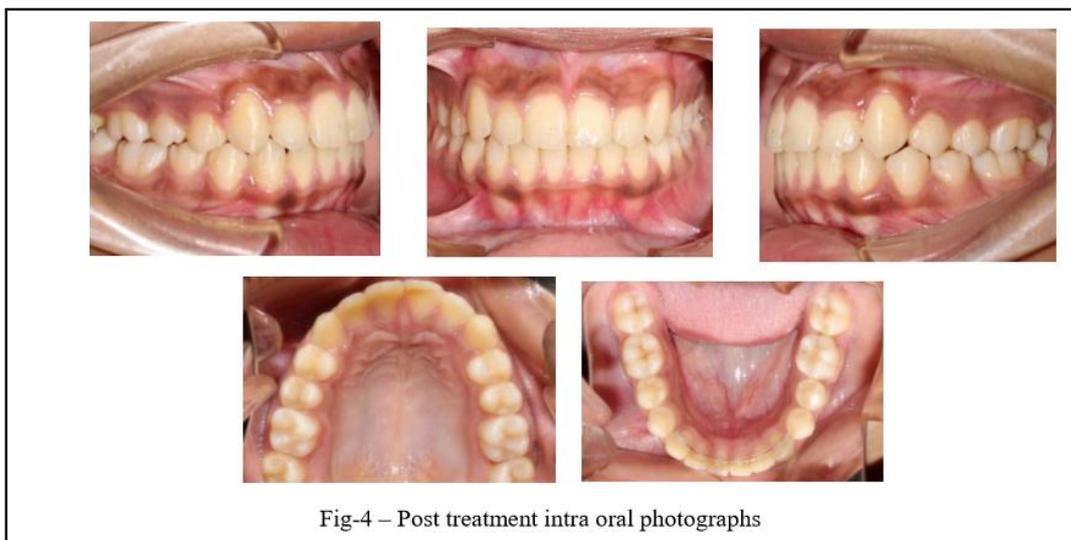
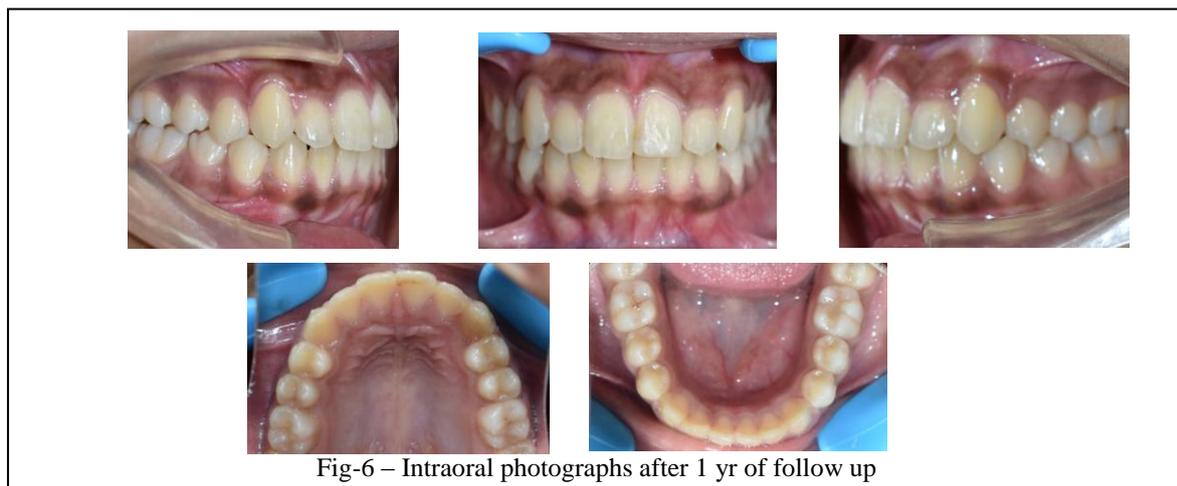


Table 1 Cephalometric findings

Variables	Standard	Pre treatment	Post treatment
SNA	82°±2°	78°	78°
SNB	80°±2°	75°	75°
ANB	2°	3°	3°
GOGN-SN	32°	32°	33°
U6 to Pt V	16	21	17
WITS APPRAISAL	0mm	0°	0°
U1-SN	102°±2°	94°	104°
U1-NA	4mm/22°	4mm/20°	6mm/25°
NASOLABIAL ANGLE	90-110°	103°	90°
U1-S LINE	0mm	-1mm	0mm



III. Discussion

Correct diagnosis and treatment planning are utmost important for successful treatment results. The present case had end on molar relation on left side with pleasant profile, average growth pattern, crowding in upper arch with buccally placed canines and upright incisors. Therefore, the patient was a good candidate for molar distalization considering the anchorage loss which usually occur with intraoral distalization which was favourable in this case.²

A randomized review on molar distalization suggested that intraoral appliances are more effective than extraoral appliances.¹² In the present case, a modified pendulum appliance was selected as it has advantages of minimal patient compliance, ease of fabrication, allow correction of minor transverse and vertical molar positions by adjustment of the springs and patient acceptance.¹¹

The present case required asymmetrical movement of the molars because of end on molar relation on left side with midline discrepancy for which the use of pendulum appliance proved to be a versatile option. Modest amount of overbite correction due wedge bite opening tendency of the appliance.^{13,14} Soft tissue profile was maintained throughout the treatment. Post treatment cephalometric findings were favorable and opg showed good root parallelism which ensures stability, the same radio opacity with lower right first premolar without any change in size, clinically the tooth was asymptomatic without any swelling and patient was asked for follow up. (Fig-6). The patient was explained about the need for removal of maxillary third molar with absent mandibular third molars, but patient was not willing for any extraction, so was asked for follow ups. The 1 yr follow up of the case showed good buccal segment relation, coinciding midline and normal function suggesting of successful treatment results.

IV. Conclusion

Planning a treatment and selection of appliance is based on critical decision making. The modified pendulum appliance in the present case was effective in achieving the treatment goals and is considered to be the effective method in treatment of mild to moderate class II malocclusion.

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