

## Case Report

# Noncompliant way of maxillary molar distalization

### ABSTRACT

An 11-year-old female patient presented with a chief complaint of labially blocked out maxillary canines and irregular teeth in the upper arch. Clinical examination and evaluation revealed an Angle's Class II malocclusion on an underlying Class II skeletal base with a crowded maxillary arch, blocked out maxillary canines, mild crowding in the mandibular arch, convex profile, and obtuse nasolabial angle. Her skeletal maturity status was Stage III of the cervical vertebrae maturity index (CVMI). A nonextraction treatment plan was considered for this case, which involves bilateral permanent first molar distalization of the maxillary arch using Jones jig distalizer followed by fixed orthodontic mechanotherapy using 022 MBT prescription. The posttreatment outcome shows an appreciable improvement in facial esthetics and occlusion. Further postorthodontic phase has retained a stable occlusion and pleasing facial profile.

**Keywords:** Class II malocclusion, Jones jig distalizer, molar distalization, nonextraction treatment

### INTRODUCTION

The goals of orthodontic treatment involve achieving a good facial profile and a long-lasting stable occlusion. There are various ways to achieve these objectives, which are broadly categorized as extraction or nonextraction treatment protocols and are based on the clinical presentation of malocclusion and information derived from essential and nonessential diagnostic aids. Judgment for a customized treatment plan for any given case depends on the malocclusion with which the patient present and the treating clinician's wisdom. There is no single treatment plan, which holds for most of the cases. The extraction method of orthodontic treatment does not hold well with all clinical situations. A recent paradigm shift of orthodontic treatment from hard tissue toward soft tissue resulted in orthodontists becoming more attentive with extraction treatment plans and exploring possible nonextraction treatment approaches.<sup>[1]</sup> Maxillary molar distalization is one such method. Contemporary upper molar distalization techniques require patient cooperation with the headgear or elastics.<sup>[2,3]</sup> Patient compliance is a very critical factor in choosing effective distalization appliances.

The focus has recently shifted toward appliances that do not require patient compliance for effective maxillary molars distalization. These promising appliances do have some shortcomings, and one of the most common unwanted side effects is tipping of the maxillary molars along with a tendency to develop crossbite if not properly adjusted in sagittal and transverse dimension.<sup>[4,5]</sup>

### CASE REPORT

#### Section I: Pretreatment assessment

##### History and clinical examination

An 11-year-old female patient presented with the chief complaints of labially blocked out maxillary canines and

**N. IBEMCHA CHANU, KULDEEP PHUKON, TRILOKYA BHARALI, JITENDRA SHARAN<sup>1</sup>**

Department of Orthodontic and Dentofacial Orthopedics, Regional Dental College and Hospital, Guwahati, Assam,

<sup>1</sup>Department of Dentistry, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India

**Address for correspondence:** Dr. Jitendra Sharan, Department of Dentistry, All India Institute of Medical Sciences, Sijua, Bhubaneswar - 751 019, Odisha, India.  
E-mail: jsbmds@gmail.com

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Figure 1: Pretreatment extra and intra-oral photographs (a-c) Extras oral photographs; (a) frontal view-at rest, (b) frontal view-smiling, (c) profile view, (d-h) Intraoral photographs, (d) right molar relation, (e) overbite, (f) left molar relation, (g) maxillary occlusal view, (h) mandibular occlusal view

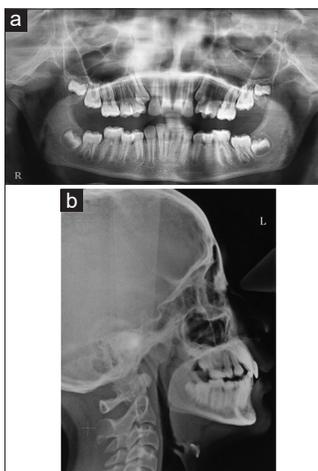


Figure 2: Pretreatment radiographs. (a) Orthopantomogram, and (b) Lateral cephalogram

irregular teeth. Both medical and dental histories were nonconclusive. Extraoral examination revealed a mesofacial symmetrical face, convex profile, and low mandibular plane angle with a flat smile, obtuse nasolabial angle, and normal mentolabial sulcus [Figure 1]. The functional examination has revealed a normal temporomandibular joint and an optimal degree of various mandibular movements. The intraoral examination revealed a permanent dentition except for the maxillary canines, all second and third molars.

Oral hygiene was good, and periodontal health was good. Permanent first molars were in Angle's Class II relationship bilaterally. Maxillary arch showed labially erupting canines, mild crowding in the mandibular arch with deep curve of spee. Maxillary right first bicuspid and left second bicuspid were in crossbite.

#### General radiographic examination

Panoramic radiographic examination revealed all the permanent teeth and developing tooth germs of all the third molars [Figure 2]. The alveolar bone levels and root morphologies of the teeth were normal. Temporomandibular joint space appeared optimal with normal size, shape, and position of condyle heads. The cephalometric evaluation revealed skeletal Class II jaw bases, horizontal growth pattern, retroclined maxillary incisors, mild proclination of mandibular incisors, convex profile, obtuse nasolabial angle, and protruded upper lip [Figure 2 and Table 1]. Skeletal maturity was assessed by cervical vertebral maturation index (CVMI) staging, which showed CVMI Stage III.

#### Diagnosis

The 11-year-old growing female patient presented with Angle's Class II malocclusion on a Class II skeletal bases with horizontal growth pattern, crowded maxillary arch,

retroclined maxillary incisors, proclined mandibular incisors, convex facial profile, the deep curve of spee, crossbite of maxillary right first bicuspid and left second bicuspid, convex profile, and obtuse nasolabial angle.

#### Treatment objectives

- To correct the skeletal base relationship
- To relieve maxillary and mandibular crowding
- To achieve bilateral Class I molar relationship
- To correct upper incisor inclination
- To establish normal overjet and overbite
- To correct the convex profile and achieve soft-tissue balance and harmony.

#### Treatment plan

The patient's skeletal maturity status (i.e., CVMI III) was suggestive of a good amount of remaining potential growth. In the mandibular arch, lower incisors were slightly proclined. Considering the patient's growth status and horizontal growth pattern, it was decided to treat the patient with a nonextraction treatment approach with bilateral maxillary molars distalization to open up space for the labially placed maxillary canines and to achieve the Angle's Class I molar relation.



Figure 3: Insertion of Jones Jig distalizers on appliance. (a) right molar relation, (b) left molar relation, (c) maxillary occlusal view



Figure 4: Extent of maxillary molar distalization by Jones Jig appliance, (a) At the time of cementation (b) In treatment and (c) Completion of distalization

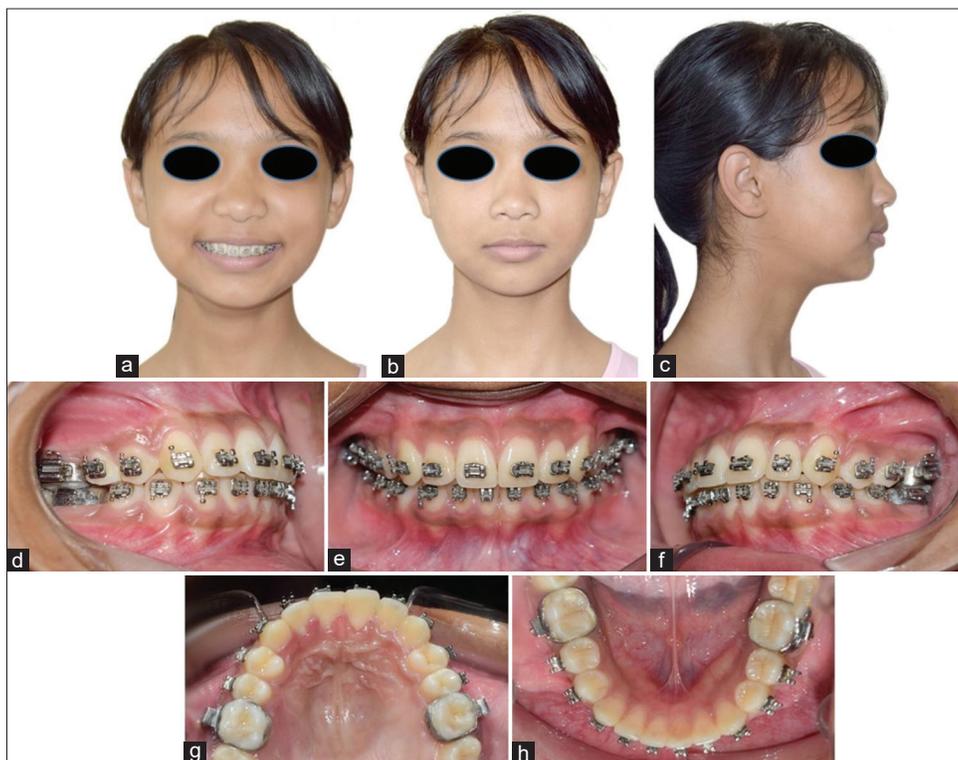
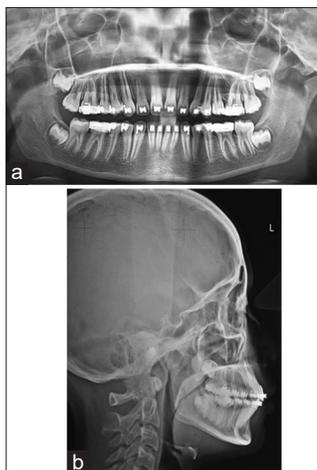


Figure 5: Extra and intra-oral photographs of the patient before debonding of orthodontic appliance. (a-c) Extraoral photographs; (a) frontal view-at rest, (b) frontal view-smiling, (c) profile view, (d-h) Intraoral photographs, (d) right molar relation, (e) overbite, (f) left molar relation, (g) maxillary occlusal view, (h) mandibular occlusal view



**Figure 6: Posttreatment radiographs. (a) Orthopantomogram, and (b) Lateral cephalogram**

### Appliance

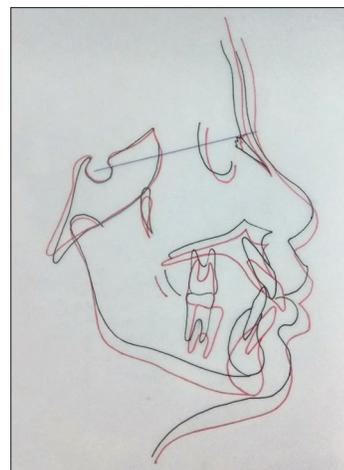
The appliance used for this case was Jones jig for maxillary molar distalization followed by fixed mechanotherapy with preadjusted edgewise appliance of 022 MBT prescription (Nu-Edge®, TP Orthodontics, Inc., Texas, USA). The Jones jig appliance produces the distal movement of the maxillary molar without the patient's need for compliance. It is effective in distal movement and maintenance of Class I molar relationship. It is easy to fabricate and apply sufficient buccal force for the desired tooth movement. This appliance was chosen for this particular case with keeping the following points under the considerations:

- The patient was actively growing with a low mandibular plane angle
- Obtuse nasolabial angle
- Erupting 2<sup>nd</sup> permanent second molar.

For special anchorage Nance's palatal button was used immediately after completion of the molar distalization.

### Biomechanical principle of molar distalization by Jones jig

Components of the Jones jig appliance system are an active arm, which applies forces to the dentition, and an anchorage unit. The anchorage augmentation is usually done through the Nance holding arch, which is attached to the maxillary first permanent molars or second premolars or the primary molars. The palatal acrylic button should at least be around 15 mm in diameter so that it provides sufficient force dissipation and anchorage in the sagittal dimension. The jig or the active arm assembly is usually a 0.030-inch wire that holds a nickel-titanium (NiTi) coil spring hook. The jig assembly is inserted into the maxillary first molar attachment at both the archwire slot and the headgear tubes. Activation of the assembly is done by sliding the hook posteriorly with 0.012-inch steel ligature wire, which compresses the NiTi coil spring. Optimal activation of the NiTi



**Figure 7: Cephalometric superimposition depicts favorable dentoalveolar and soft tissue changes**

coil spring usually delivers around 70 g of continuous force on each side, which is transferred to the permanent maxillary first molar. The anchorage unit is designed to counteract the reciprocal forces generated by the NiTi coil activation. Desired reactivation is recommended at 4 weeks of interval to maintain the optimal distalizing forces.

### Proposed retention

Removable wrap-around retainers extending till the second permanent molars in both the arches.

### Section II: Treatment

Treatment was started with maxillary first molars banding followed by alginate impression for the jones jig appliance's laboratory fabrication. Fabricated Jones Jig appliances were cemented with the desired activation [Figure 3]. The molar distalization phase continued for 7 months till overcorrected Class I molar relation was achieved bilaterally [Figure 4]. After completing the distalization, the appliances were removed, and a Nance holding arch was given for anchorage reinforcement. Fixed mechanotherapy was started using a preadjusted edgewise appliance, 022 MBT prescription (Nu-Edge®, TP Orthodontics, Inc., Texas, USA). After the initial alignment of the maxillary teeth, elastomeric chains were used to retract the maxillary premolars bilaterally. After the adequate space opening for the maxillary canines, piggyback 0.014" NiTi archwire was used to move the canines occlusally. In the mandibular arch, alignment was started using 0.014" NiTi archwire and was followed by leveling with 0.018" AJ Willcock's special plus archwire with the reverse curve of Spee. After adequate leveling and aligning in both the arches, upper and lower 0.019" × 0.025" NiTi archwires were given, followed by 0.019" × 0.025" SS archwires. Class II blue elastics were given to improve mild overjet and deep bite. Later on, both upper and lower second molars



Figure 8: Two years pos treatment, extra and intra-oral photographs. (a-c) Extras oral photographs; (a) frontal view-at rest, (b) frontal view-smiling, (c) profile view, (d-h) Intraoral photographs, (d) right molar relation, (e) overbite, (f) left molar relation, (g) maxillary occlusal view, (h) mandibular occlusal view

were bonded, and 0.016” NiTi archwires were given along with settling elastics for the appropriate occlusal settling. Active treatment lasted for 18 months, after which the fixed appliance was removed, followed by retainer delivery on the day of debonding.

#### Interpretation of posttreatment cephalometric values

Just before debonding of fixed orthodontic appliances, records were taken [Figures 5 and 6]. Pre and posttreatment cephalometric values depict a reduction of ANB angle by 4° suggestive of the mandible’s forward growth. Maxillary and mandibular incisor inclinations were normalized along with the achievement of optimal overjet and overbite [Table 1]. Effective maxillary and mandibular lengths were increased, which was secondary to the continued growth of the jawbones. Distalization of maxillary molar has helped in gaining adequate space for leveling and alignment of labially blocked maxillary canines and correction of incisor inclination. Significant improvement in the patient’s posttreatment profile can be appreciated [Figures 1 and 5]. Improvement in the soft tissue profile was due to the correction of the maxillary incisor inclination and increased lower anterior facial height [Figure 7]. Optimum overjet and overbite were achieved at the end of active orthodontic treatment.

The posttreatment occlusion revealed Class I canine and molar relation with good buccal segment intercuspation.

Table 1: Pre- and post-treatment cephalometric values

Variable	Pre Treatment	Post Treatment
<b>Sagittal Skeletal</b>		
SNA (degree)	85	85
SNB (degree)	80	81
ANB (degree)	5	4
Wits appraisal (mm)	0	0.5
AB plan angle (degree)	-9	-7
Angle of convexity (degree)	11	10
<b>Vertical Skeletal</b>		
SN Mandibular plane (degree)	30	33
FMA (degree)	29	32
Facial axis (degree)	4	2
Y-axis (degree)	73	69
Jaraback ratio (%)	67	73
SN Occlusal plane (degree)	17	19
Maxillary-length-effective (McNamara) (mm)	75	77
Mandibular-length-effective (McNamara) (mm)	98	103
<b>Dental Relations</b>		
Upper incisor to NA (deg/mm)	14/1	23/5
Lower incisor to NB (deg/mm)	27/4	29/6
IMPA (degree)	92	95
Lower incisor to APog line (mm)	1	3
Upper incisor to APog line (mm)	3	7
Interincisal angle (degree)	135	128
<b>Soft Tissue</b>		
Nasolabial angle	95	91
Lower lip to E line	1.5	-3
Upper lip to E line	-1	3

Maxillary dental midline showed mild deviation to the right by 1 mm. Lower anterior facial height also improved, which helped in overall esthetic improvement. Posttreatment maxillary midline was shifted to the right by 1 mm despite the Class I canine and molar relation bilaterally and normal overjet and overbite. The reason for the same could be slightly wider left central and lateral maxillary incisors than those of the right side. Posttreatment panoramic radiograph showed good root parallelism, which will ensure good stability of the results achieved. Further, a consonant smile arc was achieved, which had an additive effect on smile esthetics. Two-year posttreatment records show a stable dental occlusion and a balanced facial profile [Figure 8].

## CONCLUSION

The posttreatment results were highly satisfactory with good posterior occlusion and excellent facial soft tissue balance and harmony. Using a nonextraction treatment approach such as molar distalization using noncompliant distalization appliance such as Jones Jig helped us avoid over-retraction of maxillary incisors and dishing in the patient's profile. The case report also emphasizes the cautious use of extraction treatment protocol in growing patients.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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