

Non-Extraction Treatment of Severe Anterior Crowding with Unilateral Distalization

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ABSTRACT

Introduction: Recent developments in mechanotherapy and changes in concepts have reduced the need for extraction in several types of discrepancies.

Case report: This case report explains a non-extraction treatment in a patient with severe anterior crowding with the use of a modified Hilger's Pendulum appliance. The patient showed unilateral half unit Class II molar relation on the left. The appliance was modified to cater to the treatment needs and activation was done unilaterally to achieve the desired results. Post distalization, fixed orthodontic treatment was initiated and crowding was relieved with levelling and aligning.

Conclusion: An ideal overjet and overbite along with maintenance of the pleasing profile was achieved at the end of the treatment.

Keywords: Severe Anterior Crowding, Unilateral Distalization

INTRODUCTION

Management of borderline cases has always surmounted controversies.¹ An estimated 25-30% of all orthodontic patients can be benefited from maxillary expansion, and 95% of class II cases can be improved by molar rotation, distalization and expansion.² With the recent trend towards more non-extraction treatment, several appliances have been advocated to distalize molars in the upper arch. Certain principles, as outlined by Burstone³ must be borne in mind. When designing, such an appliance must have magnitude of forces, magnitude of moments, moment-to-force ratio constancy, bracket friction (frictionless appliances are preferable) and ease of use.

Indications for distalization

Careful selection of case is mandatory. It is not that molar distalization is tooth movement of choice in all malocclusions. The extraction of first premolars is the most common line of orthodontic treatment. However, in certain reasonably well defined instances, the distal movement of upper buccal segments is the mechanical treatment of choice. The indications for the distal movement of upper buccal segment are described.

1. Long distal bases
2. Buccal segment relationship
3. Minimal crowding or Spacing Anteriorly
4. Well aligned lower arch
5. Overjet reduction not indicated
6. Mesially inclined upper first molars

CASE REPORT

A 19-year-old Nepalese female presented with a chief complain of irregularly placed upper front teeth. Treatment involved use of modified Hilger's Pendulum appliance with unilateral activation followed by upper and lower pre-adjusted edgewise appliance (0.022x0.028" slot) with MBT prescription for the correction of anterior crowding.

Diagnosis and Treatment Planning

Patient exhibited a straight and pleasing profile with competent lips (Fig. 2). Molar and canine relation showed Angles Class I on the right and half unit class II relation on the left with anterior crowding (Fig. 1). Overjet and overbite were slightly increased by 0.5 mm. Mid-line could not be assessed due to anterior crowding.

Cephalometric analysis revealed a mild Class II antero-posterior skeletal pattern with ANB of 5° and Wits appraisal of + 2 mm. Maxilla showed mild prognathism with SNA of 87° and an orthognathic mandible. Vertical relation showed a horizontal growth pattern (Fig.3).

Dental analysis revealed mildly proclined upper incisors with U1-SN showing 110° and normally placed mandibular incisors. Maxillo-mandibular dental relation showed mild bidental proclination with U1-L1 showing 122° (Fig.3).

Model analysis

Arch perimeter analysis revealed a tooth arch discrepancy of 5mm in the upper and 1.5 mm in the lower arch indicating tooth material excess in both arches which was supported by Bolton's Analysis which showed maxillary anterior tooth material excess of 3.7mm.

Diagnosis

Angle's Class II subdivision (left) malocclusion on Class II skeletal bases.

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Figure-1: Pre-Treatment Intra-Oral Pictures



Figure-2: Pre-Treatment Extra-Oral Pictures

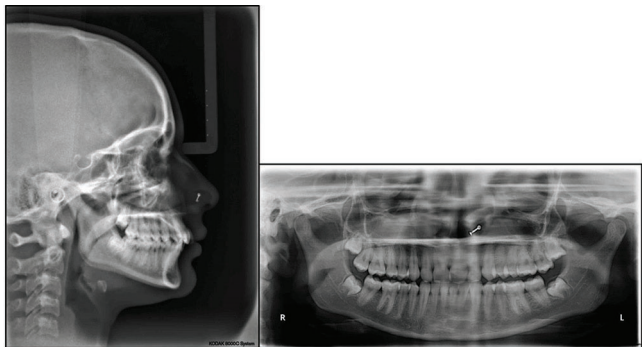


Figure-3: Pre-Treatment Radiographs



Figure-4: Modified Hilger's Pendulum Appliance



Figure-5: Two Months Post-Activation



Figure-6: Five Months Post Activation



Figure-7: Post-Treatment Intra-Oral Pictures

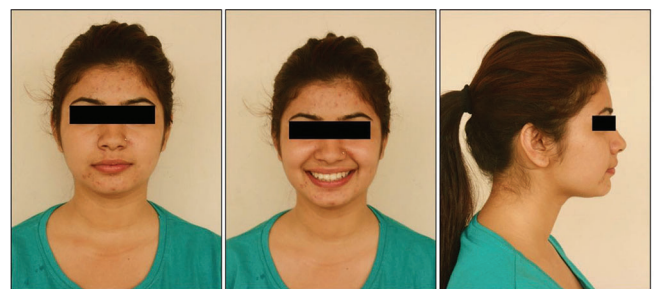


Figure-8: Post-Treatment Extra-Oral Pictures



Figure-9: Post-Treatment Radiographs

Aims and objectives of treatment

1. Correction of half unit class II relation on left
2. Levelling and aligning
3. Correction of half unit class II canine relation on the left
4. Maintaining Class I molar and canine relation on the right
5. Achieving ideal overjet and overbite
6. Maintaining pleasing profile
7. Retain corrected results

To achieve the most favourable treatment results, a non-extraction treatment was planned with the use of modified pendulum appliance (unilateral activation on the left) along with upper and lower fixed pre-adjusted edgewise appliance (0.022x0.028" slot) with MBT prescription.

Proposed retention strategy

Upper and lower bonded retainers (1st premolar to 1st premolar) along with removable wrap-around retainers in upper and lower arch.

Treatment progress

Modified Hilger's Pendulum appliance was fabricated using .032" TMA wire with unilateral activation on the left and was cemented with the help of molar bands (Fig.4). An activation of 70 degrees was done on the left.

2 months post activation a distalization of 3mm was achieved with stable molar occlusion on the right (Fig.5).

After 5 months, a total distalization of 5.5mm was achieved, attaining a super class I molar relation on the left (Fig. 6) with class I molar relationship maintained on the right.

Post distalization, fixed orthodontic treatment of upper and lower arches with fixed pre-adjusted edgewise appliance (0.022x0.028" slot) MBT prescription was started.

Aligning and levelling of the upper and lower arches was done with sequential wires progressing upto 0.019X0.025 SS archwire. And subsequent closure of space was done while keeping the molar in its corrected position.

Angles class I molar relation and a class I canine relation was achieved on the left while maintaining a Class I molar and canine relation on the right. Anterior crowding was resolved during levelling aligning.

Settling was done with 0.019X0.025 braided SS wires and settling elastics

After 8 months of active treatment, upper and lower fixed appliances were removed and bonded fixed retainers placed

from 1st premolar to 1st premolar in upper and lower arches (Fig 7).

RESULTS

Overjet and overbite reduced to 1mm. Cephalometrically, U1-SN reduced to 103° and interincisal angle increased to 130° indicating uprighting of incisors.

Clinically, class I molar and canine relation was seen bilaterally with ideal intercuspation (Fig 7).

Extra oral soft tissue profile was maintained (Fig 8). Post treatment showed stable results with good alignment in the upper and lower arch (Fig 7).

DISCUSSION

Correction of molar relationship is often required for the treatment of Class II malocclusions.⁴ Crowding and loss of space in the maxilla and the mandible, caused by mesially drifted molars and disproportion between tooth and jaw size, are problems frequently encountered in orthodontics. When planning treatment, the clinician must consider growth patterns, spaces, and features such as the facial profile and the size of the apical base. Particularly challenging in orthodontic therapy are the borderline patients, for whom non-extraction treatment plans are preferred. On the other hand, low angles and maxillary deficiencies are indications for non-extraction treatment.⁵

The traditional approach to distalize molar in maxilla is the use of extra oral traction or headgear. However, the success of extra oral traction depends heavily on patient compliance and the need to follow directions. Because of these disadvantages, clinicians have been searching for appliances that need minimal patient cooperation. Thus, intraoral distalization appliances have been introduced that minimize patient compliance and apply continuous forces. When a nonextraction treatment is planned, these appliances can distalize the maxillary molars one–two mm per month over four to five months.⁶

Over recent years, several noncompliance methods to move molars distally have gained popularity.⁷ Hilger's pendulum is one such distalization appliance. In this case the left side was in an End-on relationship while the right side was a Class I with crowding in the anterior region. Thus, a modification to the original appliance was made for unilateral distalization. On space gain by distalization we were able to achieve a Class I relation on the left and relieve anterior crowding, achieving proper levelling and aligning and maintaining the patient's profile.

CONCLUSION

At the end of the active treatment the patient was happy with the results. All the treatment objectives were achieved. Molar distalization can be used as an alternative to the extraction of premolars, but careful case selection is important.

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