

Case Report

Rapid maxillary expansion in a pseudo Class III malocclusion with blocked out maxillary canines

ABSTRACT

A major factor determining if early correction of an anterior crossbite will be stable is the achievement of a positive overbite. A clinician should avoid extracting maxillary teeth in Class III cases to contain the forward growth of the mandible. This article presents a case report of a pseudo Class III patient with anterior crossbite and maxillary blocked out canines, based on the best available evidence. We hereby propose a combination of rapid maxillary expansion with 2 × 4 appliance to provide a predictable and effective approach to managing pseudo Class III treatment with blocked out canines (moderate crowding) that were once considered implausible. A clinician should avoid extracting maxillary teeth in Class III cases to contain the forward growth of the mandible.

Keywords: Blocked out canines, maxillary expansion, pseudo Class III

INTRODUCTION

Tweed classified Class III malocclusions into pseudo Class III malocclusion with a conventionally shaped mandible and a skeletal Class III malocclusion with a large mandible or an underdeveloped maxilla.^[1] The presence of an anterior crossbite may be observed as a result of a mandibular forward displacement, due to abnormal occlusal contact. Correction of Class III malocclusion has been considered as one of the most challenging dentofacial deformities to treat in adolescents in terms of treatment outcome.^[2] In growing patients, achieving a positive overjet and overbite as best as possible seems to be the most logical way out. Prompt diagnosis and early intervention helps to curb the severity of Class III malocclusion in late adolescence, thus preventing invasive orthognathic procedures.^[3]

This article presents a case report of a pseudo Class III patient with anterior crossbite and maxillary blocked out canines, based on the best available evidence.^[4]

CASE REPORT

A 14-year-old girl presented with the chief complaint of inability to chew with her front teeth. Extraorally, the patient had a dolichoprosopic facial type, concave profile, anterior divergence with everted lower lip. Intraorally, she showed lingually placed 42, labially blocked out maxillary canines, hypoplastic 45, anterior crossbite, and Class I molar relation bilaterally. Both maxillary canines were blocked out [Figure 1]. Space analysis showed 9-mm and 5-mm spaces required in the maxillary and mandibular arches, respectively. The panoramic radiograph showed no pathologies. Cephalometric analysis indicated a protrusive mandible, a retrusive maxilla, and a slightly concave skeletal and soft-tissue profile [Figure 2].

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Figure 1: Pretreatment facial and intraoral photographs

None of the patient's direct family members exhibited skeletal Class III features. She was able to get her mandible to edge–edge bite due to a centric relation–centric occlusion discrepancy. The patient was diagnosed with a pseudo Class III malocclusion with anterior crossbite and blocked out maxillary canines.

Treatment objectives

The treatment plan was (1) to eliminate the functional mandibular shift, (2) to correct the anterior crossbite, (3) to align the anterior teeth for ideal inclination, (4) to obtain Class I canine relation, (5) to obtain ideal overjet and overbite, and (6) to obtain ideal facial and dental esthetics.

Treatment progress

On the basis of diagnostic records, a treatment plan was divided into two phases.

- Phase I – The patient was treated with a bonded Hyrax appliance with acrylic bite blocks until the lingual cusp of maxillary premolars and molars touches the buccal cup of mandibular premolars and molars and positive overjet was achieved. The rapid maxillary expansion (RME) appliance was activated twice daily (0.25 mm per turn) for 10 days, and the desired amount of expansion was achieved (4-mm diastema) The Hyrax screw was sealed with acrylic and kept in place for 3 months [Figure 3]
- Phase II – Fixed mechanotherapy with MBT 022 preadjusted edgewise was started on mandibular arch



Figure 2: Pretreatment radiographs



Figure 3: Treatment progress Phase I: 4 mm of midline diastema seen after 10 days of rapid maxillary expansion. Note the V-shaped palatal separation in maxillary occlusal intraoral periapical

and maxillary incisors. Maxillary archwires were placed in the mandibular arch for the arch coordination. A fixed retention plate was fabricated and delivered the same day in the maxillary arch with molar tubes embedded bilaterally. A 2 × 4 appliance was utilized to procline the maxillary 4 incisors and to gain space for alignment of the maxillary canines for a period of 7 months [Figure 4a and b].

After duration of 10 months, the retention plate was removed and the maxillary and mandibular arches were aligned and leveled with extraction of mandibular 42.

The planned archwire sequence started with .012" nickel–titanium (NiTi), .014" NiTi, .016" × .022" Niti for a period of 5 months. Later, it was observed that there was not enough space in the maxillary arch for the canines to get aligned, proximal stripping was performed, and alignment was carried out [Figure 4c]. A total of 4-mm interproximal reduction (IPR) was performed meticulously on maxillary incisors and premolars. The total treatment time was 18 months. Patient

compliance was excellent throughout the treatment. Fixed lingual retention along with Hawley’s retainers was given.

Treatment results

Posttreatment results showed an improved profile and Class I molar and canine relationships, with optimal overjet and overbite [Figures 5 and 6]. Maxillomandibular relations showed minor improvements during the treatment period, with changes primarily due to the increase in the sella–nasion–point A angle. The sella–nasion–point B angle showed no significant changes. The dental measurements showed a significant proclination of upper incisors while the lower incisors were uprighted. Upper molar distal movement of 2.5 mm and extrusion of 1.5 mm were observed [Table 1]. Superimposition showed downward and backward movement (clockwise rotation) of the mandible [Figure 7].

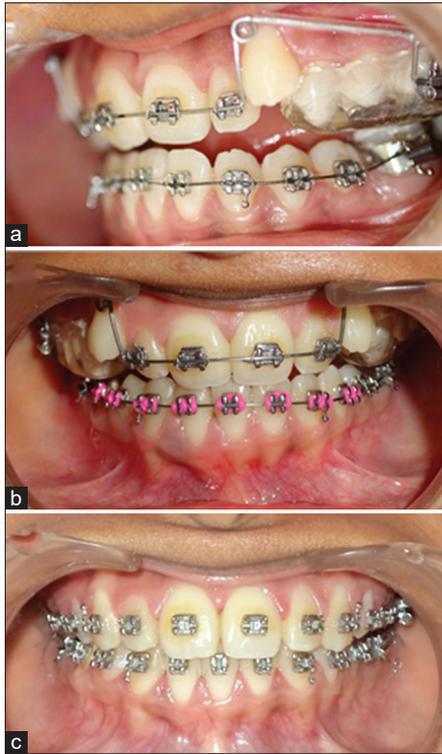


Figure 4: Treatment progress Phase II: (a) 2 × 4 appliance at the 5th month (b) Positive overjet and overbite at the 7th month, (c) Prefinishing stage at the 15th month

Table 1: Cephalometric analysis

Parameters	Pre	Post
SNA (°)	81	82.5
SNB (°)	83	83
ANB (°)	−2	−0.5
Upper incisor to NA (mm)	−1	7
Upper incisor to SN (°)	95	110
IMPA (°)	90	90
Lower incisor to NB (mm)	3	3
Pg-NB (mm)	2	2
Interincisal angle (°)	160	120
GoGnSn (°)	28	30
FMA (°)	27	28
Occlusal plane-SN (°)	11	13
Upper lip to E-line (mm)	−2	0
Lower lip to E-line (mm)	0	0

SNA: Sella–nasion–point A angle, SNB: Sella–nasion–point B, SN: Sella–nasion, IMPA: Incisor mandibular plane angle



Figure 5: Posttreatment facial and intraoral photographs



Figure 6: Posttreatment radiographs

DISCUSSION

The amount of space in the dental arch for blocked out canines can be assessed by performing a space analysis. A 9-mm space required to align the maxillary canines was obtained by expansion of the maxillary arch, proclination of maxillary incisors, derotation of premolars, and IPR. If maxillary premolars were extracted, it might have resulted in the over retraction of the maxillary anterior teeth without improvement in the patient's profile. This case report showed the results of the pseudo Class III case with an efficient orthodontic therapy of RME with maxillary anterior protraction and lower incisor extraction. The lower incisor extraction was favorable in this case to maintain the facial profile and also in the correction of lower anterior crowding. Previous case reports have also shown favorable results after mandibular incisor extraction, which is in concordance with the present case report.^[5,6] Grob showed a stability of Class I malocclusions with improvement in overbite and facial profile by extracting mandibular incisor.^[7]

Case selection is important for nonextraction treatment plan in Class III patients with buccally blocked out canines. Knowledge of the skeletal discrepancy, age, and negative inclination toward future mandibular growth is required for successful treatment planning. Establishment of ideal overjet overbite was possible with proclination of maxillary incisors which also added prominence to the upper lip for a better esthetic result. In our case, however, the maxillary incisor inclination was well within the established limit (120°) for dentoalveolar compensation in Class III treatment. 2×4 fixed appliance was also used by Hagg *et al* in pseudo Class III patients to achieve a positive overjet that was maintained in the long term.^[8] The advantages of using 2×4 appliance (17×25 titanium–molybdenum alloy wire) are the ease of control over the force magnitude and vector. Gu *et al.* found that, in Class III malocclusion patients, there were a similar amount of overjet correction in the 2×4 and reverse headgear groups and no relapse found at 1-year follow-up, even though no retainers were used after debonding.^[9] A major factor determining if early correction of an anterior crossbite will be stable is the achievement of a positive overbite.^[10,11] In our case report, RME was carried out to achieve 4 mm of

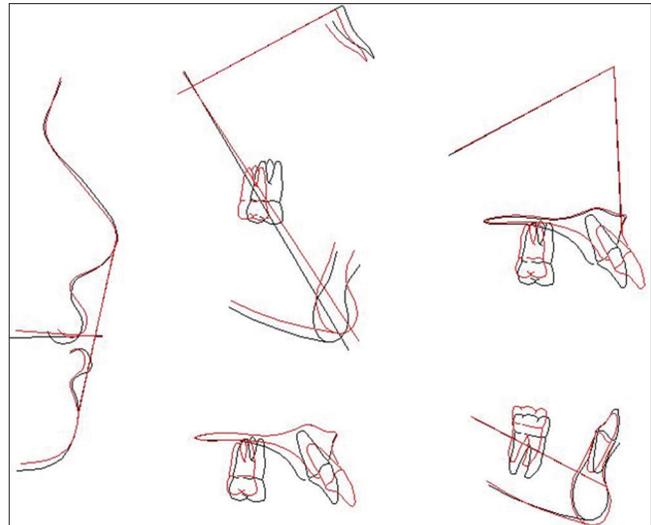


Figure 7: Superimposition of pre- and post-treatment cephalometric tracings

space; however, only 0.5-mm sagittal movement of point A was observed. We hereby propose a combination of RME with 2×4 appliance to provide a predictable and effective approach to managing pseudo Class III treatment with blocked out canines (moderate crowding) that were once considered implausible. A clinician should avoid extracting maxillary teeth in Class III cases to contain the forward growth of the mandible.

CONCLUSION

In properly selected Class III cases, RME with lower incisor extraction can be a successful alternative to maxillary premolar extraction that improves the patient's extra and intraoral features.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

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