

Case Report

Management of Class III malocclusion with Atypical Extraction

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Abstract

A 28-year-old female with a skeletal Class III malocclusion, missing her upper first premolars, retroclined upper, lower incisors and premature contact at 21 and 31 that caused anterior sliding when she bit and her chin shifted to the left was treated by orthodontic alone. Her lower second premolars (35, 45) and lower third molars (38, 48) were extracted during orthodontic treatment. Correction of the Class III malocclusion and upper space closure were achieved by Class III elastics. Prevention of retroclination of lower incisors during space closure was performed by adding gable bend to arch wire. The active treatment period was 30 months. The one-year retention showed that the treatment results were quite stable.

Keywords: Class III malocclusion, camouflage treatment, extraction

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Introduction

Class III malocclusion is more prevalent in Asian people than in Caucasians, of which 14.5 % of Class III malocclusion was found in southern Chinese people.¹ Camouflage treatment of Class III malocclusion can be performed in both non-extraction²⁻⁵ and extraction treatment plan.^{2,6-11} For Class III camouflage, only lower teeth extraction⁸⁻¹⁰ or upper second premolars and lower first premolars extraction was recommended.^{6,7,11,12} While in Camouflage Class II malocclusion cases, extraction of upper first premolars and lower second premolars was recommended.^{13,14} This case report describes the use of proper biomechanics to manage Class III camouflage with an extraction treatment plan of upper first premolars and lower second premolars.

Diagnosis and treatment plan

A 28-year-old female with a chief complaint of anterior crossbite and spacing in the upper arch. She had her upper first premolars extracted with residue space at bilateral side. The lower arch was crowded with deep curve of Spee. Her occlusion was Class III molar relationship on the left and right side with Class III canine relationship on the right side and Class I canine relationship on the left side (Fig. 1).

Premature contact can be found at 21 and 31 which caused anterior sliding when she bit in centric occlusion (Fig. 2).

Her facial profile was concave, and chin shifted to the left side. Her lower midline shifted to the left

side as her chin and upper midline shifted to the right.

Cephalometric analysis indicated a Class III skeletal base normal bite and a concave profile due to

a prognathic mandible. The upper incisors were retroclined and had short anterior dental height, lower incisors were retroclined (table 1 and Fig. 2).



Figure 1 Intra oral and extra oral photograph of patient before treatment.

Table 1 Cephalometric analysis before and at the end of treatment.

Measurement	Thai norm	Pre treatment	interpretation	Post treatment
SNA	79-87	87	Orthognathic maxilla	87
SNB	76-82	88	Prognathic mandible	86.5
ANB	2-6	-1	Skeletal Class III	0.5
Wits	(-5)-(-1)	-6	Skeletal Class III	-4
SN-GoGn	28-40	30	Skeletal normal bite	31
FMA	21-29	24	Skeletal normal bite	25
ADH	26-32	24	Short anterior dental height	23.5
UI-NA (mm)	2-8	1	UI retrusion	1
UI-NA	24-32	17	UI retroclination	24
LI-NB (mm)	4-8	5	LI normal position	1.5
LI-NB	26-28	24.5	LI retroclination	25
IMPA	95-103	85.2	LI retroclination	87.5
UI-LI	110-126	138.5	Obtuse interincisal angle	131.5
E-line	1.5-5.5	1.5	Normal L lip position (retrusion tendency)	-2
FCA	5-11	2.5	Concave profile	1.5



Figure 2 Intra oral photograph of edge to edge position

The panoramic radiograph revealed impacted lower third molars, and missing bilateral upper first premolars. (Fig. 3)

Patient refused orthognathic surgery. Overall treatment plan was camouflage treatment. Her short anterior dental height and asymmetry were compromised. Treatment options were proposed. First, to correct retroclined and retruded upper incisors, upper spaces were planned to open for dental substitution of bilateral upper first premolar. Crossbite was planned to correct by Class III elastic. Second, to close all upper spaces, position and angulation of upper and lower incisors were planned to compromise. Lower lip position was more retrude and facial profile was a little more concave. She chose the second choice because she didn't want to have any dental substitution. Treatment objectives were to close the upper extracted space, without worsening the upper incisors position and their axis, and flatten the curve of Spee in the lower arch together with retraction of lower incisors for crossbite correction. Lower lip position, position of incisors and skeletal pattern were planned to compromise.

Treatment Progress

The patient was referred to remove her bilateral lower third molars and bilateral lower second premolars. 0.018" × 0.025" pre-adjusted appliances (Roth prescription) were bonded to upper and lower arch. 0.014" and 0.016" NiTi wires were used for initial leveling. Stainless

steel 0.014" and 0.016" round wires with gable bends were used to upright distal tipped upper canine in upper arch and flattened the curve of Spee in the lower arch. The gable bends were placed at 1/3 close to canines in upper arch and first premolars in lower arch. 0.016" × 0.022" stainless steel wires were used as working wire on both arches. To close the lower extraction space, gable bends were added to the arch wire between first premolars and first molars at 1/3 close to first premolars. Lower first molars acted as anchorage to retract the anterior teeth and first premolars as once by power chains with a force of about 200-300 grams. To control the anchorage in the lower arch and to close the upper spaces, Class III elastics from lower canines to upper first molars (1.4 inch 4.5 ounces) were prescribed during crossbite correction. Every visit during space closure, the lower arch wire was removed, and gable bends were changed to approximately 1/3 close to first premolars. When spaces were left in haft of original extraction spaces, gable bends were placed at approximately to distal surface of first premolars until all remaining spaces were closed. After the cross-bite was corrected, Class I canine relationship was achieved on right side but left side was Class II canine relationship (Fig. 4).

Upper left canine was retracted to obtain Class I relationship, lower spaces were continue to be closed with the same mechanic. Class II and Class III elastics were prescribed as needed.

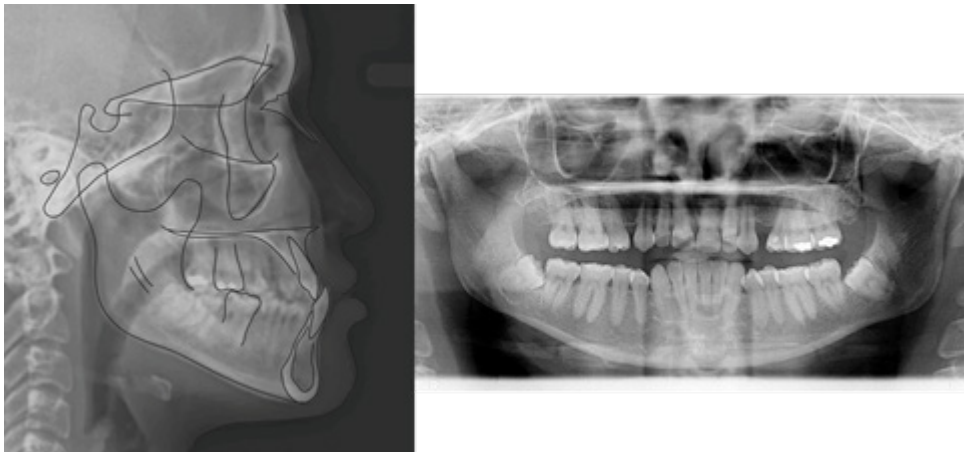


Figure 3 Cephalometric radiograph with tracing and panoramic radiograph before treatment.



Figure 4 Intra oral photograph of patient after crossbite correction.

Treatment result

After 30 months, the patient acquired normal overjet and overbite. Class I molar and canine relationships were achieved. All spaces were closed (Fig. 5). Gingiva

was slightly inflamed from calculus and dental plaque induced. There were no periodontal pocket and gingival recession found.



Figure 5 Intra oral and extra oral photograph of patient at the end of treatment.

The upper and lower wrap-around retainers were delivered. Panoramic radiograph revealed no significant root resorption and acceptable root parallelism (Fig. 6).

Cephalometric radiograph (Fig. 6) and analysis (table 1) showed a slight clockwise rotation of mandible by decreasing of SNB and Wits and increasing of ANB, FMA and SN-GoGn. The UI-NA angle was increased while the position of the upper incisor was almost the same as before treatment but more lingual root torque was found as the UI-NA angle increased. The LI-NB distance was reduced while the LI-NB angle was not changed which indicated bodily retraction of lower incisors. Her

lower lip was more retruded and her facial profile was a little more concave. Cephalometric superimposition showed mesial movement and extrusion of the upper molars. The upper incisors had lingual root torque. The lower incisors were bodily retracted and intruded, the lower molars were uprighted and mesially moved (Fig. 7). Maxilla had no change, but mandible had a slight clockwise rotation. Moreover, the condyles slightly moved backward. After a one-year retention period, her occlusion and dental alignment were quite stable. Periodontal pocket and gingival recession were not found. (Fig. 8)

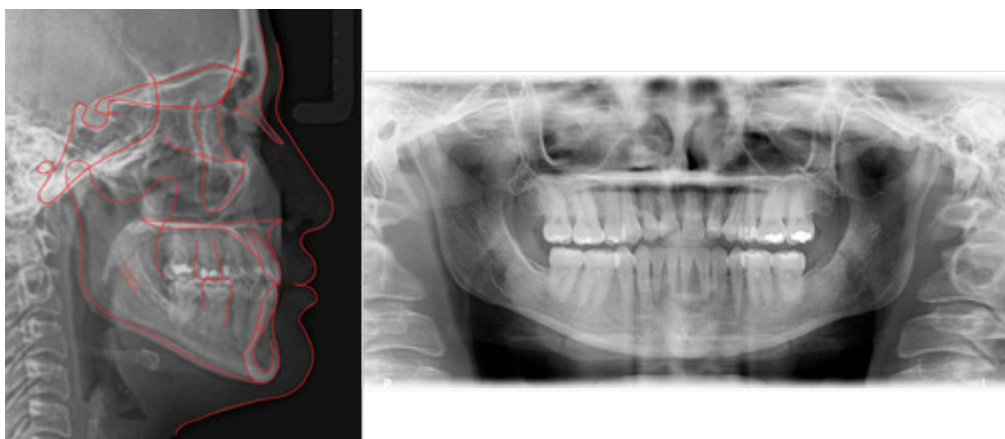


Figure 6 Cephalometric radiograph with tracing and panoramic radiograph at the end of treatment.

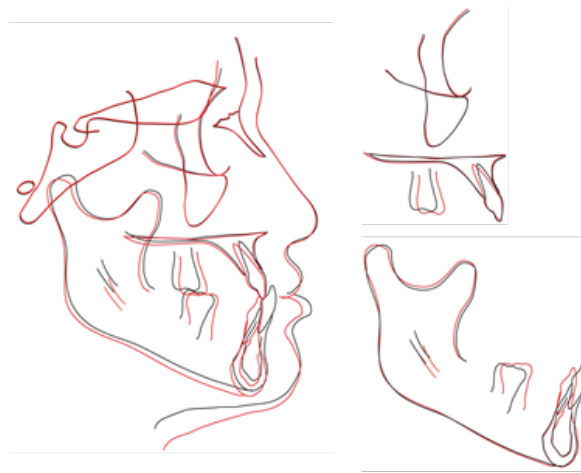


Figure 7 Cephalometric superimpose before and at the end of treatment.



Figure 8 Intra oral and extra oral photograph of patient at 1 year retention.

Discussion

To camouflage Class III malocclusion, lower teeth extraction was recommended.⁸⁻¹⁰ Some authors^{6,7,11} presented successful cases with extraction of four premolars. For four premolars extraction, the upper second premolars and the lower first premolars were recommended.^{6,7,12} The first premolars extraction promoted larger distance for incisors retraction and caused less anchorage loss

than the second premolars extraction.^{15,16} This patient had her upper first premolars extracted. To maintain the position of the upper incisors, the upper posterior teeth had to be moved mesially without upper incisors retraction during the space closure period. In the case of the lower first premolars extraction, the correction of dental Class III relationship was easier than the second

premolars extraction but skeletal anchorages were needed in order to move the upper posterior teeth mesially. To achieve treatment objectives without skeletal anchorages, it was planned to have the lower second premolars extracted. Cases with lower second premolars extraction have a tendency to loss posterior anchorage and cause minimum retraction of lower incisors^{15,16} that make anterior crossbite correction more difficult. Class III elastic was prescribed to support lower anchorage which promoted crossbite correction as well as moved the upper molar mesially as the treatment objectives. The side effect of Class III elastic was extrusion of the upper molars that caused the clockwise rotation of the mandible and that was found in superimposition. Clockwise rotation of the mandible reduced Class III relationship and produced a more harmonious lateral facial profile in this case.

Flattening of the curve of Spee and torque correction were important parts in the treatment of Class III with an excessive overbite. To achieve these parts, gable bends were added in leveling archwires at 1/3 close to canines in upper arch and first premolars in the lower arch. The gable bends in round wires produced uprighting of the tipped teeth, flattening occlusal plane and incisors proclination. Flattening of the occlusal plane minimized traumatic occlusion during crossbite correction by lower incisors retraction. Moreover, lingual root torque moment that were added by gable bends in rectangular wire during the lower incisors retraction caused proper torque and inter-incisal angle which enhanced normal inter-incisal angle that was important to prevent relapse.^{16,17} From the study of the force system of asymmetric v bend¹⁸, the larger clockwise movement and vertical force will create at the tooth closed to bend. However, the force system when the wire was engaged to brackets more than two teeth or teeth that were not equal in anchorage value was different.¹⁹ Clinical evaluation of tooth movement should be carefully performed during every visit in order to adjust treatment mechanics. From superimposition revealed the result of biomechanics that the lower incisor were bodily retracted and intruded

and lower molars were uprighted and extruded. Moreover, the upper incisor had more lingual root torque that was a result from labial tipping of the upper incisors in the leveling stage from gable bends in round wire and engaging of rectangular wire to maintain axis during upper space closure.

The limitation of this treatment plan was the retrusion of the upper and lower incisors which were not corrected. The lower incisors torque was compromised. Crossbite corrections by retraction of lower incisors caused more retrusion of the lower lip and worsened the concave facial profile. Form Superimposition and cephalometric analysis, facial profile was a little more concave as reducing of 1 degree of FCA.

The major side effects of Class III camouflage cases were root resorption and pathology of periodontium around the lower incisors.^{20,21} There were no periodontal pockets or recessions found at the end of treatment and at one year retention period.

Conclusion

A Class III adult patient missing her upper first premolars, retrocline upper and lower incisors, premature contact and mandibular prognathism was successfully treated by orthodontic treatment alone. The satisfying and quite stable treatment outcome was the result of a proper treatment plan, proper biomechanics and reliable patient cooperation.

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