

Class III Camouflage Orthodontic Treatment in Adult Patient with Anterior Crossbite and Abnormal Functional Shift: A Case Report

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ABSTRACT

Skeletal Class III malocclusion is a complex malformation with a prevalence of 81.6% in Airlangga University Dental Hospital, distributed in patients aged 15-45 years old. Camouflage treatment of skeletal Class III malocclusion improves prognosis with a mild-to-moderate shift.

This study aimed to discuss orthodontic camouflage as an option for adult patients with Class III malocclusion, emphasizing its indications, implications, and expected results.

This report presents the case of a 17-year-old male patient with poor facial aesthetics associated with protruded chin, abnormal functional shift, and temporomandibular joint pain. The facial profile was concave with lower anterior multiple diastemas, mandibular lip protrusion, mandibular displacement, and anterior crossbite. This case was treated by camouflage therapy using straight wire appliance system combined with elastic class III.

After 24 months of treatment during the pandemic, the mandibular displacement and the crossbite were corrected, the teeth were arched, the anterior crossbite fixed, and the profile became convex.

Camouflage orthodontic treatment can be an effective management option to achieve functional occlusion, stability, and a satisfactory aesthetic impression in adult patients with mild to moderate skeletal Class III deformities, anterior cross bite, and functional shift.

Keywords: Camouflage orthodontic treatment, class III malocclusion, case report, young adult



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INTRODUCTION

Skeletal Class III malocclusion is a complex malformation treated with few interventional alternatives, which is even more limited in adult patients.¹ Prevalence of malocclusion Class III is quite high in many countries, especially among Asian People.² This dental problem can occur from preschool age, adolescence to adulthood. The prevalence of skeletal Class III malocclusion in Airlangga Education Dental Hospital, Indonesia is 81.6%. The age distribution of patients suffering from this case is 15-45 years old.³

Camouflage treatment is a treatment to mask skeletal misalignment. In most cases, orthognathic surgery is the ideal treatment for adults, but often rejected by patients. Mild to moderate Class III skeletal malocclusion and acceptable facial aesthetics may benefit from treatment by compensating tooth movements.^{4,5} The purpose of camouflage treatment

is to procline the maxillary incisors and retrocline the mandibular incisors.

It becomes popular in adult patients because it is non-invasive and affordable than surgical intervention.^{6,7} Camouflage strategies for Class III malocclusion often include extraction and the correction of the position of the mandibular incisors to improve occlusion. Although it may not correct the skeletal problem, it may correct the facial profile. Camouflage treatment of skeletal Class III malocclusion improves prognosis of those with mild to moderate cases with functional shift.

Adult patients with mild to moderate skeletal Class III malocclusion and acceptable facial aesthetics can benefit from the camouflage orthodontic treatment. It enables the displacement of teeth relative to their supporting bone to compensate for an underlying jaw discrepancy. It is indicated when growth modification to overcome the basic problem is not feasible. The objectives of camouflage treatment include attaining acceptable occlusion, function, and aesthetics through dentoalveolar compensation for the skeletal discrepancy.⁸⁻¹⁰

Most cases of Class III malocclusion have a narrow maxillary intermolar width. In this case, the maxillary intermolar distance is wide thereby increasing the prognosis of successful camouflage therapy. In addition, this case has a unique vertical dimension of the patient's face that is low, so therapy that increases facial height is allowed, such as the use of maxillomandibular elastic (class III elastic). All these features improve the prognosis of successful treatment.

CASE PRESENTATION

A 17-year-old Deutro-Malay male patient was diagnosed with Class III malocclusion with anterior crossbite and

temporomandibular disorder. He came to the Airlangga Education Dental Hospital because he wanted to straighten his teeth (the front teeth of the upper jaw were in reverse position with the front teeth of the lower jaw). The patient also complained of jaw pain when chewing the food since the age of 7 years. The patient had a bad habit of moving his chin forward in order to chew food comfortably and well. His dental problem has never been treated because every time he goes to a dentist, the suggestion is always extraction or surgery. He feels afraid and refuses that option.

His parents and siblings did not have Class III malocclusion characteristics. Patient had no history of systemic disease.

Extraoral examination showed a mesoprosopic facial type, symmetrical, slightly concave facial profile, mesocephalic head shape, and competent upper and lower lips (Figure 1).

Intraorally, the following were observed: healthy gingiva, normal tongue size, good oral hygiene, moderate caries frequency; and impacted right and left upper third molars, and right and left lower third molars. Right and left molar has mesiocclusion. Right canines have cusp-to-cusp relation while the left canines have mesiocclusion. Transverse relation of the fissure bite in the maxilla is 13-41, 25-36, 24-35, 23-34. Overjet is negative 5 mm and overbite is 5 mm (anterior reverse bite). The curve of spee is deep and there is no midline shifting. The shape of the upper and lower dental arches was ovoid (Figure 2).

Functional examination showed that there was mandibular displacement due to trauma from occlusion. Mandibular path of closure was upward and forward. Normal swallowing and pronunciation patterns were observed. Panoramic radiographic examination showed impacted teeth 18, 28, 38 and 48 (Figure 3).

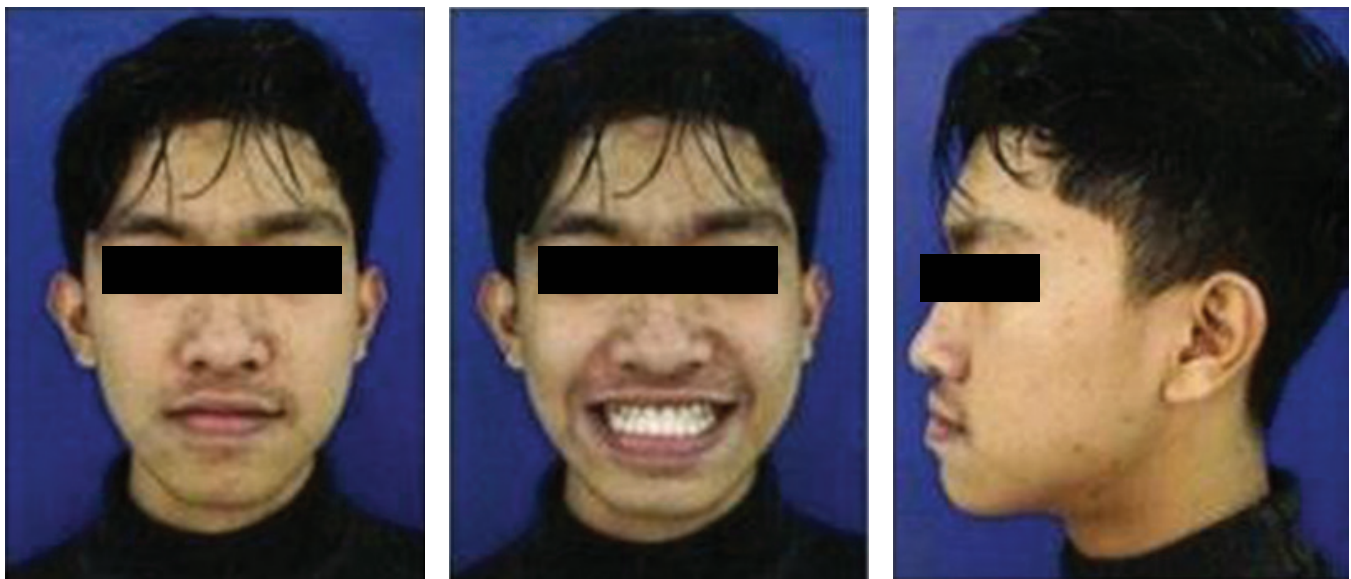


Figure 1. Pre-treatment extraoral photographs.

The condition and density of the jawbone, and the alveolar bone were normal. The results of the analysis of lateral cephalometric radiographs showed a Class III skeletal pattern with the maxillary and mandibular positions relative to the retrognathic skull base (SNA 81°, SNB 83°, ANB -2°). The skeletal profile was concave (NA-APog -9°) and the vertical growth of the middle and lower face was hypodivergent (FMA 26°). Mandibular growth direction was normal (Y-Axis 60°). The inclination of the maxillary incisors to the normal maxillary plane was UI-NA 32° and the inclination of the mandibular incisors to the normal mandibular plane was LI-NB 22.5°. The inclination of the mandibular incisors was retroclined (FMA 30°, FMIA 67°,

IMPA 83°). The upper lip is 4 mm behind the E-Line and the lower lip is 3 mm in front of the E-Line (Table 1).

The analysis of space requirements showed that there was a lack of space in the right upper jaw by 3 mm and an excess of space in the lower jaw by 4 mm. The diagnosis of this case was Class III skeletal malocclusion with anterior crossbite and multiple mandibular anterior diastemas. The relationship between the right and left canines is bulging. Overjet 5 mm (reduced) and overbite 5 mm (increased). Rotation of teeth 12, 13, and 23 and 37 were lingual tipped. There was no midline shifting.

The goals of orthodontic treatment for the patient were to eliminate the bad habit, correct the rotation of teeth



Figure 2. Pre-treatment intraoral photographs.

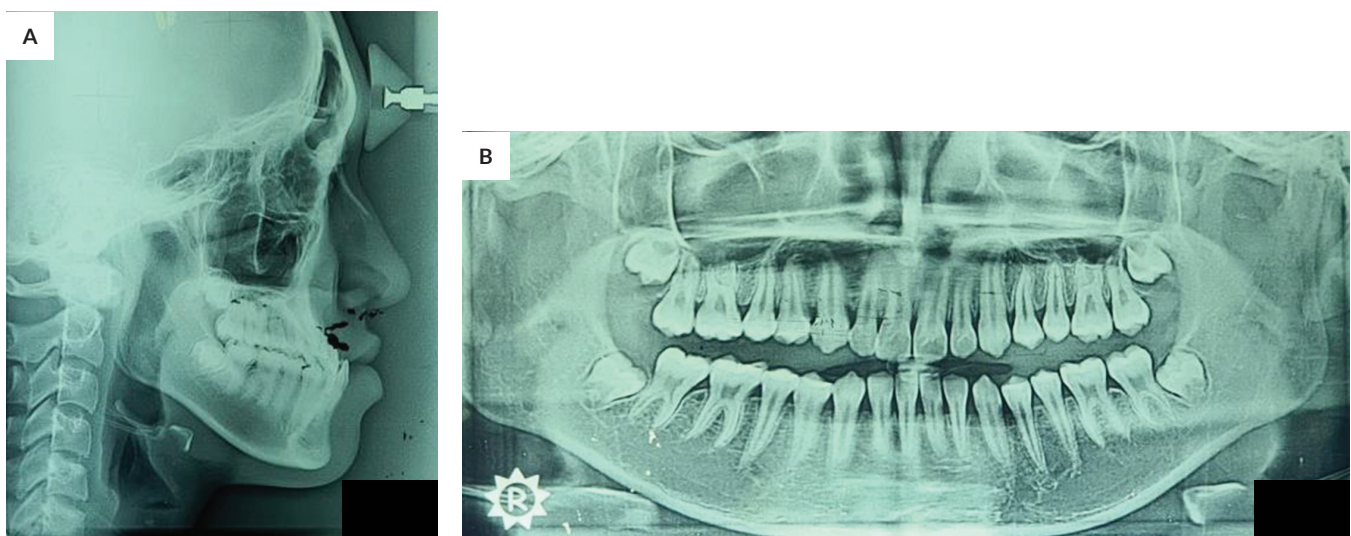


Figure 3. Pre-treatment cephalogram (A) and orthopantomogram (B).

12, 13, 23 and 37, correct multiple mandibular anterior diastemas, reduce the overjet and overbite, and provide a more regular alignment of the maxillary and mandibular teeth for aesthetics, function, and hygiene. The prognosis of this case is good.

CASE MANAGEMENT

Prior to orthodontic treatment, informed consent was given by the patient.

Dental health education was also done to eliminate his bad habits.

For this case, we used straight wire appliance orthodontic technique with bracket prescription McLaughlin Bennett Trevisi (MBT) .022. Aligning and levelling of the maxillary and mandibular teeth using Nickel Titanium (NiTi) .012, NiTi .014, NiTi .016, NiTi .016 x .022 wires were done sequentially. Bite riser was placed in the lower incisors (31, 32, 41, 42). The influence of the patient's anterior mandibular displacement was eliminated by consolidating the upper and lower arches using class III elastic (5/16" 3.5 oz) wires Stainless Steel (SS) .017 X .025. While using class III

elastic, crown torque in anterior mandibular was added. Palatal root torque for the anterior maxillary was used.

Anterior crossbite was corrected within six weeks of using the class III elastic. After reaching the acceptable occlusion, finishing and details were done, followed by passive treatment for six months to stabilize the periodontal tissue (Figures 4 and 5). The total orthodontic treatment was done within 24 months. After the treatment was completed, a Hawley retainer was used on the upper and lower arch for one year for the retention phase.

FOLLOW UP

Follow up after one year of retention phase showed that the patient's face profile was still straight (Figure 6) and tooth 31 had a slight linguoversion. Right and left interdigitation was still good and stable (Figure 7). This occurred due to the patient's lack of discipline in retainers usage and the fear of having odontectomy performed on teeth 38 and 48. Interventions for post-treatment changes after follow-up should be prevented by using retainers regularly for a set period of time or using fixed retainers. Odontectomy

Table 1. Pre-treatment and Post-treatment Cephalometric Analysis

Parameters	Normal (mean ± SD)	Pre-treatment	Post-treatment
Skeletal			
SNA (°)	82 ± 2	78	78
SNB (°)	80 ± 2	83	80
ANB (°)	2 ± 2	-5	-2
Wits appraisal (mm)	1 ± 1	-15	-6
Angle of convexity (°)	0 ± 5	-9	-5.5
Y-axis (°)	60 ± 4	60	63
SN-mandibular plane (°)	32 ± 3	33	34
MMPA (°)	27 ± 5	20.5	24

Parameters	Normal (mean ± SD)	Pre-treatment	Post-treatment
Dental			
Interincisal angle (°)	135 ± 10	129	123
U1-palatal plane (°)	109 ± 6	126.5	132
U1-NA (mm)	4 ± 2	7	10.5
L1-mandibular plane (°)	90 ± 4	85	82
L1-NB (mm)	4 ± 2	6.5	4.5
Soft tissue			
Upper lip-E line (mm)	1 ± 2	-4	-2
Lower lip-E line (mm)	0 ± 2	3	1.5

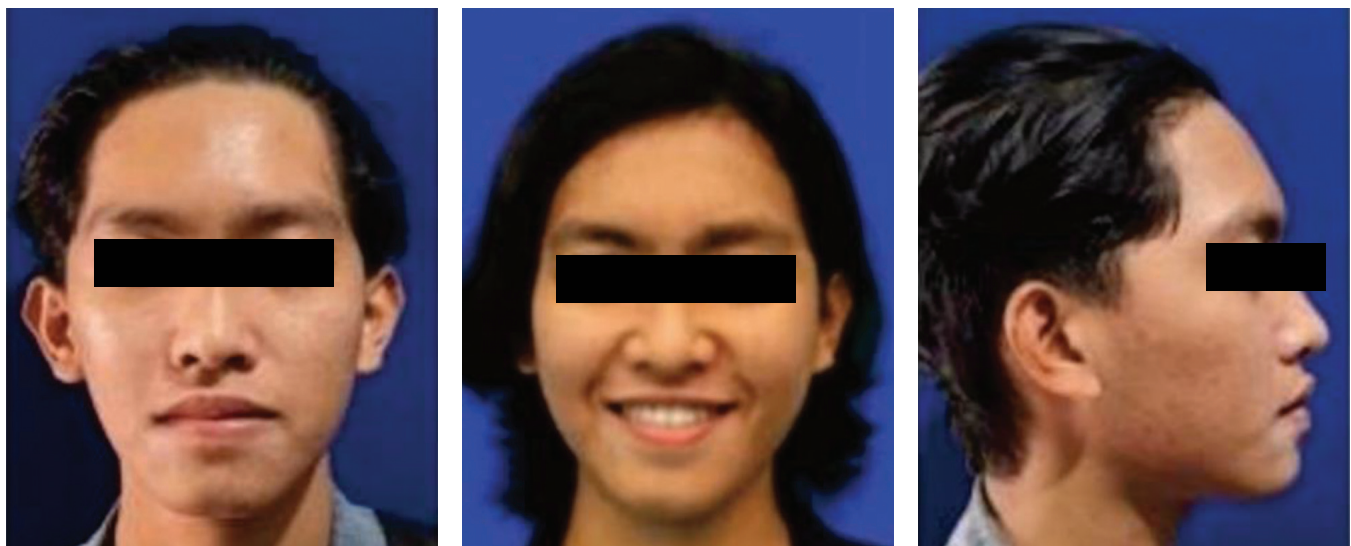


Figure 4. Post-treatment extraoral photographs.



Figure 5. Post-treatment intraoral photographs.



Figure 6. One year post-treatment extraoral photographs.

on teeth 38 and 48 must also be done to maintain the stability of treatment results.

Post-treatment change therapy after follow-up was done by modifying Hawley retainer with the addition of Z-cantilever in 31. The patient was re-educated to have odontectomy on teeth 38 and 48.

DISCUSSION

Malocclusion Class III is most common in Asian countries than in the West.¹¹ There are three main treatment options for skeletal Class III malocclusion: growth modification, dentoalveolar compensation (camouflage orthodontic), and orthognathic surgery.¹² The camouflage orthodontic was performed to achieve ideal and acceptable occlusion. The goal

is to mask the bone condition in cases of Class III skeletal defects by adjusting the angle of the teeth inclination so that a good occlusal relationship can be achieved (often called dentoalveolar compensation).

This patient was treated with camouflage orthodontic because of some unique factors. The choice of therapy was based on taking advantage of the patient's anatomical conditions, including low vertical dimensions, wide maxillary intermolar distance, hypodivergent skeletal pattern (SN-MP, 33°), and overjet negative 5. The facial profile is slightly concave which is favorable. Moon et al. indicated that Class III patients with a more hypodivergent skeletal pattern generally respond better to treatment.¹³ This case has hypodivergent skeletal pattern indicating that he would be more receptive to camouflage treatment.



Figure 7. One year post-treatment intraoral photographs.

Molars and canines' relation changed to neutroclusion after treatment and anterior crossbite was corrected. In this case, we used maxillomandibular elastics (class III elastic) because of their simplicity. It is very advantageous because the counter clockwise mandible movement could make the occlusal plane flat (Figure 8). The biomechanic of class III elastic was the extrusion of the maxillary molars, clockwise mandibular rotation that results in increased lower anterior face height¹⁴, and mandibular molar intrusion distally.

Camouflage treatment usually includes some unwanted side effects in maxilla and mandible. In the maxilla, it was extrusion of the maxillary molars and proclination of the maxillary incisors because of the Class III elastics, but those side effects were favorable in this case (Figure 8). Palatal root torque is used to control proclination maxillary incisors. In the mandible, the mandibular anterior was extruded and retroclined while there was posterior intrusion distally (Figure 8). Those side effects in the mandible could be prevented by giving anterior crown torque or inverted placement of incisors bracket.¹⁵

Mandibular plane angle at the end of the treatment increased, related to the clockwise rotation of the occlusal plane. It was optimal to the improvement of the profile in the Class III dentition. All these were beneficial in the correction of skeletal Class III malocclusion with a low mandibular plane angle.¹⁶

Through class III elastic usage, the protruded chin became less, because the forward and backward movement of the mandible was controlled. The anterior crossbite was also corrected.

The results of this study showed there were no skeletal changes, the maxillary incisors were proclined, and the mandibular incisors were retroclined, similar with de Souza

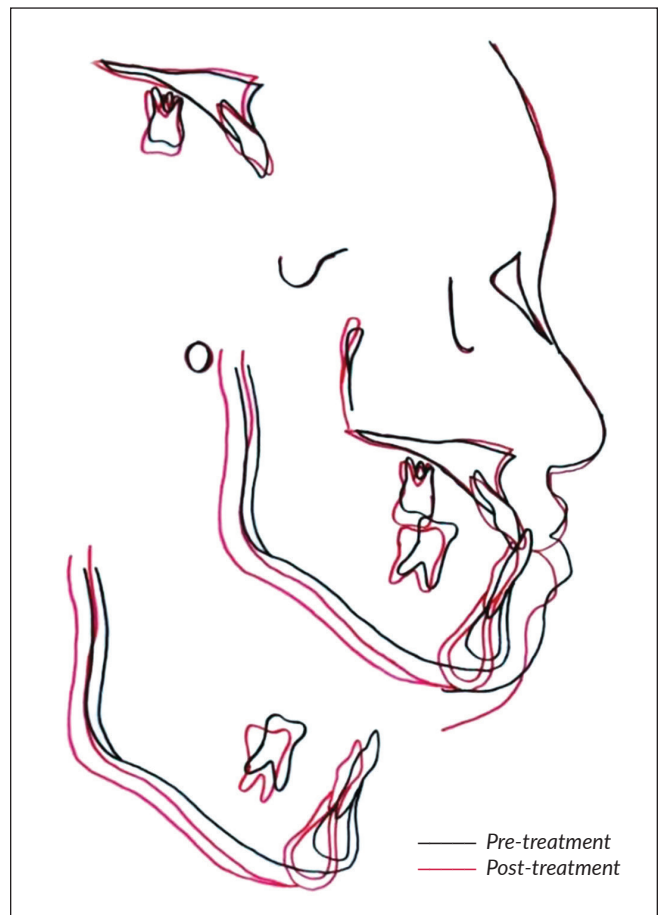


Figure 8. Cephalometric superimposition between pre-treatment and post-treatment.

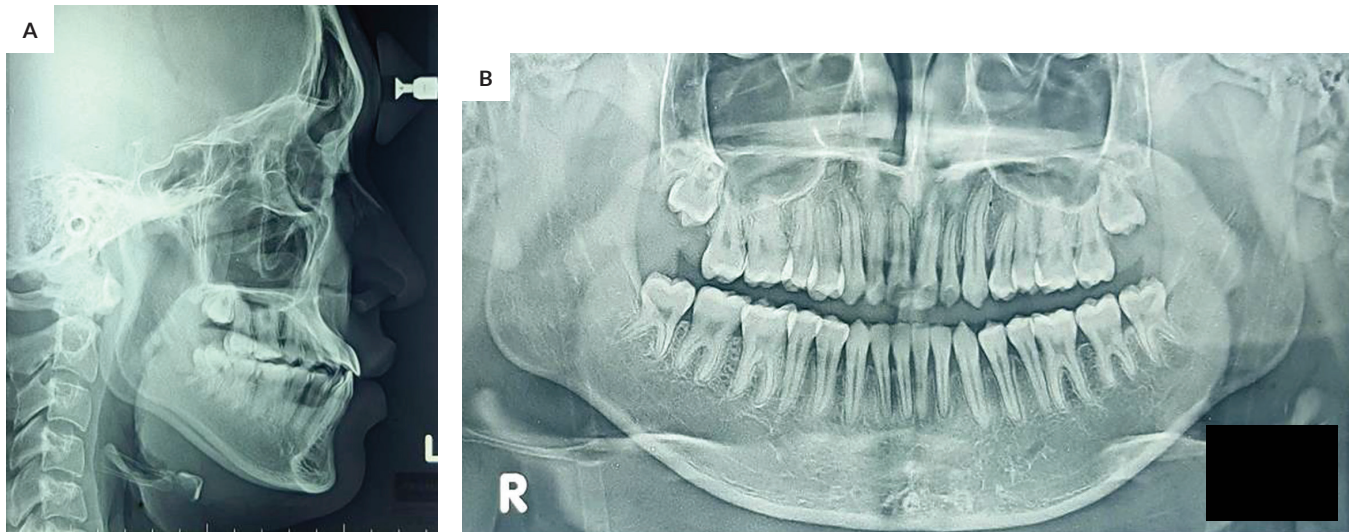


Figure 9. Post-treatment cephalogram (A) and orthopantomogram (B).

Araujo and Squeff.¹⁷ The improvement of ANB angle was visible (Table 1) and the vertical face length increased (Figure 8). At the end of the treatment, ideal interdigitation and root paralleling were achieved (Figure 9).

We decided to treat the patient with camouflage orthodontic because of some limitations such as dental anxiety with surgery and the COVID-19 pandemic. The patient also refused tooth extraction. Eventhough the skeletal relation is still class III malocclusion, the overjet and overbite have improved which changed the patient's look and smile. His facial profile became more attractive and pleasant. This makes the patient more confident and happier. He was very satisfied with the result because of the correction of facial profile, crossbite and relief of temporomandibular pain.

In this case, we determined the cause of functional shift and the character of low mandibular plane angle which prompted clinicians to review the feasibility of non-surgical treatment to improve the dental and facial aesthetics simultaneously. More importantly, the benefits and disadvantages, and the limitations of camouflage treatment should be explained carefully to the patient before the initiation of treatment.

CONCLUSION

Camouflage orthodontic treatment with class III elastics can be an effective treatment option for low vertical dimensions, wide maxillary intermolar distance, and hypodivergent skeletal pattern. Biomechanics class III elastic is the main key to achieve functional occlusion, stability, and a satisfactory aesthetic impression in adult patients with mild to moderate skeletal Class III malocclusion, anterior cross bite, and functional shift.

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Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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