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Research Article

# Proper premolar extraction to treat an angle Class III malocclusion

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## ABSTRACT

**Introduction:** One of the most challenging problems for the orthodontist is a developing skeletal Class III malocclusion. Skeletal Class III malocclusions can be characterized by a prognathic mandible, lack of maxillary growth, or both. The orthodontic camouflage treatment can be performed in Class III malocclusion patients with a mild skeletal discrepancy in patients with no growth potential. This article aims to describe the management of dentoskeletal Class III malocclusion by extraction of the upper and lower right premolars without orthognathic surgery. **Materials and Methods:** The patient was treated by a fixed orthodontic appliance with a straight wire system combined with a vertical U-loop to fix the anterior crossbite combined with Class III intermaxillary elastic. **Results:** The anterior crossbite was improved, Class I canine and molar relation had a normal overbite and overjet, and the median line was in a line, with an overall improved facial profile. **Conclusions:** Camouflage treatment with proper extraction can be considered in a nonsurgical treatment of adults.


**KEY WORDS:** Camouflage treatment, Class III malocclusion, Orthodontic, Premolar extraction

## INTRODUCTION

One of the most challenging problem for the orthodontist is a developing skeletal Class III malocclusion. Skeletal Class III malocclusions can be characterized by a prognathic mandible, lack of maxillary growth, or both, and clinically the patient's facial profile will look concave with a retrusive nasomaxillary area. Class III malocclusions represent a small proportion of all malocclusions among orthodontic patients, but the treatment is a considerable clinical challenge due to the complex diagnosis and the difficult prognosis.[1] Class III malocclusions have a strong genetic background that may express itself at an early age[2] and are far more prevalent in Asian countries than in the Western world.[3]

The orthodontist should consider several factors before planning the treatment. The severity of skeletal pattern, both anteroposterior and vertically, should be assessed. This is the major determinant of the difficulty and prognosis of the orthodontic treatment.[4] Surgical treatment may provide fear and anxiety for some patients; in these cases, the orthodontist can offer the so-called orthodontic camouflage to treat Class III malocclusion.

Camouflage treatment is defined as the displacement of the teeth relative to their supporting bone to compensate for an underlying jaw discrepancy. This treatment is generally characterized by the implementation of a less intensive treatment plan in patients with a severe problem so as to obtain optimum results within their physiologic limits. However, they may not address the actually existing problem of the patient.[5]

The orthodontic camouflage treatment can be performed in Class III malocclusion patients with a mild skeletal discrepancy in patients with no growth potential. One of the strategies of orthodontic camouflage is selective tooth extraction.[2] Conventionally, the extraction of the four premolars (mandibular first and maxillary second) is the most commons option. However, several cases of angle Class III malocclusion with different extractions have been reported, i.e. by extraction of mandibular first molar,[1] lower second molars, mandibular canine, and lower first premolars.[6] This article aims to describe the management of dentoskeletal Class III

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malocclusion by extraction of the upper and lower right premolars without orthognathic surgery.

## MATERIALS AND METHODS

### Case Summary

A 19-year-old female Javanese patient came to the private orthodontic clinic with the chief complaint of difficulty in biting and esthetics. Her medical and dental histories showed nothing abnormal. An extraoral examination showed a concave facial profile with a misaligned midline. The intraoral examination showed the patient had anterior crowding at the lower arch, space at 21–22, 22–23, and a complete bilateral Class III malocclusion both on the molar and canine relation. She also presented an anterior crossbite with negative overjet of 3 mm and mandibular midline was shifted to the left by 2 mm [Figures 1 and 2].

The temporomandibular joints were normal and slightly facially asymmetric. All permanent teeth were erupted, except for the third molars. A panoramic radiograph confirmed the presence of all permanent teeth, including unerupted third molars [Figure 3].

The initial lateral cephalometric analysis showed a dentoskeletal Class III malocclusion (ANB -2°) with maxilla and mandibular prognathic (SNA 84° and SNB 86°) with IMPA 78° and inter I 137° [Figure 4 and Table 1].

The goal of treatment, in this case, was to correct the anterior crossbite, proclination of upper and

**Figure 1:** Initial extraoral and intraoral photographs

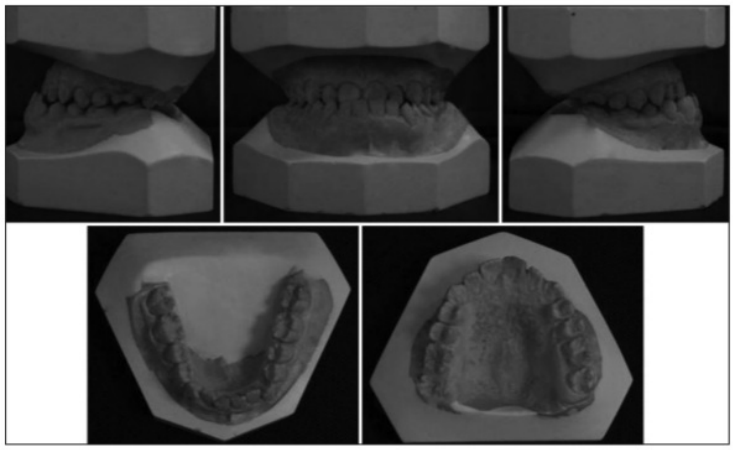

**Figure 2:** Initial dental models

**Figure 3:** Initial panoramic radiograph

**Figure 4:** Initial cephalogram

retroclination of the lower dentition, obtain normal overbite and overjet, close the anterior space, correction of the midline discrepancy and establish an esthetic profile, achieve Class 1 molar and canine relationships on both sides, and establish a good functional occlusion.

This patient had a severe crossbite (−3 mm) with a deep bite (4 mm) and the lower incisor was in a lingual position. Patients also refuse to do orthognathic surgery, so extraction needs careful consideration. In this case, we did delay extraction; therefore, it began with an anterior crossbite correction by upper incisor protraction, using vertical loops and Class III intermaxillary elastic. Once the crossbite was corrected, it was easier to determine if extraction would improve the interdigitation. Thus, in this case, 44 tooth extraction was performed for midline correction and achieved Class I canine relation and retraction 15 for the Class I molar relation. The mandibular third molars also were extracted for the distalization of mandibular teeth.

### Treatment

The first molars and the remaining teeth were bonded with a straight wire Roth fixed appliance slot 0.22. The teeth were aligned and leveled using a sequence of round Niti archwire 0.012–0.018. The treatment continued with the use of SS archwire with a vertical U-loop for

**Table 1: Cephalometric status at the initial and final treatment**

| Metode | Measurement | Normal | Pre-treatment | Post-treatment |
|---|---|---|---|---|
| Steiner | ∠SNA | 82° | 84° | 82° |
| | ∠SNB | 80° | 86° | 84° |
| | ∠ANB | | −2° | −2° |
| | I to NA (mm) | 4 mm | 6 mm | 8 mm |
| | ∠I to NA | 22° | 20° | 27° |
| | I to NB (mm) | 4 mm | 5 mm | 4 mm |
| | ∠I to NB | 25° | 27° | 13° |
| | Pg to NB | - | 0 mm | 0 mm |
| | ∠I to I | 131° | 137° | 142° |
| | ∠Occl to SN | 14° | 23° | 22° |
| | ∠Go Gn to SN | 32° | 39° | 45° |
| Downs | ∠Facial angle | 82°–95° | 94° | 94° |
| | ∠Angle of convexity | −8.5°–10° | -5° | −2° |
| | A-B plane | −9°–0° | +2° | +2° |
| | Mandibular plane (FMPA) | 17°–28° | 34° | 35° |
| | Y Axis | 53°–66° | 60° | 59° |
| | Occlusal plane | 1.5°–14.3° | 15° | 10° |
| | I to I | 130°–150.5° | 137° | 142° |
| | I – Occlusal plane | 93°–110° | 97° | 88° |
| | I – Mandibular plane (IMPA) | 81.5°–97° | 78° | 63° |
| | I – AP plane | −1–5 mm | 1 mm | 5 mm |

upper anterior protraction [Figure 5a] and produces an anterior edge to edge bite relation [Figure 5b] and then was followed using Class III intermaxillary elastics [Figure 6a]. After 6 months, the anterior crossbite was corrected, forming an overjet and overbite of 1 mm [Figure 6b]. The Class III relation on the right canine and molar, Class I on the left canine was corrected as well. The lower midline shifted to the left 2 mm. The anterior space had been closed, but the patient was not satisfied with her facial profile [Figure 7].

The treatment was followed by extraction of 15 and 44. Extraction of second maxillary premolar was done to improve the right molar relations and the extraction of first premolar mandibular to correct the median line shift. The lower third molar was extracted to facilitate the distalization. With this extraction, there was also a slight retraction the anterior teeth to improve the patient profile. After debonding, the patient was instructed to wear a circumferential Hawley retainer.


**Figure 5:** Protraction using vertical loop (a) and the result (b)


**Figure 6:** Combined with Class III elastics to create overjet (a) and the result (b)

## RESULTS

All treatment goals were successfully achieved at the end of the treatment after 2.5 years. The anterior crossbite was corrected and Class I canine and molar relation were achieved with normal overbite and overjet. The median line was in a line and the patient had a better profile. All of the teeth were in good alignment and leveled with normal interdigitation [Figures 8 and 9]. The patient was still in the stage of root paralleling and upper third molars have not been extracted [Figure 10], but she was already satisfied with the outcome of the treatment and asked to remove the bracket.

The cephalometric analysis after treatment showed improvement with the values of SNA 82°, SNB 84°, ANB-2°, inter I 142°, and IMPA 63° [Figure 11 and Table 1]. The tracing superimpositions show that the maxillary incisors had slight labial tipping and the mandibular incisors had slight lingual tipping, causing retraction of the lower lip [Figure 12]. The patient was satisfied with this achievement and reported more confidence and a beautiful smile.

## DISCUSSION

Orthodontic camouflage is well suited for patients that carry small skeletal Class III malocclusions, with no growth potential, or with a relative fine facial balance and without severe crowding.[7] This case was treated with a straight wire system appliance with vertical U-loop to correct anterior crossbite combined with the use of Class III elastic from the upper first molar to the lower U-loop.

The several loop designs that have been described have specific applications and when properly

**Figure 7:** Treatment progress

**Figure 8:** Final intraoral and extraoral photographs

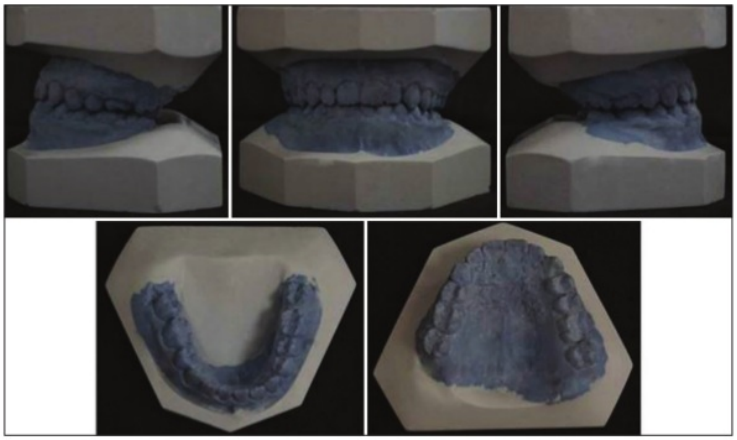

**Figure 9:** Final dental models

employed produce effective responses. One of the common applications of loops in orthodontic treatment procedures is a double vertical loop against a bracket fixed to the contained section of the archwire, activated by tying back or by compression for a mesial or distal movement (such as the midline correction).[8] Another form of camouflage is the use of Class III elastic, which allows a compensation by lingualization of the lower incisors and labialization of the upper incisors.They may extend from the upper molar to the lower cuspid and bring about retrusion of mandibular anterior and protrusion of maxillary anterior. The Class III intermaxillary elastic was used to protract maxillary first molar from Class III into Class I relation.[9] TheClass III elastic also contributes to correction of the overbite and overjet, which was at the cost of retrusion of the mandibular incisors or permitted by extraction of the lower premolar. One of the extraction patterns for Class III camouflage is an extraction of the upper second premolars and the lower first premolars.

Extraction of the maxillary second premolar, in this case, could make the maxillary molars move mesially into the Class I molar relationship. Premolar extraction favors reducing the mandibular prognathism by reducing the concavity, obtaining an esthetic profile and coincidence of midline.[10] In this case, extraction of the first premolar mandibular was used to provide to move mandibular canines distally from a Class III relationship into a Class I relationship and also to correct the midline shifting.

To improve the anterior crossbite or edge-to-edge bite, premolar extraction plays an important role by

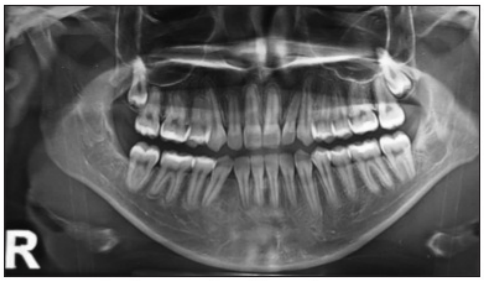


**Figure 10:** Final panoramic radiograph

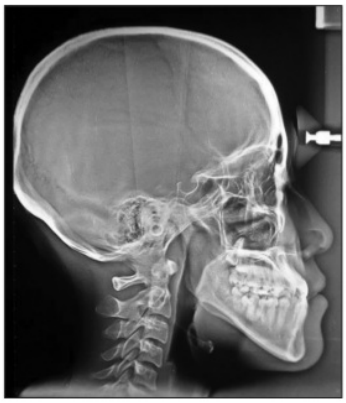

**Figure 11:** Final cephalometric radiograph

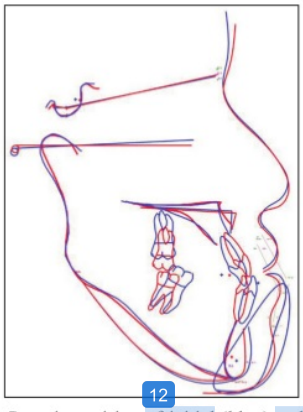

**Figure 12:** Superimposition of initial (blue) and final (red) tracing

providing space to retract lower incisors. Usually, to a patient with a Class III malocclusion having the concave profile and after extraction of lower premolars, the concave profile due to the lingual inclination of the lower incisors may feel disturbing compared to a non-extraction case.[8] However, carefulness is needed in determining whether the first or second premolars extraction. By treating the anterior crossbite first at the beginning, it will be easier to determine the proper extraction.

In this case, after correction of anterior crossbite it appears that the future removal of the first lower right premolar and the upper second premolar may improve the molar and canine relations from Class III into Class I and median line correction. The lower incisor retraction with slight lingual inclination also made the concave patient's profile much better.

## CONCLUSIONS

The treatment of anterior crossbite in this Class III malocclusion is effective using a straight wire appliance with a vertical U-loop combined with Class III intermaxillary elastic. Camouflage treatment by delaying extraction to determine tooth extraction properly can be considered in a nonsurgical treatment of adults and brings a satisfactory result.

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