

CASE REPORT

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**SUCCESSFUL TREATMENT OF CLASS III DENTOSKELETAL MALOCCLUSION
 WITH LOWER MOLAR EXTRACTION**

Valencia Ighes Tan¹⁾, Zenith Paskalin¹⁾, Avi Laviana¹⁾, Ida Ayu Evangelina¹⁾, Elih Sayuti¹⁾, Endah Mardiaty¹⁾

¹⁾ Department of Orthodontic, Faculty of Dentistry, Universitas Padjadjaran, Bandung, Indonesia

ABSTRACT

Background: Class III dentoskeletal malocclusion presents a significant clinical challenge, particularly in adult patients, due to limited skeletal growth potential and complex occlusal discrepancies. Non-surgical management often relies on dental compensation strategies, including selective extractions and transverse expansion to achieve functional and aesthetic outcomes. **Objectives:** This report aims to demonstrate the successful management of a mild skeletal Class III malocclusion using first mandibular molar extractions and maxillary expansion via quad helix appliance, as an alternative to orthognathic surgery. **Case:** A 20-year-old female patient presented with ectopic canines, chewing difficulty, and facial aesthetic concerns. Clinical and radiographic evaluations revealed a skeletal Class III relationship, bilateral anterior and posterior crossbites, and crowding. Notably, the patient had large composite restorations and overfilled endodontic treatments on her lower first molars. **Case Management:** A non-surgical orthodontic treatment was planned and executed. This included bilateral extraction of the first lower molars, maxillary expansion using a quad helix appliance, and fixed appliance therapy with a Roth-prescription straight-wire system. The treatment was followed by midline correction, retraction, and use of Class III elastics to achieve Class I molar and canine relationships. The retention phase involved clear retainers for both arches. **Conclusion:** The combination of lower first molar extraction and quad helix expansion provided an effective camouflage for a mild skeletal Class III malocclusion, improving facial aesthetics, correcting crossbites, and achieving stable functional occlusion. This case supports the viability of non-surgical orthodontic compensation in carefully selected adult Class III patients.

Keywords: class III dentoskeletal malocclusion, first lower molar extraction, quad helix

***Correspondence:** Valencia Ighes Tan, Resident of Orthodontic, Faculty of Dentistry, Universitas Padjadjaran, Jl. Sekeloa Selatan 1 40132 Bandung – Indonesia, valencia13001@mail.unpad.ac.id, +6281 322000368

INTRODUCTION

Edward Hartley Angle, known as the father of modern orthodontics, developed a classification system for malocclusions in 1899, categorizing them into Class I, Class II, and Class III based on the relationship of the first permanent maxillary and mandibular molars. This classification was refined to incorporate additional factors like jaw relationship and growth patterns. A Class III relationship indicates that the mandible is positioned further forward relative to the maxilla and/or cranial base. Occasionally, due to dental compensation, a Class I dental relationship may be observed in individuals with a Class III skeletal foundation.¹ This condition affects more than 7% of the global population, with an even higher prevalence among Southeast Asians, ranging from 12.58% to 26.67%.²

Class III malocclusion can occur due to insufficient growth of the maxilla in a downward and forward direction, or due to excessive forward growth or limited downward growth of the mandible. A hypodivergent growth pattern can worsen the Class III issue as it promotes greater upward and forward rotation of the mandible, while a vertical growth pattern can help mitigate the problem by encouraging downward and backward rotation, as long as excessive facial height does not become an additional concern. The nonsurgical management of Class III issues presents a significant challenge in our field. Nevertheless, timely diagnosis and early treatment of Class III malocclusion can be beneficial in minimizing the impact of severe Class III malocclusion during late adolescence.^{1,3}

The diagnosis, treatment planning, and prognosis of skeletal Class III malocclusion present considerable challenges for clinicians. Treatment objectives include establishing normal occlusion and improving facial aesthetics, with available modalities comprising growth modification, orthodontic camouflage, or orthognathic surgery. The selection of therapy is determined by patient age, severity of the malocclusion, presenting concerns,

clinical examination, and cephalometric analysis. Growth modification is most effective prior to the pubertal growth spurt; beyond this period, treatment options are limited to camouflage or surgical correction. In adults, the degree of skeletal discrepancy dictates the feasibility of orthodontic versus surgical intervention. Borderline cases may be managed with compensatory orthodontics, as aesthetics is not always the primary treatment objective. Extractions remain a common strategy, with the conventional protocol involving removal of four premolars, although alternative approaches have been described. De Oliveira Ruellas et al. reported that in patients with third molars, extraction of first molars may effectively address anterior-inferior crowding, control vertical dimension, and establish a Class I molar relationship.^{3,5}

CASE REPORT

A 20-year-old female presented to the orthodontic clinic of Universitas Padjadjaran for orthodontic consultation. Her chief complaint was ectopic canine teeth, difficulty of chewing well, and aesthetic problem. The extra-oral examinations showed the patient's facial index was mesoprosopic facial pattern with 87.9%, the patient's aesthetic line was Ls-E (-1mm), Li-E (0.5mm), with convex facial profile. Functional examination showed no abnormal features (Figure 1).



Figure 1. Extraoral photographs before treatment

Pre-treatment intra-oral examinations showed that she had Class III right molar relationship and Class III right and left canine relationship, with right canine ectopic. She had bilateral anterior and posterior cross bite involving the lateral incisor, left canines, right premolar and molar with severe crowding on the upper arch (9mm), while the lower arch showed mild crowding (5mm). Her lower median line shifted to the left 2mm, edge to edge relationship of anterior teeth. The patient had big composite restoration on first lower right and left mandibular (Figure 2).

Ortho-Pantomo-Gram (OPG) revealed bilateral first lower mandibular molar had overfilled of endodontic treatment (Figure 3). The pre-treatment cephalogram showed a skeletal Class III jaw relationship (as indicated by ANB angle, -2°) with vertical growth pattern and dental protrusive of both arch (Figure 4, Table 1). The patient was in good general health with no history of major systemic disease.



Figure 2. Intraoral photographs before treatment

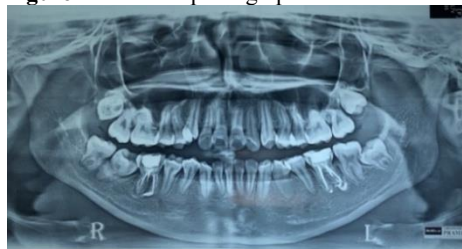


Figure 3. Ortho-Pantomo-Gram (OPG) before treatment



Figure 4. Cephalogram before treatment



Figure 5. Pre-treatment study models

Table 1. Cephalometric analysis before treatment

Variable	*Norms	Pre-treatment
<SNA	82±2°	76°
<SNB	80±2°	78°
<ANB	2±2°	-2°
U1 to N-A (mm)	4±2 mm	10 mm
<U1 to N-A	15-32°	36°
L1 to N-B (mm)	4±2 mm	8 mm
<L1 to N-B	15-32°	40°
<Interincisal	130-150°	105°
<Occlusal plane to S-N	5-30°	32°
<Go-Gn to S-N	20-40°	43°
Mandibular plane angle	17-20°	33°

* SNA: Sella-Nasion-point A; SNB: Sella-Nasion-point B; ANB: point A-Nasion-point B; U1: upper incisor; N-A: Nasion-point A; L1: lower incisor; N-B: Nasion-point B; S-N: Sella-Nasion; Go-Gn: Gonion-Gnathion. ⁶

CASE MANAGEMENT

Bands were placed on the maxillary first molars, following the cementation of a quad helix appliance (made of 0.036" stainless steel wire was soldered to the first maxillary molar band palatally) to expand the maxillary arch then used a fix orthodontic appliances (straight wire appliance with Roth prescription bracket, 0.022"x0.028" slot) in both the arches. The expansion used by quad helix appliance was stopped when the maxillary palatal cusps were in contact with mandibular buccal cusps. The total duration of expansion was three months.

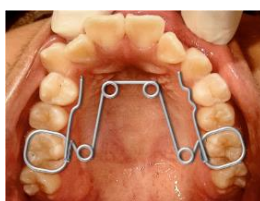


Figure 6. Illustration of quad-helix insertion on upper arch.

Brackets were bonded on both the arches and started with the phase of alignment and levelling using the 0.012", 0.014", 0.016", 0.018", 0.016x0.022" nickel-titanium wire, followed by 0.016x0.022", 0.017x0.025", 0.019x0.025" stainless steel wires. The finishing wire with 0.019x0.025" stainless steel wire used to retract the canines and anterior lower arch, and mesialization of posterior teeth using power chain. The wires down back to 0.016x0.022" stainless steel wires, Class III elastics and were used to obtain an ideal occlusal relationship.

After the finishing stage had accomplished, the settling phase was used with 0.014 nickel-titanium wire. Anterior and posterior crossbites were corrected, good interdigitation and class I canine and molar relationship between upper and lower arch had established (Figure 8). The settling phase lasted for 3 months to achieved better expression of the brackets' prescriptions and better stability. Debonding was done and clear retainer appliance was chosen as retainer in the retention phase for both maxillary and mandibular arch (Figure 12). Patient was instructed to wear the appliance full-time for the first 6 months with 1 month appointment interval. After the first 6 months, night-time wear was instructed while the appointment interval changed into 3 months to prevent relapse or occlusal changes. While the patient's mandibular growth potential remained uncertain and required ongoing monitoring, both she and her parents were pleased with the treatment outcome.



Figure 7. Extraoral photographs after treatment



Figure 8. Intraoral photographs after treatment



Figure 9. Ortho-Pantomo-Gram (OPG) after treatment



Figure 10. Cephalogram after treatment



Figure 11. Post-treatment study models



Figure 12. Clear retainer appliance

The anterior and transverse crossbites were effectively corrected by the use of quad helix and fixed appliances. A comparison of pre- and post-treatment photographs revealed a significant improvement in the patient's frontal and lateral profile (Figure 1, Figure 7). Superimposition of cephalometric tracings showed an improvement of incisive inclination of both arch (Figure 13). Additionally, the lower incisors were retracted and exhibited labial tipping.

The post-treatment radiographs showed no evidence of root resorption (Figure 9). Cephalometric analysis showed there were improvement of vertical growth pattern and dental protrusive angle of both arches that showed on Table 2.

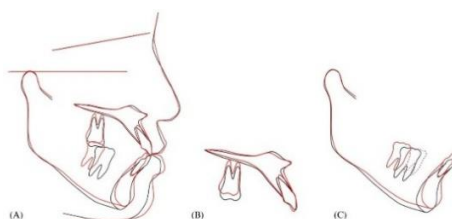


Figure 13. Cephalometric superimposition (black line: before treatment; red line: after treatment): (A) General superimposition over Sella-Nasion plane; (B) Maxillary superimposition; (C) Mandibular superimposition (red dot line = extracted first lower molar).

Table 2. Post-treatment cephalometric analysis.

Variable	*Norms	Post-treatment
<SNA	82±2°	77°
<SNB	80±2°	78°
<ANB	2±2°	-1°
U1 to N-A (mm)	4±2 mm	6 mm
<U1 to N-A	15-32°	26°
L1 to N-B (mm)	4±2 mm	6 mm
<L1 to N-B	15-32°	31°
<Interincisal	130-150°	130°
<Occlusal plane to S-N	5-30°	23°
<Go-Gn to S-N	20-40°	36°
Mandibular plane angle	17-20°	28°

* SNA: Sella-Nasion-point A; SNB: Sella-Nasion-point B; ANB: point A-Nasion-point B; U1: upper incisor; N-A: Nasion-point A; L1: lower incisor; N-B: Nasion-point B; S-N: Sella-Nasion; Go-Gn: Gonion-Gnathion. ⁶

DISCUSSION

Class III malocclusion with a strong skeletal component poses a significant orthodontic challenge, particularly when a conservative approach is preferred. A key factor in successful treatment is the patient's facial growth pattern. Conversely, when an increased lower anterior face height is present, surgical intervention is typically the preferred option. However, for patients unwilling to undergo surgery or satisfied with their facial aesthetics, an alternative approach involves dentoalveolar compensation to manage the malocclusion without addressing the underlying skeletal discrepancy, known as orthodontic camouflage.^{7,8}

In many cases, one of the aetiologies of Class III malocclusion is accompanied by maxillary transverse deficiency, requiring correction in the early stages of treatment. Skeletal maxillary protraction combined with rapid maxillary expansion (RME) has been suggested in the literature as an effective method for addressing skeletal Class III malocclusion. Additionally, studies have demonstrated that RME has beneficial effects on the sagittal positioning of the maxilla.⁹ The quad helix expander applies a slower, more gradual force and is constructed with less rigidity. Potential side effects of palatal expansion include maxillary molar extrusion and an increase in vertical facial dimensions.¹⁰⁻¹²

Common camouflage strategies for Class III malocclusion involve tooth extractions and repositioning of the mandibular incisors to enhance occlusion. While this method does not address the underlying skeletal discrepancy, it can improve the patient's facial profile. Camouflage treatment is particularly beneficial for individuals with mild to moderate skeletal Class III malocclusion and a functional shift, as it enhances treatment outcomes. By repositioning the teeth within their supporting bone, this approach helps compensate for jaw discrepancies, making it a viable option for adults seeking a non-surgical solution.¹³

In this case, the patient chose to undergo orthodontic treatment. To facilitate lower arch compensation and correct the midline, the extraction of first lower molar bilaterally was necessary. De Oliveira Ruellas et al. and Sandler et al. suggested first molar extraction as a viable treatment option in cases involving extensive caries, apical pathologies, large restorations, severe posterior crowding. The decision to extract the first molar depends on the presence and position of the third molar.⁴ Alternatively, mandibular molar extraction is an effective treatment strategy, as it provides sufficient space to correct anteroposterior discrepancies. This approach can achieve a Class I molar relationship after treatment.¹⁴

A common orthodontic compensation strategy, with or without extractions, involves using intermaxillary Class III elastics. These elastics promote mesial movement of the upper teeth, distal movement of the lower teeth, proclination of the upper incisors, and retroclination of the lower incisors. Class III elastics were utilized to correct the Class III occlusal relationship, leading to the protraction of the maxillary complex and maxillary incisors, as well as the retroclination of the mandibular incisors.^{5,14}

This case highlights that extraction the first lower molar bilaterally because of large restoration could get best option for camouflage mild Class III skeletal in this patient rather than premolar extraction, because it could make hinder jaw development, and it could cause the upper lip to move backward, leading to a more concave profile. The treatment also used a quad helix appliance to expand maxilla transversally to correct posterior crossbite with fixed appliance therapy and Class III elastics can serve as an effective strategy to camouflage mild Class III skeletal cases. Successful treatment of Class III malocclusion involved dental compensation with molar extraction followed by midline and overjet correction. Good functional occlusion and facial aesthetics were achieved by the end of treatment.

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