Case Report

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Orthodontic Camouflage as a Conservative Strategy in an Adult Skeletal Class III Patient: A Case Report

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ABSTRACT

Background: This case report presents the orthodontic management of a 17-year-old female patient with a skeletal Class III malocclusion and multiple dental discrepancies, including anterior and posterior crossbite, retrocline incisors, crowding, and retained deciduous teeth. The patient was treated with fixed mechanotherapy using the MBT 0.022" system. A multidisciplinary diagnostic approach involving clinical, radiographic, and cephalometric analysis guided the treatment planning. Favourable skeletal and dental changes were achieved, improving both function and facial aesthetics.

Keywords: Orthodontics, Conservative strategy, Skeletal class III.

INTRODUCTION

Class III malocclusions are among the most challenging cases to diagnose and treat in orthodontics due to the complex interplay of skeletal and dental discrepancies. These malocclusions often involve a combination of mandibular prognathism, maxillary deficiency, or both, which can result in negative overjet, anterior crossbite, and aesthetic concerns. The treatment becomes even more complicated in non-growing patients with limited skeletal modifications.

In growing individuals, early orthopaedic interventions may offer some skeletal correction; however, in borderline or late adolescent cases, the scope is often limited to dentoalveolar compensations. When a true skeletal discrepancy persists after growth completion, orthognathic surgery is considered the ideal treatment modality to achieve optimal facial and occlusal harmony. Despite its effectiveness, many patients refuse surgery due to its invasive nature, extended recovery period, and financial burden.

As a result, orthodontists are frequently challenged to manage these cases using non-surgical alternatives such as extractions, inter-arch elastics, camouflage mechanics, and, more recently, skeletal anchorage techniques. This case report presents the non-surgical management of a 17-year-old female with a borderline skeletal Class III malocclusion, anterior and posterior crossbite, and retrocline upper incisors with severe crowding, treated successfully with fixed mechanotherapy and strategic extractions.

CASE REPORT

A 17-year-old female patient was diagnosed with Angle's Class III malocclusion on a skeletal Class III basis. A horizontal growth pattern, upper incisors were retroclined, and lower incisors were upright. Crowding was present in both arches and a protrusive lower lip, accompanied by a reduced nasolabial angle. The soft tissue profile was straight with anterior divergence.

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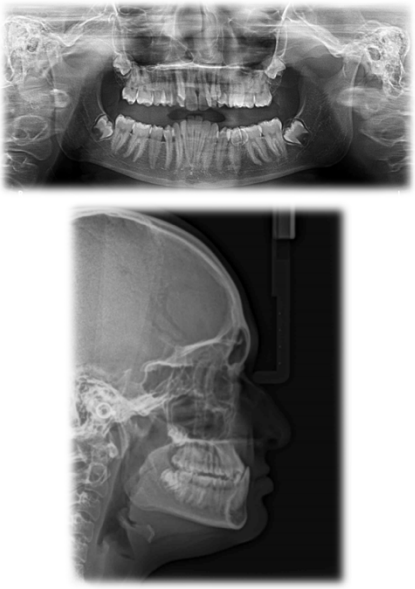
Intraorally, the patient had an Angle's Class III molar and canine relationship on both sides, with a negative overjet of 2.5 mm and a complete deep bite. The presence of over-retained teeth 53 and 83 in the upper and lower arch, respectively, with palatally blocked out 12 and 22. The maxillary incisor midline was coincident with the facial midline. Despite the presence of crossbites, no functional shift was detected when the mandible was guided into centric relation (Figure 1).

Figure 1: Pre-treatment Intraoral and extraoral photographs and radiographs.

Table 1: Cephalometric analysis.

Parameter	Mean	Pretreatment Value	Post-treatment Value
SNA (°)	82	82^0	82^0
SNB (°)	80	85^0	82^0
ANB (°)	2	-3^0	0
Go-Gn to SN (°)	32	22^0	19^0
1 to NA (°)	22^0	13^0	36^0
1 to NB (°)	25^0	12^0	27^0
Jaraback ratio	62-68	75%	70%
AO-BO	0mm	-6mm	-3mm
IMPA (°)	90	87^0	98^0
U1- SN (°)	104	95^0	118^0
U1- L1 (°)	131	158^0	117^0
Lower lip-H line	0mm	3mm	4mm

A panoramic radiograph confirmed the presence of mandibular third molars (Figure 1). Lateral cephalometric analysis indicated a skeletal Class III pattern (ANB –3°, Wits appraisal –7 mm) with a hypodivergent growth pattern (GoGn-SN, 22°). The maxillary incisors were proclined (U1–NA, 13°), and the mandibular incisors were retroclined (L1–NB, 12°) (Figure 1) (Table 1).



Treatment objective

The following treatment objectives were established:

(1) To achieve ideal axial inclination and angulation of teeth;

(2) To correct the anterior and posterior crossbite;

(3) To relieve crowding;

(4) To establish Class I molar relationships,

(5) To achieve normal overjet and overbite;

(6) To obtain a stable buccal occlusion;

(7) To improve facial and dental esthetics by establishing an aesthetic smile.

Treatment Plan

The treatment was initiated with the extraction of over-retained teeth 53 and 83. Fixed mechanotherapy using a 0.022 × 0.028" MBT prescription appliance was employed in both the maxillary and mandibular arches. Full arch bonding

and levelling were performed to initiate alignment. A lower posterior bite plate was used to disocclude the anterior region, facilitating correction of the crossbite. The palatally blocked-out maxillary lateral incisors (12 and 22) were aligned using the piggyback wire technique. The treatment was subsequently advanced through the finishing and detailing stages to achieve optimal occlusion and aesthetics.

Alternative treatment

An alternative approach to managing this borderline skeletal Class III malocclusion was orthognathic surgery, specifically a mandibular setback procedure, in combination with comprehensive fixed mechanotherapy using the MBT (0.022") appliance system. However, for patients unwilling to undergo surgery, several non-surgical orthodontic alternatives could be considered. One such option involves distalization of the mandibular dentition with the help of temporary anchorage devices (TADs). By providing absolute anchorage, TADs enable controlled retraction of the lower arch, thereby achieving a Class I molar and canine relationship without compromising the anchorage unit.

TREATMENT PROGRESS

Fixed appliances with 0.022" × 0.028" slot brackets were bonded in both the maxillary and mandibular arches. The over-retained teeth 53 and 83 were extracted. To relieve the anterior crossbite and facilitate proper alignment, posterior bite blocks were bonded to the occlusal surfaces of the mandibular posterior teeth to disocclude the bite (Figure 2, a).

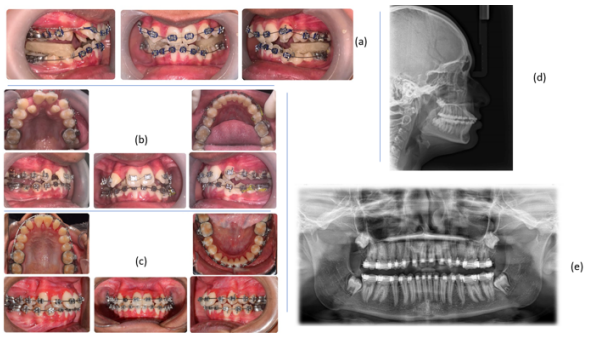


Figure 2: Treatment progress: (a) Bonded posterior bite block to elevate the bite. (b) Consolidation was carried out in 3 segments and preserved the spaces for blocked out lateral incisors and positive overjet. (c) After the alignment of blocked out laterals with the piggyback technique. (d-e) Lateral cephalogram and panoramic radiograph.

Following the proclination of the upper central incisors (11 and 21), space was gained in the anterior region. Consolidation was subsequently carried out in the regions of 16–13, 11–21, and 23–26 to preserve adequate space for the alignment of the palatally blocked-out lateral incisors (12 and 22). These teeth were successfully brought into the arch using the piggyback wire technique, which allowed for simultaneous alignment with minimal force application (Figure 2, b).

The transverse discrepancy was approximately 4 mm, which was corrected by posterior arch development. Alignment and levelling proceeded using a progressive archwire sequence, beginning with 0.014" nickel–titanium wires and progressing to 0.019" × 0.025" stainless steel wires to achieve effective torque control and final levelling of the maxillary arch and mandibular arch simultaneously (Figure 2, c).

At the end of the treatment panoramic radiograph showed no evidence of significant root or alveolar bone resorption and demonstrated satisfactory root parallelism. Lateral cephalometric analysis revealed proclination of both upper and lower anterior teeth, with U1-NA at 45° and L1-NB at 26°. The skeletal pattern indicated a horizontal growth direction (SN-GoGn: 22°), and the ANB angle measured 1°, confirming a skeletal Class III pattern (Figure 2, d and e). During the finishing phase, both molars and canines were achieved in Angle's Class I occlusion. Final occlusal detailing was performed using 0.016 NITI archwires, supplemented with triangle elastics extending from the maxillary canines to the mandibular canines and first premolars. Anterior box elastics were used from the maxillary to mandibular lateral incisors to refine overbite and facilitate occlusal settling. As expected with the use of Class III elastics, maxillary incisor proclination was noted; hence, careful control of maxillary incisor torque was incorporated into the arch wire.

The ANB changes may be explained by the downward and backwards rotation of the mandible (SN-MP, from 19° to 22°) caused by the Class III

elastics. Camouflage treatment led to a marked proclination of the maxillary and mandibular incisors, as evidenced by an increase in U1-NA from 13° to 36° and L1-NB from 12° to 27°, respectively.

After finishing and detailing the phase, the patient exhibited a well-established and stable buccal occlusion on both the right and left sides, characterized by ideal Class I molar and canine relationships. An optimal overjet and overbite were achieved, contributing to functional occlusal harmony. Additionally, the dental midlines were successfully aligned with the facial midline, enhancing both occlusal symmetry and facial aesthetics. No evidence of significant root or alveolar bone resorption was observed, and root alignment appeared satisfactory, with parallelism maintained throughout the dental arches.

The orthodontic treatment for this patient lasted 19 months, followed by a one-year retention phase. A structured retention protocol was implemented to preserve the achieved outcomes and ensure long-term stability. Removable Hawley retainers were provided for both the maxillary and mandibular arches. The patient was instructed to wear the retainers full-time during the first six months—excluding meal times and oral hygiene routines—followed by nighttime wear for the remainder of the retention period.

RESULTS

The posttreatment records showed that the treatment objectives were obtained. The patient had anterior and posterior crossbites were corrected. Acceptable overbite and overjet were achieved along with Class I canine and molar relationships, and her dental midlines were aligned with her facial midline. The facial profile was improved by downward and backward rotation of the chin. The patient's smile aesthetics were significantly improved. The patient did not report any temporomandibular joint pain or discomfort during or after orthodontic treatment. A posttreatment panoramic image showed no signs of significant root or bone resorption. Acceptable root parallelism was observed. The lateral cephalometric analysis showed skeletal changes with a slight forward movement of the maxillary skeletal base (SNA, 82) and downward and backward rotation of the mandible (SNB, 82). Because the patient is an adult, there was little chance of growth modification, and skeletal changes were impossible without surgery. The ANB changes may be explained by the downward and backward rotation of the mandible (GoGn-SN, from 22 to 19) caused by the Class III elastics. By controlling the maxillary incisor torque, the posttreatment maxillary incisor inclination increased less than 1 (U1-SN, from 95 to 118). Alignment and levelling of the lower arch, increase in inclination of mandibular incisors (IMPA, from 87 to 98). Esthetic soft tissue profile changes were demonstrated by the positions of the upper and lower lips to the H-line (lower lip-H line: 3mm to 4mm), creating an improved profile (Figure 3).

Figure 3: Post-treatment photographs (extra-oral and intra-oral).

DISCUSSION

Class III malocclusions present a significant challenge in orthodontic treatment due to the complex interplay of dental and skeletal components. This complexity is further compounded in nongrowing patients, where treatment options become limited following the completion of craniofacial growth. In such cases, camouflage treatment relies solely on dentoalveolar compensations to mask the underlying skeletal discrepancy. However, for adult patients with pronounced skeletal Class III relationships, orthognathic surgery often represents the most effective and stable treatment modality.

Despite this, many patients opt out of surgery due to concerns about cost, surgical risks, or the invasive nature of the procedure. For these individuals, non-surgical alternatives such as the use of temporary

skeletal anchorage devices (TSADs) for mandibular total arch distalization, strategic extractions, Class III intermaxillary elastics, or even facemask therapy (in select cases) may serve as viable options, albeit with certain limitations in addressing the skeletal imbalance.

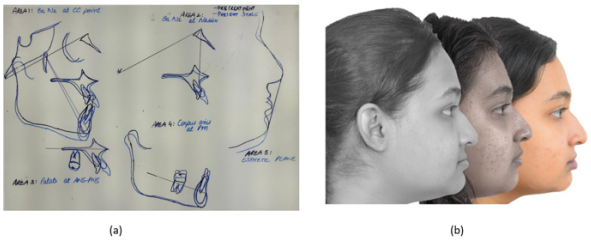
In this case, the patient presented with a skeletal Class III pattern, characterized by an orthognathic maxilla and a prognathic mandible, as evidenced by cephalometric findings of ANB: -3° and Wits appraisal: -6 mm. Clinical assessment further revealed mild midfacial deficiency and existing dental compensations. While camouflage treatment was pursued, a more comprehensive approach—including extraction of the maxillary first premolars in conjunction with orthognathic surgery—would likely have provided superior long-term skeletal and occlusal stability.

Stellzig-Eisenhauer et al[1] identified the Wits appraisal as the most decisive cephalometric parameter for determining the appropriate therapeutic pathway, camouflage versus surgical intervention, in Class III malocclusion cases. According to their findings, the average Wits value for patients successfully treated with camouflage was approximately -4.6 mm. In this patient's Wits appraisal of -6 mm exceeded this threshold, suggesting that surgery would have been the more predictable modality. Nevertheless, several clinical factors indicated that camouflage treatment could be a viable alternative.

Moon et al[2] observed that Class III patients with hypodivergent skeletal patterns generally demonstrate more favourable responses to orthodontic treatment. They reported that a patient with a mandibular angle of 23° was managed successfully, while treatment failed in a case with a 29° angle. Although these findings pertain to early treatment, they can be extrapolated to adult patients. This patient exhibited a hypodivergent skeletal pattern with an SN-MP angle of 19°, which supported the potential for successful camouflage.

Reyes et al[3] observed that adult patients with Class III malocclusion frequently exhibit an increased lower anterior facial height. However, in this particular case, the patient demonstrated a relatively reduced anterior facial height-to-total facial height ratio (51.0%), indicating a vertically compact lower face. Consequently, the mild increase in lower facial height resulting from the clockwise mandibular rotation induced by Class III elastics proved to be beneficial in enhancing overall facial proportions. In adult camouflage treatment of skeletal Class III malocclusions, the principal mode of correction is typically achieved through retroclination of the mandibular incisors, thereby contributing to the improvement of the sagittal dental relationship without significantly altering the skeletal framework.

Wehrbein et al[4] warned that patients with a narrow mandibular symphysis are at greater risk of incisor root dehiscence or cortical plate perforation during retraction. Fortunately, this patient had sufficient alveolar bone support around the mandibular incisors, mitigating the risk of iatrogenic complications.



(a) (b)

Figure 4: (a) Ricketts Superimposition. (b) Facial transformation.

Class III intermaxillary elastics are commonly employed in such cases to retract the mandibular arch and advance the maxillary dentition. While effective in altering sagittal relationships, these elastics also have vertical side effects, including extrusion of mandibular incisors and maxillary molars, which induce a counterclockwise rotation of the occlusal plane. This rotation occurs as the posterior occlusal plane drops and the anterior portion rises. Though beneficial in hypodivergent patients, this effect is undesirable in hyperdivergent individuals, where further elongation of the lower facial height should be avoided.

In this case, despite clockwise rotation of the mandible, superimposition of pre- and posttreatment records revealed a counterclockwise rotation of the occlusal plane (Figure 4, a). This was primarily due to the extrusion of the maxillary molars and mandibular incisors. While counterclockwise occlusal plane rotation may

sometimes reduce smile curvature, Batwa et al[5] reported that minor occlusal plane inclination changes are unlikely to affect smile esthetics significantly.

Considering the predictable proclination of maxillary incisors associated with the use of Class III elastics, meticulous torque control was a critical component of the treatment strategy. To mitigate excessive incisor flaring during the initial stages, rectangular nickel-titanium archwires were employed for early alignment, providing improved buccolingual control. As treatment advanced, third-order torque adjustments were incorporated into the finishing stainless steel archwires to reinforce labial root torque of the maxillary incisors. This well-planned biomechanical approach effectively maintained incisor inclination, resulting in a minimal increase in U1-SN angulation—from 95° to 118°—despite the continued application of intermaxillary elastics.

Orthodontic camouflage is a non-surgical treatment strategy aimed at masking underlying skeletal discrepancies through dental compensation. In cases of mild skeletal Class III malocclusion with acceptable facial aesthetics and harmonious soft tissue profiles, camouflage can be effectively employed through various biomechanical approaches. These may include strategic extractions of premolars, distalization of the mandibular dentition using skeletal anchorage or appliances, and the application of Class III intermaxillary elastics to correct sagittal discrepancies.

However, the success of camouflage treatment is largely dependent on careful case selection. Patients with borderline skeletal discrepancies, low mandibular plane angles, and deep bite tendencies are more suitable for this approach. In contrast, individuals presenting with severe skeletal Class III relationships, high mandibular plane angles, or increased lower anterior facial height are typically poor candidates for camouflage, as the extent of required dental compensation may compromise function, stability, and facial esthetics (Figure 4).

In such instances, orthognathic surgery—often involving mandibular setback, maxillary advancement, or bimaxillary procedures—remains the definitive treatment modality to establish a functionally stable occlusion, balanced facial proportions, and long-term treatment stability.

CONCLUSION

Orthodontic camouflage using Class III elastics can be effective in mild skeletal Class III malocclusions, particularly in patients with low mandibular plane angles and deep bites. However, it is not ideal for patients with high mandibular plane angles and increased lower anterior facial height, as Class III elastics tend to extrude maxillary molars and induce clockwise mandibular rotation, further worsening the vertical dimension. Additionally, they can exacerbate maxillary incisor proclination, compromising both esthetics and treatment stability.

Despite these limitations, when orthognathic surgery is declined, the use of temporary skeletal anchorage devices (TSADs) can help control molar extrusion and incisor flaring, making camouflage treatment with Class III elastics a viable alternative. The discussed case report illustrates a successful example where camouflage treatment combined with Class III elastics was used to correct a skeletal Class III malocclusion with crossbites, yielding functionally and aesthetically satisfactory results.

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