



# When Orthodontics Prevails: Non-Surgical Management of a Borderline Adult Skeletal Class III Malocclusion: A Case Report

Meryem Lahlou<sup>1\*</sup>, Meriem Bellamine<sup>1</sup>, Ihsane Ben Yahya<sup>2</sup>

<sup>1</sup>Department of Orthodontics, Mohammed VI Faculty of Dentistry, Mohammed VI Health & Sciences University, Casablanca, Morocco

<sup>2</sup>College of Dentistry, Mohammed VI Faculty of Dentistry, Mohammed VI Health & Sciences University, Casablanca, Morocco  
Email: \*mlahlou@um6ss.ma

**How to cite this paper:** Lahlou, M., Bellamine, M. and Ben Yahya, I. (2026) When Orthodontics Prevails: Non-Surgical Management of a Borderline Adult Skeletal Class III Malocclusion: A Case Report. *Open Access Library Journal*, **13**: e15009. <https://doi.org/10.4236/oalib.1115009>

**Received:** February 9, 2026

**Accepted:** April 20, 2026

**Published:** April 23, 2026

Copyright © 2026 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

**Background:** Skeletal Class III malocclusion in adults is commonly managed with combined orthodontic and orthognathic surgical treatment. However, when surgery is declined, orthodontic camouflage may be considered in carefully selected cases. Borderline Class III cases are particularly challenging because treatment decisions must balance skeletal discrepancy, dentoalveolar compensation, and facial esthetics. This report describes the non-surgical management of a borderline adult skeletal Class III malocclusion using controlled orthodontic biomechanics. **Case Description:** A 30-year-old patient presented with mandibular crowding, bilateral crossbite, and an edge-to-edge anterior relationship. Cephalometric analysis revealed a skeletal Class III pattern with maxillary retrognathia ( $SNA = 75^\circ$ ), hyperdivergence, and a marked AO-BO discrepancy ( $-9$  mm), although the pretreatment ANB of  $0^\circ$  placed the case in the borderline category. As the patient declined orthognathic surgery, orthodontic camouflage was planned. Treatment involved extraction of the mandibular first premolars followed by comprehensive fixed appliance therapy. Sequential archwires and Class III elastics were used to correct sagittal, transverse, and vertical discrepancies. However, long-term follow-up could not be completed because the patient did not attend the scheduled post-treatment follow-up appointments. **Conclusion:** Orthodontic camouflage can provide satisfactory functional and esthetic outcomes in selected borderline skeletal Class III cases when orthognathic surgery is declined, provided that careful diagnosis and controlled biomechanics guide treatment planning.

## Subject Areas

Dentistry

## Keywords

Skeletal Class III Malocclusion, Facially Driven Orthodontics, Camouflage Orthodontics, Borderline Orthodontics

---

## 1. Introduction

In Africa, approximately three-quarters of adolescents and young adults present with some form of malocclusion, representing a significant public health and economic burden [1]. Although Class III is among the least prevalent malocclusions in our population [2], it should not be overlooked when mastering treatment strategies.

Effective management begins with accurate diagnosis, requiring careful clinical evaluation and a thorough understanding of the multifactorial etiology of skeletal Class III malocclusion. This includes genetic predisposition, environmental influences, and dentoalveolar compensations [3]. The literature emphasizes a holistic diagnostic approach, considering sagittal discrepancies alongside transverse and vertical dimensions, as well as patient-specific dental and general health factors [4]. Treating adult patients adds a layer of complexity, as malocclusions are often compounded by compromised dentitions, including missing, carious, or restored teeth. In non-growing patients, treatment options generally fall into two categories: combined orthodontics with orthognathic surgery, or dentoalveolar compensation [5].

In practice, however, many patients with skeletal Class III malocclusion decline orthognathic surgery for financial, social, or psychological reasons. When this occurs, orthodontists must resort to camouflage treatment, aware that it entails compromises. While the underlying skeletal discrepancy cannot be fully corrected, treatment planning aims to optimize esthetics and functional balance within the limits of dentoalveolar compensation [6]. A key decision in this process concerns the extraction pattern, tailored to existing dental compensation, facial esthetics, and the biomechanics required to mask the skeletal discrepancy. In this context, biomechanics should adapt to the extraction strategy, not the reverse. Success in camouflage therapy therefore depends on the precise coordination of anchorage, torque control, and incisor inclination, while adhering to the principles of facially driven orthodontics to achieve acceptable overjet correction, functional occlusion, and a harmonious facial profile, even without surgical repositioning of the jaws [7].

The aim of this article is to present a clinical case of a borderline skeletal Class III treated with simple yet well-controlled biomechanics, designed to serve the patient while respecting her preferences and avoiding the use of additional auxiliaries. This approach demonstrates how a carefully structured, yet straightforward treatment plan can clearly illustrate each biomechanical step and ultimately deliver both functional and esthetic satisfaction.

## 2. Case Presentation

### *Diagnosis and Etiology*

A 30-year-old patient presented to the Department of Orthodontics at the Casablanca Consultations and Treatment Centre with the chief complaint of lower teeth crowding and bottom molars outlining the upper ones making her occlusion uncomfortable. No significant findings were reported in her medical history; however, her dental history included extraction of the upper first premolars during childhood. Extraoral clinical examination (**Figure 1**) revealed a concave soft-tissue profile with a retrognathic maxilla, an open nasolabial angle and a pronounced mentolabial angle. She presented with a dolichocephalic facial morphology, characterized with reduced cheek prominence, and a well-positioned chin. Clinical smile assessment demonstrated a narrow smile with wide buccal corridors and an everted lower lip.



**Figure 1.** Facial photographs.

Intraorally (**Figure 2**), the patient presented with a maxillary transverse deficiency with the absence of tooth 1.4 and 2.4. Lateral occlusal assessments showed severe Angle Class III canine relationships and Class I molars bilaterally.



**Figure 2.** Intraoral photographs.

Bilateral crossbite was present, along with a full left posterior crossbite, and anteriorly, she exhibited an edge-to-edge occlusion. Crowding was light in the maxilla shows (1 - 2 mm) and moderate in the mandible (5 - 6 mm). No temporoman-

dibular joint signs or symptoms were observed, and centric relation coincided with centric occlusion.

A panoramic radiograph (**Figure 3**) showed the absence of tooth 1.4 and tooth 2.4 as well as mandibular third molars. In addition, the lateral cephalogram (**Figure 3**) was analysed using the iortho Angel Aligner Cephalometric tracing software (**Table 1**), which showed a class III skeletal pattern with (AO-BO =  $-9^\circ$ ) associated with retrognathic maxilla (SNA =  $75^\circ$ ) and a hyperdivergent pattern (GOGN-SN =  $47^\circ$ ). The maxillary incisors (U1 to NA =  $19^\circ$ ) and lower incisors were retroclined (IMPA =  $78^\circ$ ).



**Figure 3.** Pre-treatment radiographs.

**Table 1.** Pretreatment and post-treatment cephalometrics.

Measurements	Norms	Pretreatment	Posttreatment
SNA ( $^\circ$ )	82.0	75	72
SNB ( $^\circ$ )	80.0	75	71
ANB ( $^\circ$ )	2.0	0	1
SND ( $^\circ$ )	76	72	70
Po-NB (mm)		1	2
OP-SN ( $^\circ$ )	14	28	26
GoGn-SN ( $^\circ$ )	32	47	47
U1-NA ( $^\circ$ )	24	19	19
U1-NA (mm)	4	5	4
L1-NB ( $^\circ$ )	24	21	26
L1-NB (mm)	4	3	4
U1-L1 ( $^\circ$ )	131	140	133
FMIA ( $^\circ$ )	67	71	64
FMA ( $^\circ$ )	25	31	30
IMPA ( $^\circ$ )	88	78	86
AO-BO (mm)	$-2 \pm 2$	$-9$	$-3$
AFH (mm)	65	67	67
PFH (mm)	45	43	41
PFH/AFH (%)	0.69	64	61

Although the AO-BO discrepancy ( $-9$  mm) and the severe maxillary retrognathia would typically indicate the need for surgical correction, the pretreatment ANB of  $0^\circ$ , balanced bimaxillary dental compensations, and the patient's harmo-

nious facial profile place this case in the borderline category between orthodontic camouflage and surgery.

#### *Treatment plan*

The treatment objectives were to correct the transverse maxillary deficiency and restore proper lateral and posterior occlusion, achieve a Class I canine relationship while maintaining Class I molar relationships, and establish appropriate overjet and overbite. Additional goals included resolving dental crowding to obtain ideal dental alignment, preventing any worsening of the vertical dimension, and harmonizing the patient's facial profile. Finally, the treatment aimed to broaden the smile and eliminate dark buccal corridors, contributing to an overall improvement in facial esthetics. The ideal treatment option for this case would have been a non-extraction surgical approach. Given the prior extraction of teeth 1.4 and 2.4, a surgical correction would have allowed for biomechanically more favourable management of the existing maxillo-mandibular discrepancy. Maxillary advancement combined with mandibular repositioning would have significantly improved the patient's facial esthetics, reduced the nasolabial angle, corrected the lower lip eversion, and potentially enhanced the vertical dimension. However, the patient declined orthognathic surgery, leaving camouflage as the only feasible option. Consequently, an extraction camouflage treatment was planned. We chose to extract teeth 3.4 and 4.4 and utilise orthodontic biomechanics to achieve the desired treatment objectives.

Comprehensive fixed orthodontic therapy was initiated using a 0.022 × 0.028-inch bracket system, with a total treatment duration of 24 months (**Figure 4**). During the initial leveling and alignment phase, an anterior open bite developed, resulting from mandibular arch expansion and the natural consequence of resolving lower crowding, which led to protrusion of the lower incisors. Sequential Nickel-Titanium archwires were employed for leveling and alignment: 0.014, 0.016, 0.016 × 0.022, 0.017 × 0.025, and 0.018 × 0.025 inches, followed by a 0.019 × 0.025-inch stainless steel archwire with negative torque for lower incisor up-righting. Anchorage was reinforced with full-arch stainless-steel wires and selective use of Class III (5/16-inch, 4.5 oz) and intermaxillary (3/16-inch, 4.5 oz) elastics to control sagittal and vertical movements. Extraction spaces were allocated as follows: primary relief of lower crowding, controlled retraction and up-righting of mandibular incisors, and direct canine repositioning into the extraction sites to establish Class I canine relationships.

The transverse deficiency was successfully treated through dentoalveolar expansion using the NiTi archwire sequence and stainless steel archwire adjustments. Individualized arch coordination guided the expansion, which was limited to the anatomical boundaries of the WALA ridges. The sagittal dimension was corrected with the inferior premolars' extractions and class III elastics. An ideal overbite was established, along with Class I molar and canine relationships, meeting all the treatment objectives. Post-treatment photographs, radiographs and superimpositions (**Figures 5-7**) reveal a fuller smile and improvements in facial aes-

thetics and overall facial balance. The cephalometric measurements before and after treatment are detailed in **Table 1**.



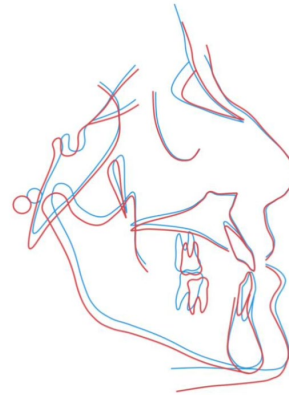
**Figure 4.** Treatment progress intra oral photographs.



**Figure 5.** Post-treatment photographs.



**Figure 6.** Post-treatment radiographs.



**Figure 7.** Pre-treatment and post-treatment superimposition.

Retention was performed using bimaxillary bonded retainers: 2-2 in the maxilla and 3-3 in the mandible. The occlusion was finished to achieve perfect intercuspation, which provided additional support for long-term stability. The bonded retainers were intended for indefinite wear, with regular monitoring at follow-up appointments.

However, limitations exist. Long-term stability could not be fully assessed, as the patient did not attend all post-retention follow-up appointments. Although vertical dimension was carefully controlled during treatment, some increase occurred due to elastic wear. Furthermore, this case would ideally have been treated with orthognathic surgery to fully correct the skeletal Class III discrepancy, but camouflage orthodontic treatment was presented as an alternative because the patient declined the surgical plan.

### 3. Discussion

Class III treatment in non-growing patients depends on the severity of the malocclusion and generally falls into two categories: mild to moderate cases are managed with dento-alveolar compensations, whereas severe cases require a combination of orthodontics and orthognathic surgery [8]. However, this distinction is not always straightforward. Some cases are in between these categories, so-called borderline cases, which often represent one of the most challenging decision-making scenarios for orthodontists. In such situations, the choice is not simply right or wrong; rather, it demands a well-though treatment plan that must be confidently carried through to restore both aesthetics and function.

Our patient presented as a borderline case, and we initially recommended an orthognathic approach, considering the maxillary retrognathia, the absence of upper premolars, and the overall facial aesthetics. Nevertheless, treatment decisions should be made collaboratively between patient and clinician. In this instance, the patient declined surgical intervention, leaving orthodontic camouflage as the only viable alternative. We agreed to pursue this treatment plan, as the patient was primarily concerned with her smile aesthetics and was not worried about her overall facial appearance. The position of the maxillary and mandibular incisors (I/NA =

5 mm and IMPA = 88°) further supported the feasibility of a camouflage approach. This decision is consistent with the recommendations of Kerr *et al.*, who suggested that, when determining the treatment plan for a patient with a marked Class III malocclusion, an ANB angle of  $-4^\circ$  and a lower incisor inclination of  $83^\circ$  to the mandibular plane may represent the threshold of what can typically be corrected using orthodontic appliances alone [9].

The decision to extract the lower first premolars was guided by the presence of significant mandibular crowding (5 - 6 mm), which facilitated the achievement of a Class I canine relationship more rapidly, as the canines could be repositioned with relative ease. This extraction strategy allowed us to maintain the position of the maxillary incisors while improving the axial inclination of the mandibular incisors. In Class III camouflage cases, treatment objectives typically involve proclination of the maxillary incisors and retroclination of the mandibular incisors to achieve compensation [8]. However, it has been reported that extraction of the mandibular first premolars may result in excessive space [10]. In our case, this potential excess was primarily utilized to resolve the severe crowding and, secondly, to achieve the desired proclination, which contributed to uprighting the mandibular incisors (IMPA increased from  $78^\circ$  to  $86^\circ$ ). Nonetheless, caution is warranted in Class III cases, as these patients often present with flat or concave profiles, and extraction of the mandibular first premolars may further accentuate this profile. In situations where the space gained by extraction exceeds the amount of crowding, extraction of the second premolars is often preferable, as it allows mesial movement of the posterior segments while minimizing the impact on the profile [10] [11]. We may think that in cases of surgical correction, the incisor inclination would be ideal as it could be corrected pre-surgically and post surgically while at the same time resulting in optimal facial aesthetics, however a study by Troy and Al has shown that there was no statistical difference in incisor inclination and position between the Class III surgical and camouflage groups after treatment [12]. With that being said, in the current era of facially driven orthodontics, treatment planning must account for both skeletal and soft tissue consequences of biomechanics. The goal is no longer merely to achieve ideal dental inclinations but to preserve or enhance facial aesthetics. Supporting this perspective, Al Khtaab *et al.* concluded that camouflage treatment with fixed appliances and Class III elastics can be a viable option for patients with mild to moderate skeletal Class III malocclusion and limited dentoalveolar compensation [13]. Nonetheless, the reason we suggested the orthognathic surgery treatment for our patient, is that although she was satisfied with her overall facial appearance, the retrusive position of the maxilla that results in a concave profile and an open nasiolabial angle is still somewhat prejudicial. In our opinion, further enhancements to the facial aesthetics could be brought and her smile attractiveness could have benefited from that. In a study conducted by Reis *et al.*, smile attractiveness in patients with class III malocclusion treated with orthodontic camouflage or orthognathic surgery were compared. It has concluded that although both treatments resulted in enhanced smile attractiveness, The surgical treatment promoted a greater improvement in

smile attractiveness and a better final result than the camouflage treatment [14].

In our clinical case, conventional orthodontic treatment was undertaken. Clinical smile analysis revealed a poor display of the maxillary incisors, which remained uncorrected at the end of treatment. This limitation may be attributed to the use of Class III elastics, which can flatten the occlusal plane by extruding the maxillary molars and mandibular incisors. The literature continues to offer a wide array of novel non-surgical strategies for the management of Class III patients. Nevertheless, despite the relative simplicity of our treatment plan, it provided satisfactory results within a reasonable timeframe and allowed the patient to achieve a smile outcome that met her expectations.

#### 4. Conclusion

Managing non-surgical Class III cases often requires adaptability and, at times, the simplification of treatment plans to balance feasibility with patient expectations. While such an approach can achieve satisfactory functional and aesthetic outcomes, it remains essential to acknowledge the limitations of conventional methods. Future directions may benefit from the integration of more innovative techniques, which could provide opportunities to optimize aesthetic results and further enhance patient satisfaction.

#### Patient Consent

Informed consent was obtained from the patient for publication of this case report, including all identifiable facial photographs and clinical images.

#### Authors Contribution

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

**Acquisition, analysis, or interpretation of data:** Meriem Bellamine, Meryem Lahlou.

**Drafting of the manuscript:** Meryem Lahlou.

**Supervision:** Meriem Bellamine, Ihsane Ben Yahya.

#### Conflicts of Interest

The authors declare that they have no financial, personal, or professional conflicts of interest that could have influenced the work reported in this case.

#### References

- [1] Yemitan, T.A. and Oyapero, A.O. (2022) Prevalence of Malocclusion in Africa: A Systematic Review and Meta-Analysis. *Magna Scientia Advanced Research and Reviews*, **5**, 30-35. <https://doi.org/10.30574/msabp.2022.5.1.0041>
- [2] Bourzgui, F., Sebbar, M., Hamza, M., Lazrak, L., Abidine, Z. and El Quars, F. (2012) Prevalence of Malocclusions and Orthodontic Treatment Need in 8- to 12-Year-Old Schoolchildren in Casablanca, Morocco. *Progress in Orthodontics*, **13**, 164-172. <https://doi.org/10.1016/j.pio.2011.09.005>

- [3] Li Y.B., *et al.* (2024) Is Maxillary Protraction the Earlier the Better? A Retrospective Study on Early Orthodontic Treatment of Class III Malocclusion with Maxillary Deficiency. *Journal of Clinical Pediatric Dentistry*, **48**, 133-143.
- [4] Pérez-Varela, J.C., Campoy, M.D., López-Vila, M., Camañes-Gonzalvo, S., García-Sanz, V. and Paredes-Gallardo, V. (2024) Management of Skeletal Class III Discrepancies Using Temporary Anchorage Devices. Clinical Cases Review and Biomechanical Considerations. *Seminars in Orthodontics*, **30**, 572-590.  
<https://doi.org/10.1053/j.sodo.2024.04.002>
- [5] Park, J.H., Emamy, M. and Lee, S.H. (2019) Adult Skeletal Class III Correction with Camouflage Orthodontic Treatment. *American Journal of Orthodontics and Dentofacial Orthopedics*, **156**, 858-869. <https://doi.org/10.1016/j.ajodo.2018.07.029>
- [6] Nyakale, M.D. (2025) Camouflage Orthodontic Treatment of a Severe Class III Malocclusion. *Case Reports in Dentistry*, **2025**, Article ID: 9839448.  
<https://doi.org/10.1155/crid/9839448>
- [7] Ellis, E. and McNamara, J.A. (1984) Components of Adult Class III Malocclusion. *Journal of Oral and Maxillofacial Surgery*, **42**, 295-305.  
[https://doi.org/10.1016/0278-2391\(84\)90109-5](https://doi.org/10.1016/0278-2391(84)90109-5)
- [8] Alhammadi, M.S., Almashraqi, A.A., Khadhi, A.H., Arishi, K.A., Alamir, A.A., Beleges, E.M., *et al.* (2022) Orthodontic Camouflage versus Orthodontic-Orthognathic Surgical Treatment in Borderline Class III Malocclusion: A Systematic Review. *Clinical Oral Investigations*, **26**, 6443-6455. <https://doi.org/10.1007/s00784-022-04685-6>
- [9] Kerr, W.J.S., Miller, S. and Dawber, J.E. (1992) Class III Malocclusion: Surgery or Orthodontics? *British Journal of Orthodontics*, **19**, 21-24.  
<https://doi.org/10.1179/bjo.19.1.21>
- [10] Liu, L., Liu, Y., Guo, K., Ma, H. and Yang, F. (2025) Soft and Hard Tissue Changes after Compensatory Treatment in Skeletal Class III Malocclusion. *PLOS ONE*, **20**, e0322551. <https://doi.org/10.1371/journal.pone.0322551>
- [11] Mascarenhas, R., Majithia, P. and Parveen, S. (2015) Second Premolar Extraction: Not Always a Second Choice. *Contemporary Clinical Dentistry*, **6**, 119-123.  
<https://doi.org/10.4103/0976-237x.149307>
- [12] Troy, B.A., Shanker, S., Fields, H.W., Vig, K. and Johnston, W. (2009) Comparison of Incisor Inclination in Patients with Class III Malocclusion Treated with Orthognathic Surgery or Orthodontic Camouflage. *American Journal of Orthodontics and Dentofacial Orthopedics*, **135**, 146.e1-146.e9.  
<https://doi.org/10.1016/j.ajodo.2008.07.012>
- [13] Abu Alhaja, E.S.J. and Al-Khateeb, S.N. (2011) Skeletal, Dental and Soft Tissue Changes in Class III Patients Treated with Fixed Appliances and Lower Premolar Extractions. *Australasian Orthodontic Journal*, **27**, 40-45.  
<https://doi.org/10.2478/aoj-2011-0008>
- [14] Reis, G.M., de Freitas, D.S., Oliveira, R.C., de Oliveira, R.C.G., Pinzan-Vercelino, C.R.M., Freitas, K.M.S., *et al.* (2021) Smile Attractiveness in Class III Patients after Orthodontic Camouflage or Orthognathic Surgery. *Clinical Oral Investigations*, **25**, 6791-6797. <https://doi.org/10.1007/s00784-021-03966-w>