Open Access Library Journal
2026, Volume 13, e15002
ISSN Online: 2333-9721
ISSN Print: 2333-9705

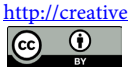
Non-Extraction Class II Treatment: The Importance of Lower Anterior Torque Control—A Case Report

Meriem Bellamine, Mohamed Mehdi Echchadi, Salma El Benna, Ihsane Ben Yahya

Orthodontics Department, Faculty of Dentistry, University Mohammed VI of Health Sciences (UM6SS), Casablanca, Morocco
Email: mbellamine@um6ss.ma

How to cite this paper: Bellamine, M., Echchadi, M.M., El Benna, S. and Ben Yahya, I. (2026) Non-Extraction Class II Treatment: The Importance of Lower Anterior Torque Control—A Case Report. *Open Access Library Journal*, **13**: e15002.
https://doi.org/10.4236/oalib.1115002

Received: February 6, 2026
Accepted: March 24, 2026
Published: March 27, 2026



Abstract

Background: The management of Class II malocclusion without extractions remains a therapeutic challenge, particularly in borderline cases where esthetic concerns and dentoalveolar compensation must be carefully balanced. Adequate control of lower anterior torque plays a pivotal role in achieving stable and esthetically satisfactory outcomes while avoiding undesirable proclination. **Case presentation:** This case report describes the orthodontic treatment of an 18-year-old female patient presenting with dental crowding and a skeletal Class II pattern. A non-extraction treatment approach was selected after comprehensive clinical and radiographic assessment. Particular emphasis was placed on the biomechanical control of lower anterior torque throughout treatment. Fixed appliances were used, and treatment mechanics were carefully planned to optimize alignment, overjet reduction, and occlusal relationships while preserving periodontal health. **Results:** At the end of treatment, satisfactory dental alignment, Class I canine and molar relationships, and improved facial esthetics were achieved. Proper control of lower incisor torque contributed to favorable occlusal stability and avoided excessive proclination. The treatment objectives were met without extractions, and the patient expressed high satisfaction with the functional and esthetic outcomes. **Conclusion:** This case highlights the clinical importance of lower anterior torque control in nonextraction Class II treatment. Careful biomechanical planning allows clinicians to manage dentoalveolar discrepancies effectively while minimizing risks to stability and esthetics.

Subject Areas

Dentistry

Keywords

Class II Malocclusion, Non-Extraction Orthodontic Treatment, Lower Incisor Torque, Orthodontic Biomechanics, Case Report

1. Introduction

The non-extraction approach in Class II orthodontic treatment has gained increasing interest due to its potential to preserve dental structures and facial esthetics. However, this strategy requires precise biomechanical control to prevent unfavorable dental compensations, particularly in the mandibular anterior region.

Among the most critical biomechanical challenges is the control of lower incisor torque. Excessive proclination of the mandibular incisors may lead to periodontal risks, compromised smile esthetics, and long-term instability. Several authors have emphasized that inadequate torque control represents one of the main limitations of non-extraction Class II treatment.

The present case report aims to illustrate the importance of lower anterior torque control during nonextraction Class II treatment and to highlight the clinical strategies that allow successful management of this biomechanical challenge.

2. Clinical Case

An 18-year-old female patient presented to the Dentofacial Orthopedics Department of the University Hospital Center of Casablanca with an esthetic concern related to dental crowding.

2.1. Clinical Examination

The frontal clinical assessment showed a symmetric long face, with a harmonious and flat facial profile, a well-defined nasolabial angle, a pronounced labiomental fold, and a chin aligned with the facial midline. Vertically, the patient exhibited a normodivergent facial pattern (Figures 1(a)-(c)).

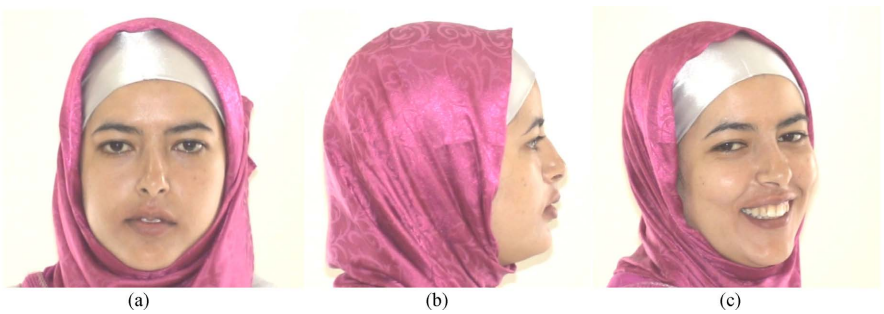


Figure 1. (a)-(c): Initial extraoral photographs: frontal, profile, and smiling views.

At intraoral examination, the patient presented with a Class I canine and molar relationship on the right side, and a Class II canine with a Class I molar relation-

ship on the left side, associated with a dentallyoriginated midline deviation and a moderately increased overjet.

In the maxillary arch, anterior crowding was noted, along with constriction of the lateral segments, distorotation of teeth 13 and 23, and buccal flaring of teeth 11 and 21.

In the mandibular arch, anterior crowding of 4 mm was observed, in addition to moderate left lateral crowding of approximately 4 mm related to the buccal displacement of tooth 35 (**Figures 2(a)-(c)**, **Figures 3(a)-(b)**).

Figure 2. (a)-(c): Right, frontal, and left intraoral buccal views at the beginning of treatment.

Figure 3. (a) & (b) Initial maxillary and mandibular occlusal views.

2.2. Complementary Diagnostic Examinations

The analysis of the dental casts confirmed all clinically observed findings, particularly the accentuated mandibular Curve of Spee (**Figure 4**).

Figure 4. Pre-treatment study cast photographs.

The functional examination revealed a mixed oral-nasal breathing pattern and an atypical swallowing pattern characterized by lower lip interposition, associated with a lower-lip sucking habit. No signs of temporomandibular joint disorder were reported.

The initial panoramic radiograph showed a complete permanent dentition, including the four third molars, with no evidence of osseous pathology (Figure 5).

Figure 5. Pre-treatment panoramic radiograph.

The initial lateral cephalometric radiograph showed signs of moderate anterior rotation, with both mandibular and maxillary incisors positioned labially (Figure 6).

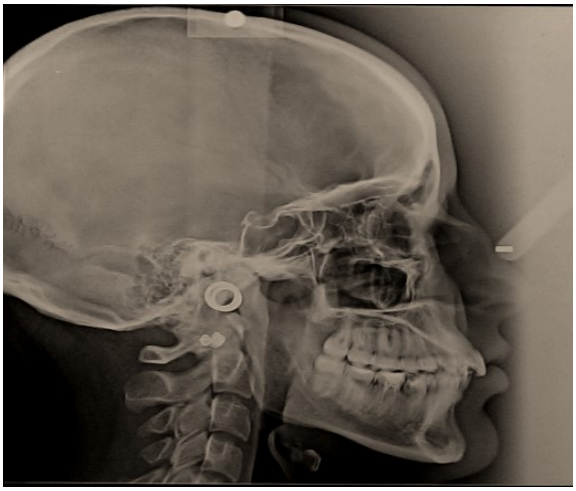


Figure 6. Pre-treatment lateral cephalometric radiograph.

Steiner and Tweed analyses were performed (Table 1 and Table 2). Cephalometric evaluation confirmed a skeletal Class II maxillomandibular sagittal relationship (ANB = 4˚; AoBo = −2 mm) with a normodivergent vertical pattern (GoGn = 30˚; FMA = 25˚). The upper incisors were proclined (U1 − NA = 24˚/6 mm), as were the lower incisors (L1 − NB = 30˚/6 mm; IMPA = 97˚).

Steiner's analysis also revealed a total mandibular arch crowding of 17 mm, mainly associated with dental crowding and a pronounced curve of Spee (Figure 7).

2.3. Diagnosis

Facial examination revealed a normodivergent pattern with an accentuated labiomental fold. Skeletally, the patient presented a normodivergent skeletal Class II relationship. Dentally, she exhibited an increased overbite in the vertical dimension, a left canine Class II relationship with deviation of both maxillary and mandibular midlines, and a bimaxillary protrusion. The severe dental crowding was suggestive of relative macrodontia.

Table 1. Pre-treatment Steiner analysis.

SNA	**86˚**
SNB	**85˚**
ANB	**1˚**
SND	**81˚**
I to NA	**24˚**
I to NA (mm)	**6 mm**
I to NB	**30˚**
I to NB (mm)	**6 mm**
Po to NB (mm)	**1mm**
I to I	**112˚**
Occl to SN	**13˚**
GoGn to SN	**29˚**

Table 2. Pre-treatment Tweed analysis.

FMIA	**58˚**
FMA	**25˚**
IMPA	**97˚**
SNA	**86˚**
SNB	**85˚**
ANB	**1˚**
AO-BO	**2 mm**
Plan d'occ	**5˚**
Angle Z	**80˚**
Upper Lip	**7 mm**
Total Chin	**10 mm**
Ht faciale post.	**42 mm**
Ht facial ant.	**61 mm**
Index post./ant.	**0.68**

	+	-
Encombrement		8
Position de I		3
Courbe de spee		3
E space		
T.I.M		
Sous Total		14
Extractions	14	
Total	0	

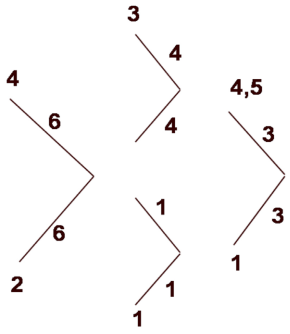


Figure 7. Chevron diagrams and the Steiner BoxTreatment objectives.

2.4. Treatment Objectives

They were established as follows:

- Correct the dental crowding
- Achieve a Class I canine relationship on the left side
- Restore normal overbite and overjet
- Ensure long-term stability of the treatment outcomes

To achieve these objectives, two treatment options were considered:

The first therapeutic option consisted of extracting the maxillary and mandibular second premolars, as confirmed by Steiner's analysis, which revealed a total mandibular arch discrepancy of 17 mm indicating the need for premolar extractions. This approach would allow correction of the left canine Class II relationship and resolution of dental crowding, while improving the axial inclinations of both maxillary and mandibular incisors.

The second therapeutic option involved a non-extraction treatment approach. In this case, correction of the left canine Class II relationship and both maxillary and mandibular crowding would be achieved through arch expansion and further proclination of the lower incisors, combined with Class II mechanics. This option would preserve the facial profile harmony, and since the patient presents a normodivergent pattern, a certain degree of lower incisor proclination can be tolerated.

Therefore, this second option was selected, although it requires strict control of the anterior torque to achieve optimal occlusal results and ensure long-term stability.

2.5. Treatment Evolution

A standard Edgewise appliance with a 0.022 × 0.028-inch slot was used. Alignment and leveling were initiated using 0.016-inch NiTi archwires in both arches, with slight expansion and an accentuated curve of Spee in the maxilla and an inverse curve of Spee in the mandible, with bends placed behind the molar tubes. Leveling was continued using 0.019 × 0.025-inch NiTi archwires while maintaining the same curve of Spee principles. At the end of this phase, significant proclination of the mandibular incisors and absence of overbite were observed (**Figures 8(a)-(c)**).

The consolidation phase was carried out using 0.019 × 0.025-inch stainless steel archwires in both arches (Figures 9(a)-(c)). The mandibular archwire included an inverse curve of Spee and a lingual-crown torque, which increased the overjet and enabled correction of the Class II using intermaxillary elastics (3/16 in, 3.5 oz, ORMCO) (Figures 10(a)-(c)).

The total treatment duration was 15 months. After debonding, fixed retainers were placed from teeth 12 to 22 in the maxillary arch and from 33 to 43 in the mandibular arch.

Figure 8. (a)-(c) Right, frontal, and left intraoral buccal views during treatment.

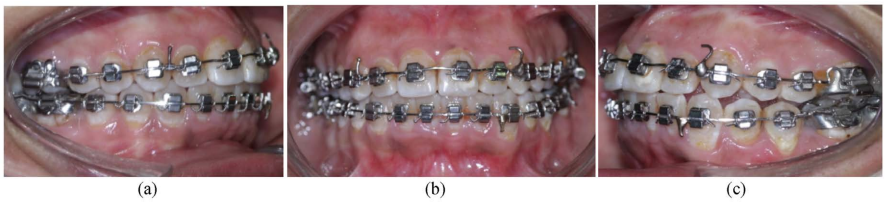


Figure 9. (a)-(c) Right, frontal, and left intraoral buccal views during the finishing phase.

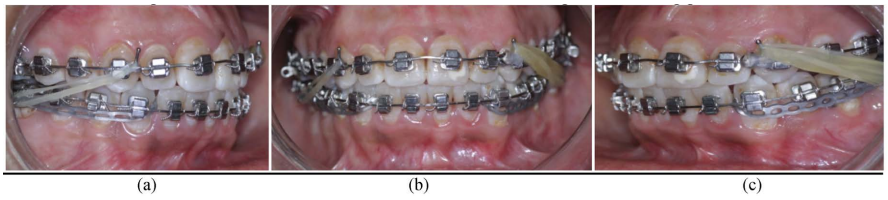


Figure 10. (a)-(c) Right, frontal, and left intraoral buccal views during the finishing phase.

2.6. End of Treatment

The treatment objectives were successfully achieved. From a facial and profile standpoint, there was a notable improvement in the nose-lips-chin relationship, along with a significantly enhanced smile esthetics (Figures 11(a)-(c)). A Class I canine relationship on the left side was obtained, with coincident dental midlines and ideal overbite and overjet (Figures 12(a)-(c), Figures 13(a)-(b), and Figure 14).

The panoramic radiograph demonstrated parallelism of the dental roots (Figure 15).

Cephalometric analysis and superimpositions showed no skeletal changes; however, they revealed significant dentoalveolar improvements, including substantial reduction of the overjet and overbite, primarily achieved through intru-

sion of both maxillary and mandibular incisors, as well as a marked proclination of the mandibular incisors (Figures 16-18; Table 3 and Table 4).

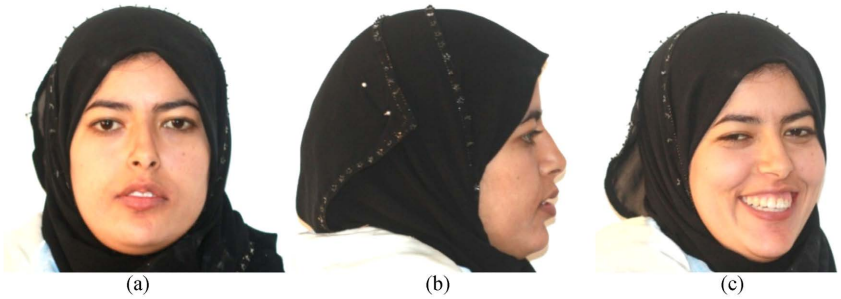


Figure 11. (a) & (c) Frontal, profile, and smiling extraoral photographs at the end of treatment.

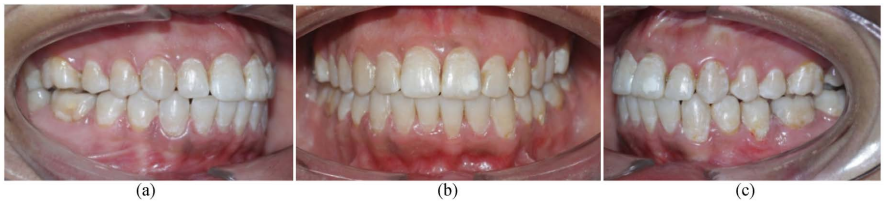


Figure 12. (a) & (c) Right, frontal, and left intraoral buccal views at the end of treatment.

Figure 13. (a) & (b) Maxillary and mandibular occlusal views at the end of treatment.

Figure 14. Post-treatment cast photographs.

A 6-month post-treatment follow-up was conducted. Clinical examination showed stable overjet and overbite with no relapse of midline deviation. Fixed retainers remained intact, and no periodontal changes were observed. These early findings support short-term stability of the treatment outcome.

Figure 15. Post-treatment panoramic radiograph.

Figure 16. Post-treatment lateral cephalometric radiograph.

Figure 17. Tweed general superimpositions.

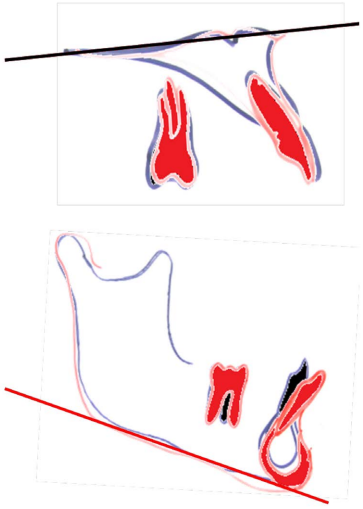


Figure 18. Tweed local superimpositions.

Table 3. Post-treatment Steiner analysis.

SNA	**82˚**
SNB	**84˚**
ANB	**2˚**
SND	**80˚**
I to NA	**24˚**
I to NA (mm)	**6 mm**
I to NB	**30˚**
I to NB (mm)	**6 mm**
Po to NB (mm)	**109˚**
I to I	**1.5 mm**
Occl to SN	**16˚**
GoGn to SN	**39˚**

Table 4. Post-treatment Tweed analysis.

FMIA	**52˚**
FMA	**26˚**
IMPA	**102˚**
SNA	**82˚**
SNB	**84˚**
ANB	**2˚**
AO-BO	**−2 mm**
Plan d'occ	**9˚**
Angle Z	**76˚**
Upper Lip	**7 mm**
Total Chin	**10mm**
Ht faciale post.	**50 mm**
Ht facial ant.	**72 mm**
Index posterior./anterior.	**0.69**

3. Ethics and Consent

The patient provided written informed consent for orthodontic treatment and for the use of anonymized clinical records, photographs, and radiographs for scientific publication. The study was conducted in accordance with the Declaration of Helsinki.

4. Discussion

The present case illustrates the successful management of a Class II subdivision malocclusion in a young adult patient through a non-extraction orthodontic camouflage approach, with emphasis on lower incisor torque control. The decision between extraction and non-extraction therapy for Class II patients remains one of the most debated topics in orthodontics. In the current case, the patient's harmonious facial profile, normodivergent skeletal pattern, and absence of significant soft-tissue convexity supported a nonextraction approach despite a notable mandibular anterior discrepancy. This treatment option aligns with several reports showing that non-extraction therapy can be appropriate in Class II patients when facial balance is favorable and sufficient dentoalveolar compensation is possible.

Class II correction without extractions generally relies heavily on dentoalveolar changes, as confirmed in multiple studies. Systematic reviews [1] [2] and clinical reports [3]-[5] indicate that Class II elastics predominantly induce proclination and intrusion of mandibular incisors, extrusion of maxillary incisors, and mesialization of lower molars. These effects, while useful for sagittal correction, may compromise periodontal health or facial aesthetics if not properly controlled. In this case, the biomechanical strategy incorporated rectangular stainless-steel archwires with an accentuated reverse curve of Spee and lingualcrown torque, enabling the clinician to redirect part of the elastic forces toward intrusion and uprighting of mandibular incisors rather than uncontrolled flaring. The maintenance of stable overbite and overjet at the end of treatment confirms the efficacy of this torque-control protocol.

The proclination of mandibular incisors is one of the main concerns in non-extraction Class II treatment due to its potential impact on the periodontal envelope [6]. Several studies have demonstrated that excessive proclination beyond the alveolar housing may enhance gingival recession, dehiscence, or bone loss. However, recent evidence indicates that moderate flaring, when occurring within physiological limits and supported by adequate periodontal tissue, does not necessarily lead to adverse effects. Choi *et al.* [7] reported that changes in mandibular incisor inclination do not significantly alter gingival thickness or height when movements remain controlled. In this case, the increase in IMPA from 97˚ to 102˚ represents a moderate and biologically acceptable proclination, consistent with what the literature describes as safe for normodivergent patients. No clinical signs of periodontal compromise were observed during or after treatment.

The present case also highlights the role of functional habits in both diagnosis

and stability. The patient exhibited a mixed oro-nasal breathing pattern and atypical swallowing with lower-lip interposition. Several authors have noted that lip posture and peri-oral muscular imbalance can influence incisor inclination and jeopardize long-term outcomes if not addressed. The integration of functional re-education and patient awareness is therefore essential to reinforce the stability of orthodontic corrections, particularly when the treatment strategy relies on dentoalveolar compensation.

5. Conclusion

Non-extraction treatment of Class II malocclusion can be successfully achieved provided that strict biomechanical control is applied throughout treatment. This case report emphasizes that lower anterior torque control represents a critical determinant in preventing unfavorable dental compensations during nonextraction protocols. Careful management of mandibular incisor inclination allowed correction of the Class II relationship while preserving functional occlusion, periodontal integrity, and esthetic balance. Clinicians should therefore consider lower anterior torque control as a key factor when planning and executing nonextraction Class II orthodontic treatment to ensure stable and predictable outcomes.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Nalbantoglu, E.R., Uckan, S. and Singh, P. (2025) Non-Extraction Orthodontic Camouflage for Severe Class II Malocclusion Post-TMJ Gap Arthroplasty: A Case Report. *Oral*, **5**, Article 45. https://doi.org/10.3390/oral5020045

[2] Papageorgiou, S.N., Konstantinidis, I., Papadopoulou, K., Jäger, A. and Bourauel, C. (2014) Clinical Effects of Pre-Adjusted Edgewise Orthodontic Brackets: A Systematic Review and Meta-Analysis. *European Journal of Orthodontics*, **36**, 350-363. https://doi.org/10.1093/ejo/cjt064

[3] Lu, L., Si, J., Wang, Z. and Chen, X. (2024) Cone-Beam Computed Tomographic Evaluation of Mandibular Incisor Alveolar Bone Changes for the Intrusion Arch technique: A Retrospective Cohort Research. *The Korean Journal of Orthodontics*, **54**, 79-88. https://doi.org/10.4041/kjod23.173

[4] Rongo, R., Dianišková, S., Spiezia, A., Bucci, R., Michelotti, A. and D'Antò, V. (2022) Class II Malocclusion in Adult Patients: What Are the Effects of the Intermaxillary Elastics with Clear Aligners? a Retrospective Single Center One-Group Longitudinal Study. *Journal of Clinical Medicine*, **11**, Article 7333. https://doi.org/10.3390/jcm11247333

[5] Janson, G., Sathler, R., Fernandes, T.M.F., Branco, N.C.C. and de Freitas, M.R. (2013) Correction of Class II Malocclusion with Class II Elastics: A Systematic Review. *American Journal of Orthodontics and Dentofacial Orthopedics*, **143**, 383-392. https://doi.org/10.1016/j.ajodo.2012.10.015

[6] Narmada, I.B., Martalia, C. and Ramadhani, S.D.N. (2023) Non-Extraction Treatment of Class II Division 2 Malocclusion with Cover Bite: A Case Report. *Acta Medica Philippina*, **57**, 81-88.

[7] Choi, Y.J., Lee, J., Cha, J. and Park, Y. (2011) Total Distalization of the Maxillary Arch in a Patient with Skeletal Class II Malocclusion. *American Journal of Orthodontics and Dentofacial Orthopedics*, **139**, 823-833. https://doi.org/10.1016/j.ajodo.2009.07.026