World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

Correction of upper midline diastema and crowding in a Class I malocclusion with skeletal Class II pattern

Ratna Nurlia Alfiandini * and Ari Triwardhani

Department of Orthodontics, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

World Journal of Advanced Research and Reviews, 2025, 26(03), 1461-1466

Publication history: Received on 26 April 2025; revised on 11 June 2025; accepted on 13 June 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.26.3.2326

Abstract

A 17-year-old female presented with concerns about spacing on her upper teeth, crowding, and facial asymmetry. Clinical and radiographic evaluations revealed Angle Class I malocclusion with a skeletal Class II base, anterior crowding in the lower arch, central diastema associated with a high labial frenulum, proclined incisors, and a deep bite. The patient also had a unilateral chewing habit for the past two years.

Treatment: A non-extraction orthodontic plan was carried out using pre-adjusted MBT fixed appliances. Treatment began with scaling, oral hygiene education, and frenectomy. Archwire sequencing, torque correction, elastic use, and bite-opening mechanics were employed to align teeth, close diastema, and achieve occlusal and facial balance. Retention was maintained using fixed lingual retainers.

Results: Post-treatment assessment showed improved facial profile, reduced facial convexity, normalized maxillomandibular skeletal relationship (Class I), decreased incisor proclination, and an increased nasolabial angle. However, the lips remained slightly anterior to the aesthetic line.

Conclusion: This case demonstrates that a well-planned, non-extraction orthodontic approach, combined with surgical adjuncts and individualized biomechanics, can effectively manage Class I malocclusion with skeletal Class II features and achieve both functional and esthetic outcomes.

Keywords: Malocclusion; Medicine; Orthodontic; Diastema; Frenectomy

1. Introduction

Malocclusion is a prevalent dental condition that impacts not only oral function but also facial esthetics and psychosocial well-being.[1] Among the various forms, Angle Class I malocclusion is the most frequently encountered and often presents with coexisting problems such as anterior crowding, central diastema, deep overbite, and proclination of the incisors.[2] These conditions may arise from both genetic predispositions and environmental influences, including aberrant oral habits, muscular imbalances, and atypical eruption sequences.[3]

One common contributing factor to midline diastema is a high labial frenulum attachment, which can inhibit natural closure of the space between the maxillary central incisors and may necessitate surgical intervention such as frenectomy.[4] Anterior crowding of the mandibular arch can result from tooth-size/arch-length discrepancy or premature loss of primary teeth, affecting occlusion and long-term stability.[1] Additionally, a deep overbite can lead to incisal trauma, mandibular displacement, and increased stress on the temporomandibular joint if left uncorrected.[5]

* Corresponding author: Ratna Nurlia Alfiandini

Orthodontic management of such complex malocclusions requires a comprehensive and individualized approach. Non-extraction treatment is often preferred when space requirements are minimal and esthetic facial balance is preserved.[6] Modern fixed appliance systems, equipped with controlled torque, in combination with auxiliary mechanics such as intermaxillary elastics, enable the precise correction of skeletal and dental discrepancies. The incorporation of retention strategies is crucial for maintaining treatment results and ensuring long-term stability.[1]

This case report presents the orthodontic management of a 17-year-old female with Class I Angle malocclusion, anterior crowding, central diastema, deep bite, and an underlying skeletal Class II pattern. The treatment, which involved non-extraction fixed appliance therapy and frenectomy, resulted in improved occlusion, facial profile, and cephalometric parameters. This report underscores the importance of early diagnosis, individualized biomechanical strategies, and the integration of surgical adjuncts in treating complex malocclusion cases.

2. History and Clinical Findings

A 17-year-old female patient presented with concerns regarding dental crowding and spacing between her central teeth, as well as a subjective perception of facial asymmetry, particularly a deviation of the facial profile to the right. She reported a two-year history of unilateral mastication on the right side. Her general health was unremarkable, with no history of systemic diseases, allergies, endocrine disorders, or respiratory abnormalities. Family history revealed her mother had protrusive teeth and a sibling exhibited spacing in the dentition. Extraoral examination showed a convex facial profile, mesoprosopic facial type, and mesocephalic head shape. The lips were competent, phonetics were normal, and no parafunctional habits were currently observed, although the patient had a previous history of pen biting on the right side and unilateral chewing. Intraoral examination revealed healthy oral mucosa, tongue, and palate, with good oral hygiene and moderate caries experience. Notably, a high labial frenulum attachment was observed between teeth 11 and 21, contributing to the presence of a midline diastema. All permanent teeth had erupted, except for teeth 48 and 38, which were impacted. Carious lesions were present in teeth 17, 16, 12, 21, 22, 26, 27, 36, 27, 46, and 47. Functional analysis showed a 3 mm freeway space and an abnormal path of closure with a rightward mandibular shift, though temporomandibular joint function was normal, and no displacement of the mandible was noted. Model analysis revealed an ovoid arch form in both jaws, with a 3 mm excess space in the upper arch (RA) and a 3.5 mm deficiency in the lower arch (RB). The curve of Spee was measured at +3 mm bilaterally. Study model analysis indicated mild rotations of anterior teeth, and a 1 mm leftward midline deviation of the lower arch.

Figure 1 Pre-treatment Extra Oral and Intra Oral Photos

Malalignment and crowding were primarily noted in the anterior regions of both arches. The overbite was increased to 4 mm with an overjet of 5.5 mm. Canine and molar relationships showed neutroclusion on the right, with cusp-to-cusp contact on the left molars. Cephalometric analysis (Downs, Steiner, and Wits) indicated a skeletal Class II relationship characterized by maxillary prognathism, mandibular retrognathism, and proclination of both upper and lower incisors. Soft tissue evaluation showed that both lips were positioned anterior to the esthetic lines (E-line and S-line), consistent with the convex profile. The overall diagnosis was Angle Class I malocclusion with a midline diastema, deep bite, anterior crowding of the lower arch, proclined upper and lower incisors, and a skeletal Class II base. Potential etiologic factors included a high labial frenulum attachment, aberrant tooth bud positioning (teeth 11, 21, 45), and premature loss of tooth 35.

Figure 1 Pre Treatment Cephalometric and Panoramic Radiograph

3. Case Management

The patient was offered two different options. The first option is to extract her four premolars, followed by the retraction of all her anterior teeth segments. This approach will correct her convex profile and protruding lips. The second option is to place four temporary anchorage devices (TADs) to distalize the entire maxillary and mandibular segments. The patient refused all treatment options and chose the non-extraction method, even knowing that her convex profile and protruding lips would not be corrected, and the stability of post-treatment results is questionable. However, she opted for treatment with a non-extraction orthodontic approach. The treatment plan consisted of several sequential phases to address the underlying malocclusion and associated functional and aesthetic issues. Initial management included preventive and preparatory measures, namely oral health education, professional dental scaling, and a frenectomy to address the high labial frenulum attachment. Active treatment phases involved correcting anterior crowding in the lower arch, closing the central diastema, correcting deep bite, aligning proclined upper and lower incisors, and correcting midline deviation, followed by a retention and evaluation phase.

In the upper arch, therapy with a fixed appliance using a pre-adjusted Roth system (slot 0.022) was initiated, featuring buccal tubes on the first molars. Sequential leveling and alignment were carried out with NiTi archwires, ranging from sizes 0.012 to 0.016×0.022, complemented by Class II elastics (2.5 oz and 4.5 oz, 3/16"). Arch coordination was achieved using stainless steel (SS) wires sized 0.016×0.022 and 0.017×0.025 mm. To correct the central diastema, an SS 0.017×0.025 archwire was employed alongside a long-type elastic chain. Anterior torque control was managed by applying palatal crown torque through SS 0.017×0.025 wires. For deep bite correction, U-loops were placed between teeth 12–13 and 22–23, along with additional figure-of-eight ligatures on the posterior teeth. Finally, finishing and detailing were carried out with the same SS wire, followed by a passive phase before debonding and the application of a fixed lingual retainer for retention.

Figure 3 Progress of treatment after 10 months

Similarly, in the lower arch, pre-adjusted MBT appliances (slot 0.022) with buccal tubes on the first molars were used. Leveling and alignment were carried out using the same sequence of NiTi wires and Class II elastics. Arch coordination was performed with SS 0.016×0.022 and 0.017×0.025 wires. Anterior torque correction was done with lingual crown torque using SS 0.017×0.025. Deep bite correction in the lower arch utilized U-loops between teeth 32–33 and 42–43, along with figure-of-eight ligatures on the posterior teeth. Final finishing and detailing were completed with SS 0.017×0.025, followed by a passive phase, debonding, and placement of a fixed lingual retainer for long-term stabilization.

4. Discussion

This case highlights the management of a Class I Angle malocclusion with anterior crowding, central diastema, deep bite, and proclined incisors, associated with an underlying skeletal Class II pattern. The presence of a high labial frenulum attachment was identified as a contributing factor to the central diastema, while asymmetrical masticatory habits likely influenced the deviation in facial profile and midline. A non-extraction orthodontic approach was chosen to preserve arch integrity and address the discrepancy through arch coordination, torque control, and space redistribution.

Table 1 Comparison of Cephalometric Measurements Pre and Post Treatment

	Mean	S.D	Pre Treatment	Post Treatment
Skeletal				
SNA	82°	2°	85°	82°
SNB	80°	2°	80°	79°
ANB	2°	2°	5°	3°
SN-MP	32°	5°	36°	35.5°
FMA	25°	4°	27°	27°
Dental				
U1 - SN	104°	5°	116°	114°
U1-NA	4°	2°	9°	13°
L1-NB	4°	2°	10°	14°
L1-MP	90°	5°	101. 5°	109°
Soft Tissue				
Upper Lip to E line	-4°	2°	3°	5.8°
Lower Lip to E line	-2°	2°	3°	6.5°

Pre-treatment cephalometric analysis (Downs, Steiner, and Wits) revealed a convex facial profile, skeletal Class II discrepancy, and proclination of both maxillary and mandibular incisors. The treatment plan was designed to correct malocclusion components, including midline shift, deep bite, incisor proclination, and diastema, while establishing functional occlusion and enhancing esthetic harmony.

Post-treatment cephalometric evaluation demonstrated notable improvements. The facial convexity was reduced, indicating improved facial balance and a more refined profile. The skeletal relationship transitioned to Class I, with the maxilla and mandible establishing a normal relationship to the cranial base. However, some degree of upper and lower incisor proclination remained. Additionally, the lips are still anterior to the aesthetic line.

Figure 4 Post Treatment Extra Oral and Intra Oral Photos

This case supports the effectiveness of comprehensive orthodontic treatment in correcting malocclusion without the need for extractions, especially when combined with early intervention, such as frenectomy, and meticulous torque and anchorage management. Consistent use of Class II elastics, precise wire sequencing, and controlled tooth movement facilitated an ideal occlusion with esthetic and functional outcomes.

5. Conclusion

The non-extraction orthodontic treatment in this case addressed multiple components of malocclusion, including anterior crowding, deep bite, midline diastema, and incisor proclination, in a patient with an underlying skeletal Class II relationship. Post-treatment results demonstrated facial profile improvement, occlusal stability, and skeletal harmony with a Class I base. This case emphasizes the importance of individualized treatment planning, early management of contributing factors (such as high frenulum attachment), and the value of biomechanical control in achieving optimal outcomes in complex malocclusion cases.

Compliance with ethical standards

Acknowledgments

The authors would like to thank the Orthodontic Department, Faculty of Dental Medicine, Universitas Airlangga for the support.

Disclosure of conflict of interest

No conflict of interest was reported.

Statement of informed consent

Consent was obtained from all individual participants included in the study.

References

[1] Proffit WR, Fields HW, Larson BE, Sarver DM. Contemporary Orthodontics. 6th ed. Elsevier; 2019.

[2] Graber LW, Vanarsdall RL, Vig KWL, Huang GJ. Orthodontics: Current Principles And Techniques. 6th ed. Elsevier; 2017.

[3] Singh G. Textbook of Orthodontics. Jaypee Brothers Medical Publishers Pvt. Limited; 2015. https://books.google.co.id/books?id=MsIHCgAAQBAJ

[4] Muhamad A-H. The Midline Diastema: A Review of Its Etiology and Treatment.; 2021.

[5] Watted N, Lone IM, Zohud O, Midlej K, Proff P, Iraqi FA. Comprehensive Deciphering the Complexity of the Deep Bite: Insight from Animal Model to Human Subjects. J Pers Med. 2023;13(10). doi:10.3390/jpm13101472

[6] Cross TF. The Tweed philosophy: the Tweed years. Semin Orthod. 1996;2(4):231-236. doi:10.1016/S1073-8746(96)80022-3