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Case report

Management of skeletal class I malocclusion in a patient with lateral incisor agenesis and deep bite

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ABSTRACT

Background: This case report describes the orthodontic management of a 28-year-old female patient with a Skeletal Class I malocclusion characterized by maxillary lateral incisor agenesis, deep bite, and retained deciduous teeth. **Objective:** To explain the malocclusion Class I with maxillary lateral incisor agenesis, deep bite, and retained deciduous teeth treatment approach using the Preadjusted Edgewise MBT fixed appliance (Mini Diamond™, Ormco). **Case management:** A 28-year-old female patient with Class I malocclusion with unilateral maxillary lateral incisor agenesis also presented with deep bite, retained primary teeth, and microdontia, specifically a peg-shaped lateral incisor. The treatment goal was to improve aesthetics and masticatory function without tooth extraction. Management of maxillary lateral incisor agenesis involved canine substitution. The deep bite was addressed by various leveling methods, such as incisor intrusion or molar extrusion, to correct the vertical discrepancy. **Results:** By carefully managing the agenesis through canine substitution and preserving retained primary teeth with favourable crown-to-root ratios, the treatment successfully maintained alveolar bone and achieved a stable, aesthetic result. Proper mechanotherapy not only met the patient's expectations but also ensured treatment efficiency and prevented complications such as root resorption.

Keywords: class I malocclusion; deep bite; lateral incisor agenesis; persistence deciduous teeth

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INTRODUCTION

Agenesis of the maxillary lateral incisors can occur due to various factors, including trauma, infection, medication, syndromes, and genetic mutations. The prevalence of congenital maxillary lateral incisor agenesis varies between 1.5 and 2% in the population.[1–3] Agenesis can occur bilaterally or unilaterally, where unilateral maxillary lateral incisor agenesis often occurs in conjunction with peg-shaped lateral incisors on the contralateral side, which can affect the patient's aesthetics.[4] Treatment alternatives in this case are extraction of the peg-shaped lateral incisors followed by symmetrical space closure, unilateral space closure with a combination of restorative therapy, or opening space for prosthetic replacement.[3] Space closure accompanied by canine substitution is a standard orthodontic treatment option for patients with maxillary lateral incisor agenesis.[5] The advantages of choosing canine substitution treatment are that it can be performed at a young age, minimizes long-term dental treatment commitment, has a shorter treatment time, and the appearance can be adjusted to look natural. The disadvantages of this treatment include differences in size, anatomy, and color between the canines and the central incisors.[3,6]

In addition to agenesis, a deep overbite should also be considered. Deep overbite is a condition where the maxillary incisors erupt more than 30% over the mandibular incisors.[7] Cephalometric evaluation is performed to determine the skeletal relationship of a deep overbite in a short face.[8] Correction of deep overbite in the levelling phase can be done in several ways, namely incisor intrusion,

Figure 1. Extraoral examination before and after treatment

molar eruption, molar extrusion, and incisor proclination. Another method is to use a fixed or removable anterior biteplane to disocclude the posterior teeth, allowing passive eruption.[9] This case report discusses the treatment of Class I malocclusion with unilateral maxillary lateral incisor agenesis, deep bite, persistence of primary teeth, and microdontia. The treatment goal was to improve aesthetics and masticatory function without tooth extraction. The patient has given consent for the publication of this case.

CASE

A 28-year-old female patient of Batak-Javanese ethnicity presented with complaints of crowding and misalignment of her upper and lower front teeth, causing difficulty in chewing. Extraoral examination (Figure 1) revealed a mesofacial, asymmetrical facial type. The facial profile is straight, and the smile is unaesthetic because the smile curve is not parallel to the lower lip, and the buccal corridor is large and asymmetrical on the right and left sides. The intraoral examination (Figure 2) showed deep palate depth, agenesis of tooth 12, peg-shaped microdontia of tooth 22, and persistence of tooth 53. The patient has a Class I incisal relationship, a Class III ¼-unit (1 mm) first molar relationship on the right, and a Class I molar relationship on the left. The right canine relationship is Class II, and the left is

Figure 2. Intraoral examination before and after treatment

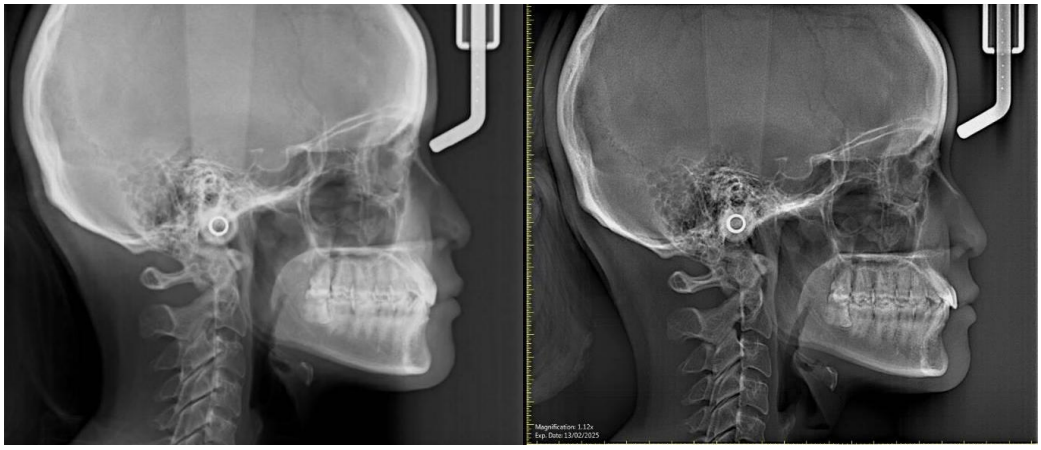

Figure 3. Cephalometric radiograph before and after treatment

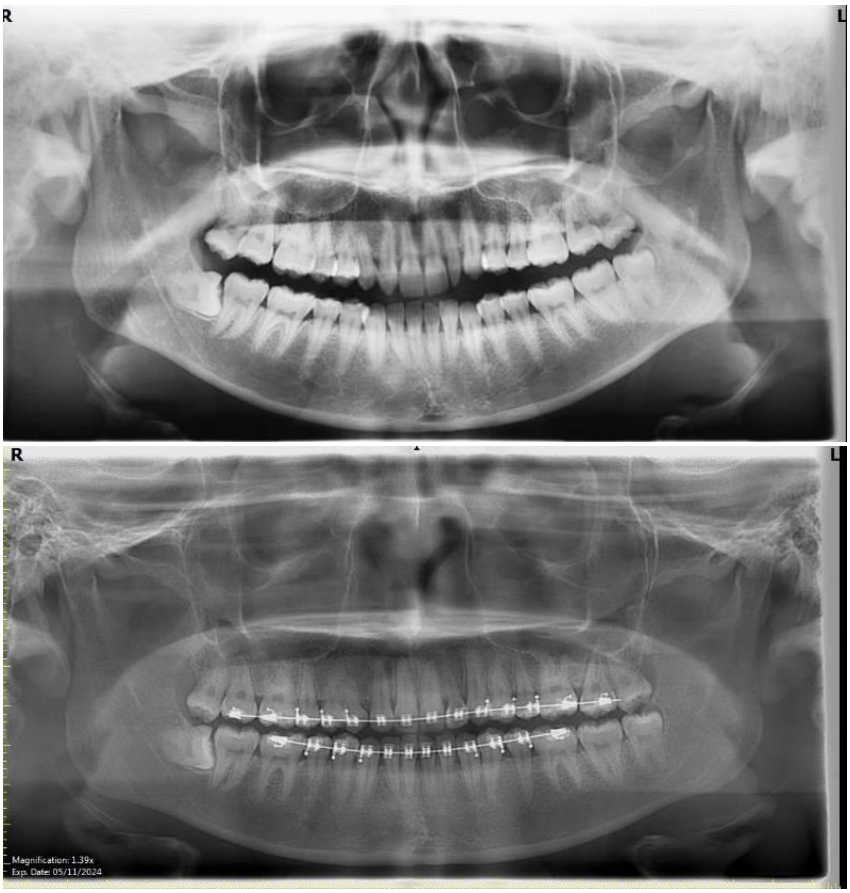

Figure 4. Panoramic radiograph before and after treatment

Class II ¼ unit (1.5 mm). Overjet +1 mm, overbite +5/9 mm (55.5%), and normal depth curve of spee (0.5 mm). Mild crowding of the upper and lower jaws, midline shifting of the upper teeth 1.5 mm to the left, and the midline of the lower teeth coincides with the midline of the face. The patient has no bad habits.

The lateral cephalometric analysis concluded that the patient had a skeletal Class I malocclusion with maxillary and mandibular

Table 1. Cephalometric analysis before and after treatment

	Mean	Before	After
Horizontal Skeletal Parameters			
SNA	81°± 3°	85°	85°
SNB	78°± 3°	84°	84°
ANB	3°± 1°	1°	1°
Facial Angle	87°± 3°	85°	85°
Angle of Convexity	0°± 10°	-4°	-3°
Pg-NB	4 ± 2 mm	+ 3 mm	+ 3 mm
Vertical Skeletal Parameters			
Y-Axis	60°± 6°	52°	52°
Go Angle	123°± 7°	118°	118°
SN-MP	32°± 3°	25°	25°
MMPA	27°± 4°	20°	20°
LAFH	55 ± 2%	53%	54.12%
Dental Parameters			
Interincisal Angle	135°± 10°	157°	126°
UI-SN	104°± 6°	96°	114°
UI-MxPl	109°± 6°	101°	115°
UI-NA	4± 2 mm	+4.5 mm	+4.5 mm
LI-MP	90°± 4°	83°	94°
LI-NB	4 ± 2 mm	+1,5 mm	+3,5 mm
Soft Tissue Parameters			
Upper Lip to E-Line	1 ± 2 mm	0 mm	0 mm
Lower Lip to E-Line	0 ± 2 mm	0 mm	0 mm

prognathism relative to the cranial base, a straight skeletal profile, and normal vertical growth of the mid and lower face. The inclination of the upper and lower incisors was retrusive, and the upper and lower lips aligned with the E-line (Figure 3 and Table 1). The panoramic radiograph showed the absence of tooth 12, the presence of tooth 53, a peg-shaped crown of tooth 22, and impacted teeth 38 and 48 (Figure 4).

CASE MANAGEMENT

The patient underwent non-extraction orthodontic treatment using a pre-adjusted Edgewise fixed orthodontic appliance (Mini Diamond™, Ormco) The leveling and aligning stages began with NiTi .014 (3M™ Unitek Nitinol) on the upper and lower jaws, progressing to working wire using Stainless Steel .019 x .025. (3M™ Unitek Stainless Steel) Management of maxillary lateral incisor agenesis was performed with canine substitution and retention of persistent tooth 53. Overbite correction was performed using an anterior bite riser to achieve passive intrusion of the posterior teeth. Maxillary midline correction was performed after creating space by mesial-distal recontouring of tooth 13. Protraction was performed on the anterior segment of the maxilla by 2 mm. The final stage involved improving interdigitation and settling the occlusion. The patient was planned to be referred to the Conservation and Periodontics clinic for smile design after the orthodontic treatment phase was

completed. The retention phase was performed by fabricating an Essix vacuum-formed retainer.

Orthodontic treatment after 21 months, with 16 controls, provided occlusal improvement, resolving the patient's complaints both aesthetically and functionally. The patient's interdigitation at the end of treatment was good, with crowded and tilted teeth and deep bites corrected, resulting in improved chewing function. The soft-tissue profile was maintained straight, with a facial convexity angle of -4° to -3° and an improved nasolabial angle from 96° to 91° (Table 1)

Intraoral evaluation after orthodontic treatment (Figure 2) shows that the teeth in the upper and lower jaws are level and aligned. The deep bite is corrected, and the dental asymmetry is corrected. The midline of the upper and lower jaws coincides with the midline of the face. Overjet examination +3 mm, overbite +3/9 mm (33,3%). Right and left permanent molar relationship Class I, right and left canine relationship (53-43, 23-33) Class I, and incisor relationship Class I. The post-orthodontic panoramic radiographs revealed parallel root alignment, as well as normal height and density of the alveolar bone. The cephalometric analysis of post-orthodontic therapy showed that the angulation of the upper incisors relative to the lower incisors and the maxillary plane is within normal limits. The alignment of the upper incisors relative to the maxilla and facial profile is normal. The angulation of the lower incisors relative to the mandibular plane has returned to normal (Figure 3).

DISCUSSION

In treating this case, we used the Preadjusted Edgewise bracket system. Lawrence Andrews designed a 'pre-adjusted' edgewise bracket that combines the three "order bends" to achieve Andrew's six keys to a normal occlusion.[6] Ideal bracket placement can result in good occlusion, an easier finishing phase, and reduce the time-consuming process of bracket repositioning.[10] Bracket prescription will be better expressed if the space between the wire and the bracket slot is smaller. Large, rigid working wires are selected to minimize deflection and improve overbite control when force is applied.[10]

This case also involves persistent deciduous teeth, which remain in the mouth beyond their normal exfoliation period. The most common cause of persistent deciduous teeth is the absence or ectopic eruption of permanent teeth.[1,11] Preservation of deciduous teeth for as long as possible is necessary when no permanent teeth are available to replace them, and the deciduous teeth have a good crown-to-root ratio.[11] Deciduous teeth can function as space maintainers, minimize alveolar bone resorption, and improve appearance and function in cases of permanent tooth agenesis. Without permanent replacement teeth, there is no evidence to suggest that primary tooth roots will resorb spontaneously.[12]

Treatment began with the levelling and aligning stages on the .012 NiTi wire, aiming to apply light force. Placing brackets 11 and 21 1 mm more towards the incisal was expected to provide intrusion force on 11 and 21. The posterior bite riser was placed at the beginning of treatment to disocclude the maxilla and mandible, as the patient had a deep bite, causing the lower anterior brackets to occlude with the incisal plane of the upper teeth, which resulted in the lower anterior brackets becoming easily dislodged.

The posterior bite riser was replaced with a bite turbo on the palatal teeth 11 and 21 after the upper and lower anterior teeth were more level. The use of the anterior bite turbo was expected to correct the deep bite resulting from passive extrusion of the posterior teeth. Extrusion of the posterior teeth was expected in this case because it would produce clockwise mandibular movement, thereby increasing lower face height in patients with 53% LAFH. Correction of the deep bite also occurs due to improvement in the inclination of the lower incisors. The inclination of the lower incisors relative to the mandible was previously retrusive, at 83°. Improvement in

inclination with proclination of the lower incisors relative to the mandible to 94° occurred due to the well-expressed bracket prescription. The selection of a .019 x .025 working wire in a .022 slot was done so that the play was only 10°. A large, rigid working wire was chosen to reduce deflection and improve overbite control when force was applied.

Transposition of tooth 13 occurred due to a combination of agenesis of tooth 12, persistence of tooth 53, and bone conditions. The lower bone density of the maxilla compared to the mandible, along with more porous alveolar bone in the canine and lateral incisor areas compared to the posterior teeth, causes transposition to occur more frequently in the anterior maxilla. Canine substitution was chosen to address the agenesis of tooth 12. The patient's profile is straight, but the patient has a Class III skeletal tendency. The patient's maxillary canines and premolars have moved anteriorly, closing the maxillary lateral incisor space, so canine substitution and retention of tooth 53 in the arch were chosen as treatment options.[13] Tooth 13 is transposed in region 12, so 13 erupts mesial to 53. Without a permanent replacement tooth, the root of the deciduous tooth will not resorb spontaneously. Preservation of the deciduous tooth for as long as possible is necessary if there is no permanent replacement tooth and the deciduous tooth 53 has a good crown-to-root ratio. Placement of a lateral incisor bracket on tooth 13 with bracket positioning more incisally, followed by recontouring of the canine, was chosen to position the canine more palatally and intrude it, due to the different anatomy of the lateral incisor and canine crowns.[14] Placement of the bracket on tooth 12 more incisally was intended to minimize the reduction of the incisal surface of tooth 13 to prevent devitalization. This choice was also made because the patient did not want a treatment plan that involved the extraction of tooth 53, followed by distalization of tooth 13 to make room for prosthetic restoration of missing tooth 12. The patient hoped that tooth 53 could be preserved in the arch as much as possible. If the retained primary tooth is compromised and leads to issues such as gingival recession, the patient has been advised that the tooth may be substituted with a dental implant.

Recontouring of the maxillary canine tooth 13 and maxillary lateral incisor tooth 22 was performed during orthodontic treatment as a guide for tooth movement. Tooth 22 was microdontic and peg-shaped, so bracket placement at the start of orthodontic treatment was not possible. The mesial-distal dimension of tooth 13 was reduced by only 1 mm, from a mesiodistal width of 8.5 mm to 7.5 mm, the cervico-incisal dimension by 0.5 mm, and the labio-palatal dimension by 0.5 mm, from 8.5 mm to 8 mm, as the Conservative Dentistry clinic did not recommend further reduction of tooth material, which could lead to devitalization of tooth 13. This consideration led to the anterior occlusal stop being possible only between teeth 13 and 42, due to the different labial-palatal thicknesses of tooth 13 compared to tooth 22.

After obtaining adequate space with a 1.5 mm midline correction of the upper jaw to the left, a composite restoration was performed on tooth 22 to create a reversible, semi-permanent restoration, allowing tooth 22 to be included in the treatment and achieving good function and aesthetics.[2,3] Direct composite restoration was chosen because it is minimally invasive, aesthetically pleasing, clinically durable, and inexpensive. The disadvantages of composite restorations include low color stability and low surface hardness in nanocomposites, which require periodic polishing. The high filler content in the composite increases the risk of polymer shrinkage, leading to marginal defects and gaps.[15]

The improvement in mandibular incisor proclination was from 83° to 94°. Proclination of the mandibular incisors in non-growing patients is not stable in the long term.[16] A vacuum-formed retainer was chosen for the retention phase mainly because it is better at preventing relapse in the mandible than a Hawley retainer. A removable retainer was chosen because it is more comfortable for the patient and easier to

clean. The patient's dental and oral health was good, so there was little risk of hyperplastic gingiva developing, which could loosen the vacuum-formed retainer.[6]

CONCLUSION

Orthodontic treatment was administered to address a case of Class I malocclusion, characterized by a deep bite and the absence of the maxillary lateral incisor. This was achieved by retaining a primary canine to enhance the patient's aesthetics and occlusal function. The deep bite correction involved a combination of increased proclination of the lower incisors and passive eruption of the posterior teeth. The patient sought orthodontic treatment without extractions to improve aesthetics and chewing function, while also minimizing the need for future dental interventions. The choice of orthodontic mechanotherapy was made following a thorough diagnosis and tailored to the patient's preferences. The significance of the retention phase was emphasized to the patient, particularly in deep bite cases, to prevent relapse. Both the patient and the author were pleased with the overall results following the orthodontic treatment.

REFERENCES

1. Bilgin N, Kaya B. Etiology and treatment alternatives in tooth agenesis: a comprehensive review. Stomatological Disease and Science. OAE Publishing Inc. 2018; 2(11): 9. doi: 10.20517/2573-0002.2018.11
2. Sun YT, Chang TW, Yang PY, Lee TH. Orthodontic treatment management for congenitally missing maxillary lateral incisors. Taiwan J Orthod. 2018; 30(4): 196–199. doi: 10.30036/TO.201812_30(4).0001
3. Josefsson E, Hedmo C. Missing maxillary lateral incisors: A narrative review of treatment alternatives. Semin Orthod. W.B. Saunders; 2025. doi:10.1053/j.sodo.2025.09.007
4. Cocconi R, Rapa S. Unilateral agenesis of the maxillary lateral incisor: space closure versus space preservation in growing patients. Semin Orthod. W.B. Saunders; 2020; 26(1): 24–32. doi: 10.1053/j.sodo.2020.01.004
5. Bocchino T, Martina S, Sangiuolo C, Galdi M, Valletta A, D'Antò V. Maxillary Impacted Canine and Upper Lateral Incisor Agenesis Treatment with "Canine First Technique" and Clear Aligners: A Case Report. Healthcare (Switzerland). MDPI; 2023; 11(16): 2345. doi: 10.3390/healthcare11162345
6. Littlewood SJ, Mitchell L. An Introduction to Orthodontics. 5th ed. Oxford: Oxford University Press; 2019.
7. Ghafari JG, Macari AT, Haddad R V. Deep bite: Treatment options and challenges. Semin Orthod. 2013; 19(4): 253–266. doi: 10.1053/j.sodo.2013.07.005
8. Cobourne MT, DiBiase AT. Handbook of Orthodontics. 2016.
9. Al-Zoubi EM, Al-Nimri KS. A comparative study between the effect of reverse curve of Spee archwires and anterior bite turbos in the treatment of deep overbite cases: A randomized clinical trial. Angle Orthod. 2022; 92(1): 36–44. doi: 10.2319/020921-117.1.
10. McLaughlin R, Bennet J, Trevisi H. Systemized Orthodontic Treatment Mechanics. Edinburgh: Mosby; 2001.
11. Jiang R, Huang R. Retained deciduous teeth: the epidemiology, etiology, and treatment plans. Journal of Clinical Pediatric Dentistry. MRE Press. 2025; 49(2): 51–58. doi: 10.22514/jocpd.2025.023
12. Kenworthy CR, Larson BE. Incorporating retained deciduous teeth in orthodontic therapy. Am J Orthod Dentofac Orthop. Mosby Inc.; 2001; 119(3): 202–210. doi: 10.1067/mod.2001.112445
13. Thomas C, Vaysse F, Courset T, Nasr K, Courtois B, L'Homme A, Chassaing N, Vinel A, Bailleul-Forestier I, Raynaldy L, Laurencin-Dalicieux S. From child to

adulthood, a multidisciplinary approach of multiple microdontia associated with hypodontia: Case report relating a 15-year-long management and follow-up. Healthcare (Switzerland). MDPI. 2021; 9(9): 1180. doi: 10.3390/healthcare9091180

14. Namdar P, Bardideh E, Lal Alizadeh F, Jahanbin A, Eslami N. Comparison of Roth and McLaughlin-Bennet-Trevisi prescriptions as two popular pre-adjusted orthodontic bracket systems: a systematic review. Orthod Waves. Taylor and Francis Ltd.; 2020. 65–75. doi: 10.1080/13440241.2020.1777798
15. Milian R, Lefrançois E, Radzikowski A, Morice S, Desclos-Theveniau M. Pre-orthodontic restorative treatment of microdontia diastema teeth using composite injection technique with a digital workflow-Case report. Heliyon. 2023; 9(5): e15843. doi: 10.1016/j.heliyon.2023.e15843
16. Alpakan ÖO, Türköz Ç, Varlık SK. Long-term stability of mandibular incisor alignment in patients treated non-extraction with or without interproximal enamel reduction. Am J Orthod Dentofac Orthop. 2023; 163(6): 802–810. doi: 10.1016/j.ajodo.2022.07.020