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CASE STUDY

Orthodontic management of angle Class III malocclusion with severe anterior crowding

Gita Retyoningrum*✉, Zenith Paskalin*, Elih Sayuti, Avi Laviana**, Ida Ayu Evangelina**, Endah Mardiati****

*Orthodontics Specialty Program, Faculty of Dentistry, Universitas Padjadjaran, Bandung, West Java, Indonesia
**Department of Orthodontics, Faculty of Dentistry, Universitas Padjadjaran, Bandung, West Java, Indonesia
*Jl Sekeloa Selatan I, Bandung, West Java, Indonesia; ✉ correspondence: gita21004@mail.unpad.ac.id

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ABSTRACT

Dental malocclusion Class III is a challenging condition characterized by a Class III molar relationship, and it has a specific anterior condition according to Dewey Classification. In some cases, Class III dental malocclusion with skeletal Class I may present with a convex rather than a concave profile. Several methods are available to correct a convex profile, including extraction, full arch distalization using TADs, intermaxillary elastic Class II, anterior segment retraction, and others. Combining more than one of these methods can be effective in correcting a convex profile. An 18 year-old woman presented to RSGM Universitas Padjadjaran with a diagnosis of angle Class III dental malocclusion, skeletal Class I with a convex profile, normal maxillary incisor inclination, asymmetric profile, severe anterior crowding in both arches, minimal overjet, anterior crossbite, upper midline shift, clockwise rotation and high-angle mandible, and lingual inclination of the mandibular incisors. The patient was treated with a Roth prescription fixed orthodontic appliance. Maxillary and mandibular first premolars were extracted to create space, and lacebacks were applied to the canines to correct severe anterior crowding. Bilateral intermaxillary Class III elastics were used to maintain the facial profile and prevent it from becoming concave. Treatment was completed in 18 months, achieving a Class I molar relationship, midline correction, optimal overbite and overjet, and preservation of the facial profile. This case report presents the orthodontic management of angle Class III malocclusion with skeletal Class I and severe anterior crowding, successfully treated with first premolar extractions while maintaining a convex profile.

Keywords: convex profile; dental malocclusion Class III; first premolar extraction; ROTH prescription

INTRODUCTION

Angle's Class III malocclusion is characterized by a discrepancy in the anteroposterior teeth position, which can be influenced by changes in the anteroposterior and vertical planes.[1] Individuals with malocclusion Class III often exhibit a combination of characteristics, including protrusion of the lower lip, a concave facial profile, midface deficiency, and anterior and posterior crossbites.[2] Most etiological factors associated with this condition include genetic and environmental influences. Heredity appears to play a particularly strong role in mandibular prognathism.[3]

Class III malocclusion can also be affected by environmental factors such as enlarged tonsils, mouth breathing, traumatic events, nasal blockages, and atypical tongue function.[4] Class III malocclusion is defined by the positional relationship of the first molars, specifically when the mesiobuccal cusp of the maxillary first molar occludes posterior to the buccal groove of the mandibular first molar. The Dewey Classification of Class III malocclusion is as follows: type 1 refers to a Class III molar relationship with an edge-to-edge anterior occlusion; type 2 involves a Class III molar relationship accompanied by mandibular incisor crowding; and type 3 is characterized by a Class III molar relationship with an anterior crossbite. This Classification, first proposed a century ago, has been regularly revised with a focus on occlusal relationships and treatment planning.[5]

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The age of the patient plays a crucial role in determining the orthodontic treatment options for Class III malocclusion, with younger patients offering more flexibility in treatment planning. Adult patients often require orthognathic surgery in conjunction with orthodontic treatment. A broader range of treatment options is available for growing patients, including orthodontic and orthopedic appliances such as the Frankel type III (FR-III) appliance, bite plane with removable appliances, chin cup, and facemask (with or without expander)).[1,6]

Orthodontic camouflage treatment is a suitable option for patients with mild to moderate Class III malocclusion. The methods used in camouflage treatment are primarily dental changes; these may include teeth extractions, mandibular distalization, and intermaxillary Class III elastics. Treatment decisions should be based on skeletal discrepancies, dental abnormalities, and facial profiles.

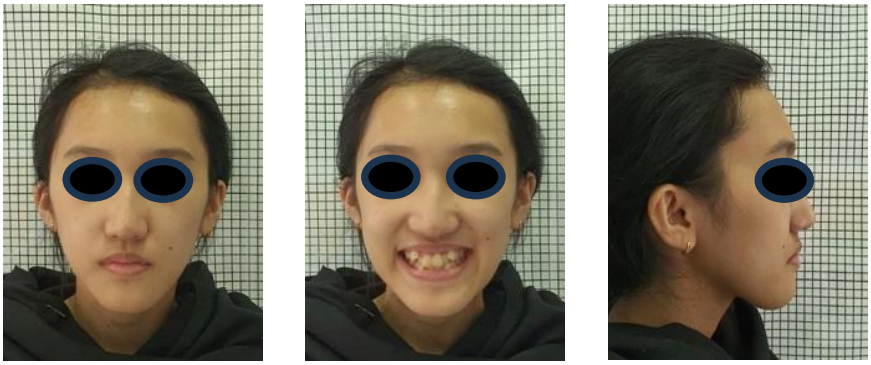
Proper diagnosis is necessary to establish realistic treatment goals and minimize undesirable outcomes.[7,8] This case report describes camouflage treatment of angle Class III malocclusion with extraction of the maxillary and mandibular first premolars in an adult patient.

METHODS

This case study reports an 18-year-old female who presented to the Orthodontic Clinic of Universitas Padjadjaran with a chief complaint of crowded teeth and lack of confidence. On extraoral examinations, the patient displayed a convex facial profile (15°). Ricketts's aesthetic E-line analysis was within the normal range, with the lower lip positioned 1.5 mm and the upper lip 2 mm behind the E-line. Pre-treatment cephalometric analysis showed SNA: 79°; SNB: 78°; ANB; 1°. Wit's appraisal: -11 mm with high angle occlusal plane (21.5°); I-NB: 1 mm; I-NB: 9.5°; High Angle Mandible: 44°; Y-Axis: 70; (Table 1).

Table 1. Pre- and post-treatment radiographic findings. Note the significant improvements in U1-NA (°), U1-NB (°), U1-NA (mm), U1-NB (mm), Wit's appraisal, and interincisal angle

Measurement	Normal	Pre-treatment	Post treatment
Skeletal pattern			
SNA (°)	82 ± 2	80	80
SNB (°)	80 ± 2	79	79
ANB (°)	2 ± 2	1	1
Wits appraisal (mm)	1 ± 2	-11	-5
Angle of convexity (°)	0 ± 10	-2	-3
Y- Axis (°)	60 ± 6	70	65
Facial angle (°)	87 ± 5	82	82
Occlusal plane angle (°)	9 ± 5	21.5	9.5
Dental pattern			
U1-NA (°)	22 ± 10	20	24
U1-NA (mm)	4 ± 2	3,5	5
U1-NB (°)	25 ± 10	9.5	22
U1-NB (mm)	4 ± 2	1	4
Interincisal angle (°)	131 ± 10	150	132
Soft tissue			
UL - E-line (mm)	2-3 mm behind E-line	2 mm behind E-line	1.5 behind E-line
LL - E-line (mm)	1-2 mm behind E-line	2 mm behind E-Line	0.5 behind of E-Line



(A) (B) (C)

Figure 1. Extraoral pictures before treatment (A, B) Frontal view. (C) Lateral view

(A) (B) (C)

(D) (E) (F)

Figure 2. Intraoral pictures before treatment. (a) Right view of the dentition. (b) Left view of the dentition. (c) Occlusal view of the maxilla arch. (d) Occlusal view of the mandibular arch. (e) Anterior view. (f) Overjet and Overbite

Figure 3. Panoramic radiograph**.** The radiograph showed that teeth 18, 48 and 38 were partially formed. Agenesis of tooth 28 was noted

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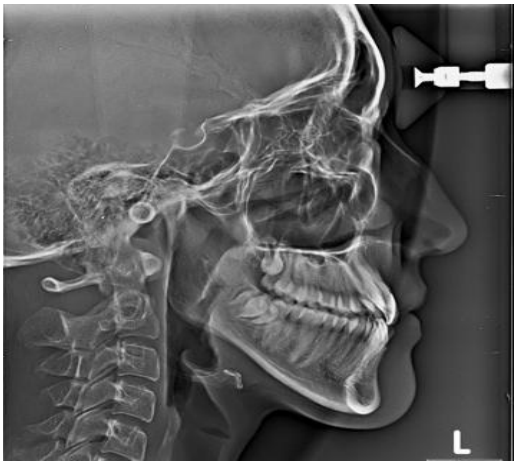

Figure 4. Cephalometric radiograph**.** The lateral cephalometric radiograph showed that the patient had protrusive maxillary incisors

(A) (B) (C)

Figure 5. Extraoral pictures after treatment**.** (a, b) Frontal views. (c) Lateral views

Pre-treatment clinical examinations revealed Class III malocclusion with a convex profile, skeletal Class I, normal maxillary incisor inclination, asymmetric profile, severe anterior crowding of both arches, minimal overjet, anterior crossbite of the lateral incisors, upper arch midline deviation, and lingual inclination of the mandibular incisors.

There are anterior severe crowding of maxilla and mandible. Arch-length discrepancy analysis revealed –14 mm in the maxilla and –12 mm in the mandible. The depth of the curve of Spee was within normal limits bilaterally. Extraoral examination Classified the patient's facial shape as mesocephalic and leptoprosopic, with a convex profile. (Figure 1)

The clinical and radiographic examinations showed that the patient was diagnosed with dental malocclusion Class III types 1 and 2 (Dewey Classification), skeletal Class I with anterior severe crowding of the maxilla and mandible, a convex facial profile, normal curve of Spee, an asymmetric profile, minimal overjet, anterior crossbite of the lateral incisors, upper arch midline shifting, and lingual inclination of the mandibular incisors (Figure 2). A fixed orthodontic appliance was placed following extraction of the first premolars of the maxilla and mandible on both the right and left sides. This case used pre-adjusted brackets (ROTH 0.022).

Note: There were no significant changes in the facial profile, indicating that the management of dental malocclusion Class III with extraction of the first premolars of the maxilla and mandible

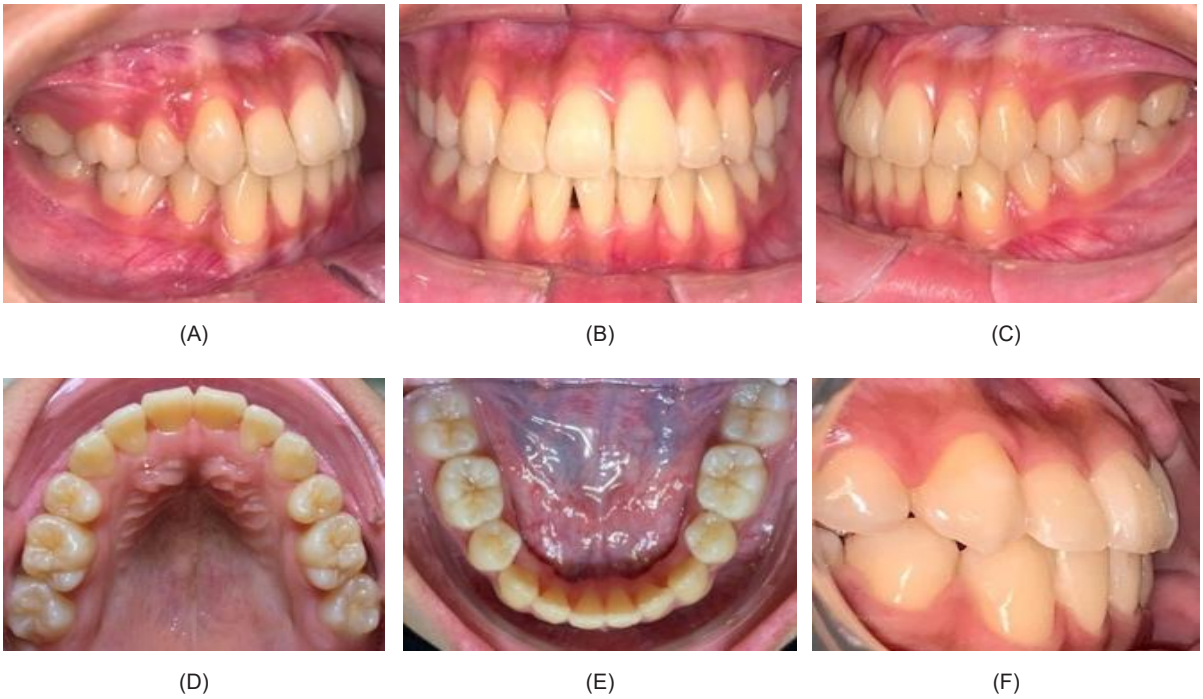

Figure 6. Post-treatment records**.** (A, B and C) Intraoral views showed well-aligned teeth with good interdigitation and improved molar relationships on both sides. (D) Maxillary occlusal plane (E) Mandibular occlusal plane. (F) Overbite and overjet

Figure 7. Panoramic radiograph after treatment

(both sides) was successful without resulting in a concave profile.

The temporomandibular joint (TMJ) examination was normal, and the patient's upper and lower lips showed normal muscle tone. Intraoral examination showed that the right and left first molar relationships were Classified as angle Class III malocclusion. The right and left canine relationships were also Classified as Class III.

The panoramic radiograph examination showed supporting tissues and alveolar bone within normal limits (Figure 3). Agenesis of tooth 28 was confirmed. Teeth 18, 48, and 38 were partially formed. The lateral cephalometric radiograph showed that the patient had normal inclination of the maxillary incisors with retroclination of the mandibular incisors (Figure 4).

The treatment plan involved extraction of the first premolars of the maxilla and mandible on

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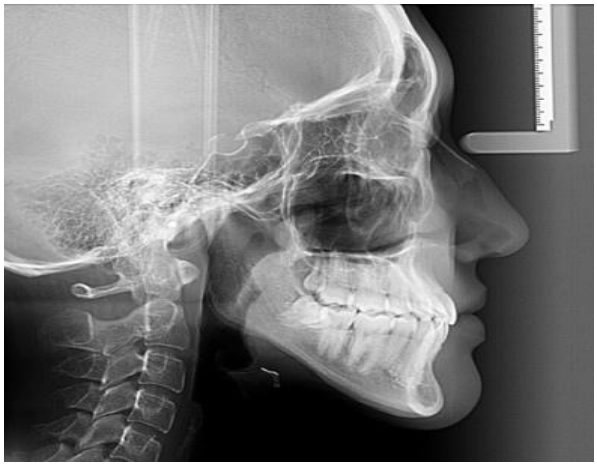

Figure 8. Cephalometric radiograph after treatment

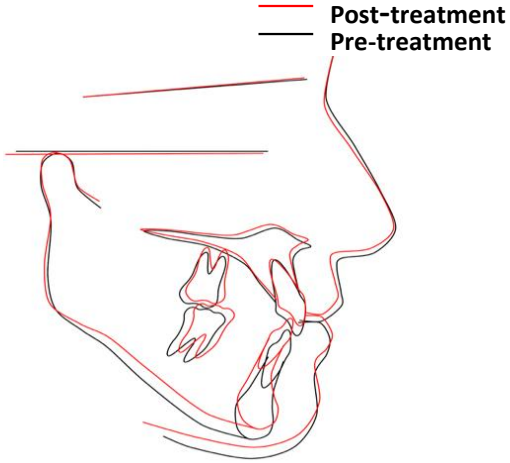

Figure 9. Before and after treatment cephalometric superimpositions

Note there is no significant changes of facial profile means the management of dental malocclusion Class III with extraction of first premolar maxilla and mandible (both side) was successful without making it become concave profile

both sides, performed to address crowding, with an arch length discrepancy (ALD) analysis of –14 mm in the maxilla and –12 mm in the mandible. Orthodontic treatment was performed using pre-adjusted brackets (Roth 0.022). Bracket placement was guided by the Roth bracket placement chart.

The treatment started with the leveling and alignment phase, using NiTi 0.012-inch wire for the first three months. This was followed by NiTi 0.014-inch wire for the maxillary arch, while the mandibular arch remained with NiTi 0.012-inch wire, with lacebacks applied to teeth 13, 23, 33, and 43. After one month, the wire sequence for the maxillary arch progressed to NiTi 0.016-inch, and continued with NiTi 0.018-inch one month later.

The wire was changed to NiTi 0.014-inch after two months for the mandibular arch. Two months later, the maxillary arch was changed to stainless steel (SS) 0.016 × 0.022-inch, and the mandibular arch to NiTi 0.016-inch. The leveling and alignment phase lasted for 12 months.

Crowding was resolved, achieving the desired initial alignment on both arches. After initial alignment was achieved, stainless steel wires 0.016 × 0.022-inch and 0.017 × 0.022-inch were placed before progressing to the working phase.

The working phase used stainless steel 0.019 × 0.025-inch wires. Midline deviation was corrected by using diagonal elastics from 13 to 33. Midline correction was performed with diagonal elastics extending from the maxillary canine to the mandibular canine, with a diameter of 5/16 inch and a force of 2 oz, adjustable to 3.5 oz depending on clinical response. Use of Class III elastics on both sides (left and right) began after completion of the leveling and alignment phase to achieve Class I canine relationships. The use of Class III elastics also maintained the facial profile, preventing concavity following extraction of the first premolars of the maxilla and mandible on both sides. The end of the working phase showed well-aligned and leveled teeth.

Midline deviation was corrected. Overjet and overbite were normalized to 2.5 mm. The facial profile was well maintained. The settling phase used NiTi 0.014-inch wire. Treatment was completed in 18 months (Figures 5 and 6). The retention phase was managed with a clear retainer.

A panoramic radiograph after treatment showed ideal root parallelism. The patient refused extraction of the third molars (Figure 7). A lateral cephalometric radiograph after treatment showed good inclination of the maxillary and mandibular anterior teeth. The facial profile changed from convex to straight, which remained acceptable (Figure 8). Cephalometric superimposition before and after treatment is shown in Figure 9.

DISCUSSION

The increasing awareness of malocclusion among patients necessitates that dentists enhance their skills and knowledge in diagnosing and planning treatment to provide personalized care that meets patients' expectations for both functional and aesthetic improvements.[9]

Malocclusion Class III primarily results from skeletal, dental, or combined components, most commonly due to the skeletal component. The dental component is characterized by a compensatory mechanism involving retrusion of the mandibular anterior teeth and protrusion of the maxillary anterior teeth.[10]

Malocclusion Class III is distinguished by discrepancies in the dental or skeletal components, occurring in the anteroposterior or vertical planes, which can compromise facial aesthetics and drive individuals to seek orthodontic treatment.[5] The development of malocclusion Class III is primarily attributed to hereditary factors, although environmental influences, such as deleterious oral habits and mouth breathing, may also contribute to its etiology.[10]

Dental malocclusion Class III is characterized by a specific molar relationship, where the mesiobuccal cusp of the maxillary first molar occludes posterior to the mandibular first molar's buccal groove. According to Dewey's Classification, the patient presented with type 1 and type 2 dental malocclusion Class III, characterized by edge-to-edge occlusion or minimal overjet, along with severe anterior mandibular crowding and a convex profile.

To prevent the development of a full-blown malocclusion Class III, treatment should be initiated as early as possible in cases where a Class III tendency is diagnosed. [9] In this case of dental malocclusion Class III with an acceptable facial profile, camouflage treatment was considered appropriate, as research has demonstrated its effectiveness in achieving stable and satisfactory outcomes. [11]

Orthodontic camouflage techniques for dental malocclusion Class III can be done with: (1) retraction of mandibular incisors, (2) proclination of maxillary incisors, (3) extractions, and (4) intermaxillary elastics.[5,11–13] Facial profile evaluation can be done by clinical examination and cephalometric radiography, which is an essential step in orthodontic treatment. Various cephalometric analyses were developed to evaluate the facial profile, such as Downs', Ricketts', Holdaway's, and Steiner's analyses.[14] In this patient, the facial profile was maintained by the use of Class III intermaxillary elastics. There was no retraction of the anterior segment of the maxilla and mandible because the extraction spaces of the first premolars were utilized to relieve anterior crowding.

Malocclusions that develop during growth and development can impact the facial profile.[15] The mandible grows anteriorly, leading to a reduction in skeletal profile convexity.[16] The total soft tissue profile convexity is stated to become more convex during growth (including the nose and mouth).[17] However, the convexity of the soft tissue profile tends to remain relatively stable or undergo only minimal changes as an individual ages.[18] This patient presented with a convex facial profile and dental malocclusion Class III. The positions of the nose and lips showed a normal relation according to the aesthetic Ricketts line. This indicates that soft tissue (nose and lips) changes during growth can affect the facial profile in dental malocclusion Class III.

The methods used in camouflage treatment are primarily dental changes; these may include tooth extractions, distalization of mandibular teeth, and the use of Class III intermaxillary elastics.[11] The objective of dental camouflage treatment is to achieve a more aesthetically pleasing profile and to correct the alignment of the maxillary and mandibular teeth, thereby effectively masking underlying skeletal discrepancies.[19]

In this case, extraction of the first premolars in both the maxilla and mandible was performed to create space to relieve the moderate crowding. The patient initially had a minimal overjet and anterior crossbite, maxillary midline deviation, clockwise mandibular rotation with a high mandibular angle,

a steep occlusal plane, and lingual inclination of the mandibular incisors. The patient also had severe to moderate crowding, and the extraction spaces were used to resolve it. We corrected the molar and canine relationship from Class III to Class. I

The facial profile was maintained and did not become concave by using Class III elastics on both sides (16 to 43 and 26 to 33). The initial facial profile of the patient was convex (15°), measured by Ricketts's method. After extraction of the four first premolars, the final profile was straight (10°) and acceptable. Treatment of maxillary midline shifting was performed using a power chain from the distal wing bracket of 22 to 23 and an open-coil spring between 12 and 13.

The same ANB angle was maintained before and after treatment, as shown in the cephalometric analysis table. Wits appraisal improved from –11 mm to –5 mm. This improvement was due to a reduction of the occlusal plane angle from high (21.5°) to normal (9.5°). The angle of convexity changed from –2.0° to –3.0° due to relief of anterior maxillary crowding, which influenced point A and reduced skeletal convexity, but the result remained proportionate and clinically acceptable.

The Incisor–NB angle (I–NB) improved from 9.5° to 22.0°. The mandibular incisor inclination became more upright due to torque expression using a 0.019 × 0.025-inch archwire. The interincisal angle improved from 150° to 132°, which falls within the stability range of 125°–135° for anterior teeth. After orthodontic treatment, the retention phase is a necessary part of management. Orthodontic retention refers to the process of maintaining the stability of the teeth and periodontal tissues to ensure optimal aesthetic and functional outcomes.[20]

Clear retainers were used in this case because they offer a favorable combination of aesthetics, comfort, and affordability. Compared to traditional fixed and removable retainers, clear retainers are transparent, thin, and durable, fabricated with a vacuum-formed design.[21]

Treatment outcomes in adult patients depend on a confluence of factors. In this specific case, extraction of the upper and lower premolars was chosen to relieve anterior crowding, and the gained space was used to correct both maxillary and mandibular midlines. Class III intermaxillary elastics were used to maintain the facial profile and to achieve a Class I canine and molar relationship. The successful treatment of this Class III malocclusion case relied on the effective combination of patient cooperation and adherence to a well-planned treatment protocol.

CONCLUSION

This case report highlights the orthodontic treatment of Class III dental malocclusion in a skeletal Class I patient, where the treatment goals included correcting overjet, overbite, and the midline, while maintaining the facial profile. These goals were achieved through extraction of the first premolars in both the maxilla and mandible.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this study.

REFERENCES

1. Proffit WR, et al. Contemporary Orthodontics. 6th ed. St. Louis: Elsevier; 2019. 203–359, 395-400.
2. Halim H, Halim IA. Profile changes in Class III malocclusion using protraction facemask in indonesian young patients (cephalometric study). Open Dent J. 2023; 17(1): 1–7. doi:10.2174/18742106-v17-e230320-2022-144
3. Shetty SK, Kumar M, Gervasis BA, et al. Impact of heredity on Class III malocclusion. Int J Appl Dent Sci. 2019; 5(4): 276–279.

4. Iwasaki T, Sato H, Suga H, Takemoto Y, Inada E, Saitoh I, Kakuno E, Kanomi R, Yamasaki Y. Relationships among nasal resistance, adenoids, tonsils, and tongue posture and maxillofacial form in Class II and Class III children. Am J Orthod Dentofacial Orthop. 2017; 151(5): 929-940. doi: 10.1016/j.ajodo.2016.10.027
5. Maruswamy, Nayak UV, Nayak P. Management of Class III malocclusion - a review with report of four cases. Annals of Dental Specialty. 2018; 6(4): 464–471.
6. Azamian Z, Shirban F. Treatment options for Class III malocclusion in growing patients with emphasis on maxillary protraction. Scientifica (Cairo). 2016; 2016: 8105163. doi: 10.1155/2016/8105163
7. Wang RH, Shen HL. Camouflage orthodontic treatment for adult patient with skeletal Class III malocclusion and bilateral posterior cross-bite. Taiwanese Journal of Orthodontics. 2017; 29(3): 182–191. doi: 10.30036/TJO.201709_29(3).0004
8. Sakoda KL, Pinzan A, Cury SEN, Bellini-Pereira SA, Castilo AAD, Janson G. Class III malocclusion camouflage treatment in adults: A Systematic Review. Journal of Dentistry Open Access. 2019; 1(1):1–12. doi: 10.31487/j.jdoa.2019.01.04
9. Sarangal H, Namdev R, Garg S, Saini N, Singhal P. Treatment Modalities for Early Management of Class III Skeletal Malocclusion: A Case Series. Contemp Clin Dent. 2020; 11(1): 91–96. doi: 10.4103/ccd.ccd_393_19
10. Chunduru R, Kailasam V, Ananthanarayanan V. Quantum of incisal compensation in skeletal Class III malocclusion: a cross-sectional study. J Korean Assoc Oral Maxillofac Surg. 2024; 50(5): 265-272. doi: 10.5125/jkaoms.2024.50.5.265.
11. Monika F, Widayati R. Class III malocclusion camouflage treatment using a conventional orthodontic appliance in a non-growing patient. J Dent Indones. 2023; 30(1): 48–51. doi: 10.14693/jdi.v30i1.1467
12. Alam MK, Nowrin SA, Shahid F, AlHarby H, Abutayyem H, Alswairki HJ, El-Din Mohamed SK. Orthognathic versus camouflage treatment of class III malocclusion: a systematic review and meta-analysis. *Applied Science.* 2022; *12*(7): 3314. doi: 10.3390/app12073314
13. Bellot-Arcís C, Ferrando-Magraner E, Tarazona-Álvarez B, García-Sanz V, Paredes-Gallardo V. Nonsurgical treatment of an adult with skeletal Class III malocclusion, posterior crossbite and mandibular asymmetry. J Clin Exp Dent. 2023; 15(11): 978–983. doi: 10.4317/jced.60939
14. Dominique V, Nofrizal R. Degree of facial profile convexity using Subtelny's analysis in patients aged 6 to 12 years. Majalah Kedokteran Gigi Indonesia. 2023; 9(3): 238–244. doi: 10.22146/majkedgiind.81931
15. Yu X, Zhang H, Sun L, Pan J, Liu Y, Chen L. Prevalence of malocclusion and occlusal traits in the early mixed dentition in Shanghai, China. PeerJ. 2019; 7(e6630): 1–15. doi: 10.7717/peerj.6630
16. Nielsen IL. Factors affecting mandibular growth and displacement and their effect on treatment outcome. Taiwanese Journal of Orthodontics. 2022; 34(3): 127–137. doi: 10.38209/2708-2636.1134
17. Kumar A, Tandon P, Singh GK, Singh GP. Soft tissue growth changes from 8 to 16 years of age: A cross-sectional study. Natl J Maxillofac Surg. 2019; 10(2): 161-167. doi: 10.4103/njms.NJMS_18_16
18. Perović T, Blažej Z. Male and female characteristics of facial soft tissue thickness in different orthodontic malocclusions evaluated by cephalometric radiography. Med Sci Monit. 2018; 24(1): 3415–3424. doi: 10.12659/MSM.907485
19. Eslami S, Faber J, Fateh A, Sheikholaemmeh F, Grassia V, Jamilian A. Treatment decision in adult patients with Class III malocclusion: surgery versus orthodontics. Prog Orthod. 2018; 19(28): 1–6. doi: 10.1186/s40510-018-0218-0

20. Kartal Y, Kaya B. Fixed orthodontic retainers: a review. Turk J Orthod. 2019; 32(2): 110–114. doi: 10.5152/TurkJOrthod.2019.18080
21. Alhasyimi AA, Pudyani PP, Asmara W, Ana ID. Enhancement of post-orthodontic tooth stability by carbonated hydroxyapatite-incorporated advanced platelet-rich fibrin in rabbits. Orthod Craniofac Res. 2018; 21(2): 112-118. doi: 10.1111/ocr.12224
22. Chaimongkol P, Suntornlohanakul S. Clear retainer. APOS Trends in Orthodontics. 2017; 7(1): 54–60. doi: 10.4103/2321-1407.199173