Case Report

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Non-Extraction Management of a Camouflaged Class III with Mandibular Repositioning Due to Occlusal Interferences and Severe Dental Wear in an Adult Patient Using Distalization Technique with Skeletal Anchorage

Manejo sin extracción de una clase III camuflada con reposicionamiento mandibular por interferencias oclusales y desgaste dental severo en un paciente adulto utilizando la técnica de distalización con anclaje esquelético

Tratamento sem extração de uma Classe III camuflada com reposicionamento mandibular devido a interferências oclusais e desgaste dentário severo em um paciente adulto usando técnica de distalização com ancoragem esquelética

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■ **Abstract.** Class III malocclusion results from a combination of hereditary and environmental factors and affects various populations, with higher prevalence in Asians and Hispanics. Characteristics include maxillary deficiency, mandibular prognathism, or both, often leading to a pseudo-Class III if left untreated. Traditional treatments involve extractions or interproximal reductions (IPR), but these approaches can be time-consuming and less acceptable to patients, especially in aesthetic zones. Skeletal anchorage with mini-screws offers a modern solution, enabling movements such as full arch distalization, intrusion beyond 1 mm, and multi-planar adjustments without excessive root stress. This method reduces treatment time and avoids complications like bowing effects often seen in conventional techniques. The case study describes a 30-year-old patient with Class III malocclusion, lower arch crowding, and incisor wear. Treatment involved using mini-screws for asymmetrical distalization in all quadrants. Bite blocks facilitated mandibular repositioning, and space was created to align the lower incisors without compromising periodontal health. The treatment took 16 months, including temporary incisal reconstructions and final restoration with lithium disilicate veneers. The patient's malocclusion, mandibular deviation, and tooth wear were successfully addressed. The skeletal anchorage allowed precise control over movements, maintaining facial height and achieving stable occlusion. Condylar repositioning eliminated zigzag deviation and discomfort. Compared to traditional methods, this approach was faster and tailored to the patient's needs, avoiding extractions while improving aesthetics and function. Skeletal anchorage proves effective in addressing challenges that traditional orthodontics cannot resolve, offering faster treatment times, better control in all three spatial planes, and improved patient satisfaction. This technique represents a significant advancement in orthodontic care for complex cases.

Keywords: Class III, Skeletal Anchorage, Orthodontics, Mini Screws.

■ **Resumen.** La maloclusión de Clase III resulta de una combinación de factores hereditarios y ambientales, y afecta a diversas poblaciones, con una mayor prevalencia en asiáticos e hispanos. Sus características incluyen deficiencia maxilar, prognatismo mandibular o ambos, lo que a menudo conduce a una pseudo-Clase III si no se trata. Los tratamientos tradicionales incluyen extracciones o reducciones interproximales (IPR), pero estos enfoques pueden ser

lentos y menos aceptados por los pacientes, especialmente en zonas estéticas. El anclaje esquelético con mini-tornillos ofrece una solución moderna, permitiendo movimientos como distalización de arco completo, intrusión superior a 1 mm y ajustes multiplanares sin un estrés excesivo en las raíces. Este método reduce el tiempo de tratamiento y evita complicaciones como los efectos de arqueo que se observan frecuentemente en técnicas convencionales. El estudio de caso describe a una paciente de 30 años con maloclusión de Clase III, apiñamiento en el arco inferior y desgaste incisivo. El tratamiento incluyó el uso de mini-tornillos para distalización asimétrica en todos los cuadrantes. Los bloques de mordida facilitaron el reposicionamiento mandibular y se creó espacio para alinear los incisivos inferiores sin comprometer la salud periodontal. El tratamiento duró 16 meses, incluyendo reconstrucciones temporales de los bordes incisales y restauración final con carillas de disilicato de litio. La maloclusión, desviación mandibular y desgaste dental de la paciente fueron corregidos con éxito. El anclaje esquelético permitió un control preciso de los movimientos, manteniendo la altura facial y logrando una oclusión estable. El reposicionamiento condilar eliminó la desviación en zigzag y la incomodidad. En comparación con los métodos tradicionales, este enfoque fue más rápido y se adaptó a las necesidades del paciente, evitando extracciones y mejorando la estética y la función.El anclaje esquelético demuestra ser efectivo para resolver desafíos que la ortodoncia tradicional no puede abordar, ofreciendo tiempos de tratamiento más cortos, mejor control en los tres planos espaciales y una mayor satisfacción del paciente. Esta técnica representa un avance significativo en la atención ortodóntica para casos complejos.

Palabras Claves: Clase III, Anclaje esquelético, Ortodoncia, Mini tornillos.

Resumo. A má oclusão de Classe III resulta de uma combinação de fatores hereditários e ambientais, afetando diversas populações, com maior prevalência entre asiáticos e hispânicos. Suas características incluem deficiência maxilar, prognatismo mandibular ou ambos, o que frequentemente leva a uma pseudo-Classe III se não tratada. Os tratamentos tradicionais incluem extrações ou reduções interproximais (IPR), mas esses métodos podem ser demorados e menos aceitos pelos pacientes, especialmente em zonas estéticas.A ancoragem esquelética com mini-parafusos oferece uma solução moderna, permitindo movimentos como distalização completa do arco, intrusão superior a 1 mm e ajustes multiplanares sem sobrecarga excessiva nas raízes. Esse método reduz o tempo de tratamento e evita complicações, como os efeitos de arqueamento frequentemente observados em técnicas convencionais.O estudo de caso descreve uma paciente de 30 anos com má oclusão de Classe III, apinhamento no arco inferior e desgaste incisivo. O tratamento incluiu o uso de mini-parafusos para distalização assimétrica em todos os quadrantes. Bloqueios de mordida facilitaram o reposicionamento mandibular, e foi criado espaço para alinhar os incisivos inferiores sem comprometer a saúde periodontal. O tratamento durou 16 meses, incluindo reconstruções temporárias das bordas incisais e restauração final com facetas de dissilicato de lítio.A má oclusão, a desvio mandibular e o desgaste dental da paciente foram corrigidos com sucesso. A ancoragem esquelética permitiu controle preciso dos movimentos, mantendo a altura facial e alcançando uma oclusão estável. O reposicionamento condilar eliminou o desvio em zigue-zague e o desconforto. Comparado aos métodos tradicionais, essa abordagem foi mais rápida e adaptada às necessidades da paciente, evitando extrações e melhorando a estética e a função.A ancoragem esquelética demonstra ser eficaz para resolver desafios que a ortodontia tradicional não consegue abordar, oferecendo tempos de tratamento mais curtos, melhor controle nos três planos espaciais e maior satisfação do paciente. Essa técnica representa um avanço significativo no cuidado ortodôntico para casos complexos.

Palavras-chave: Classe III, Ancoragem Esquelética, Ortodontia, Mini Parafusos.

INTRODUCTION

When discussing Class III malocclusion, it is important to note a mixed etiology involving hereditary and environmental factors (some environmental factors include muscle hypertonicity, mouth breathing, pituitary gland diseases, hormonal disorders, habits, trauma, among others) (1,2). The global prevalence of Class III malocclusion ranges from 0 to 26.7%, predominantly affecting Asian populations, followed by Hispanic community(1–4). The main characteristics include maxillary growth deficiency and/or retrognathia, excessive mandibular growth and/or prognathism, or a combination of both. In the other hand, this malocclusion can present as mandibular prognathism caused by occlusal interferences, affecting the anteroposterior position of the mandible and creating a pseudo-Class III, which, if untreated, can evolve into a skeletal Class III (5–7).

For a proper diagnosis of Class III malocclusion, both skeletal and dentoalveolar components must be considered (6,8). Intraorally, it is characterized by dentoalveolar compensation of the upper and lower incisors, which are often proclined, retruded, or cross-bite (6,7,9). Extraoral characteristics such as, maxillary hypoplasia results in deficient growth in both the anterior and inferior directions, leading

to mandibular rotation upwards and forwards, thus accentuating features such as: concave profile, poor zygomatic projection, nasolabial groove flattening, and increased lower facial height (6,10).

Regarding treatment for adult Class III malocclusion, various studies have reported the use of the MEAW technique (Multiloop Edgewise ArchWire), orthodontic treatment with extractions, and treatment with extra-alveolar mini-screws (7,8,11–14). However, most research concludes that in adults, non-surgical changes are typically camouflage and limited.

Skeletal anchorage has improve treatments since it was first used, and many techniques have being developed since then to help on movements that with in traditional orthodontics wont be able to achieve, such as full arch distalizations, teeth intrusion over 1 mm and teeth movements with out adding extra force on the roots to achieve this.

CLINICAL HISTORY

A 30-year-old patient, with no relevant medical history, sought treatment to correct her bite and address tooth wear without undergoing dental extractions. The patient exhibited moderate crowding in the lower arch, severe wear of the incisors, bis-a-bis bite, as well as a class I molar and canine dental relationships (Figure 1, Figure 2). During extraoral examination, both condyles were palpable during opening, with a zigzag deviation upon mandibular closure. Radiographic and tomographic evaluations revealed posteriorly impacted and descended condyles in their glenoid cavities. Cephalometric analysis in centric relation confirmed the following diagnosis: Class III malocclusion with a mixed component (maxillary and mandibular), with a posteriorly impacted mandible due to premature occlusal contacts during closure. The lower incisors were proclined, and moderate lower arch crowding was present.

REASON FOR CONSULTATION

The patient sought treatment without extractions. A treatment plan involving distalization of the four quadrants using skeletal anchorage (mini-screws) was proposed. This technique is indicated in cases where there are no third molars, and sufficient space exists for molar distalization without impaction against the mandibular ramus.

The treatment involved placing 12 mm extra-alveolar infra-zygomatic screws in the maxilla and 16 mm extra-alveolar screws along the external oblique line of the mandible. Sliding jigs were added to these screws to distalize the teeth.

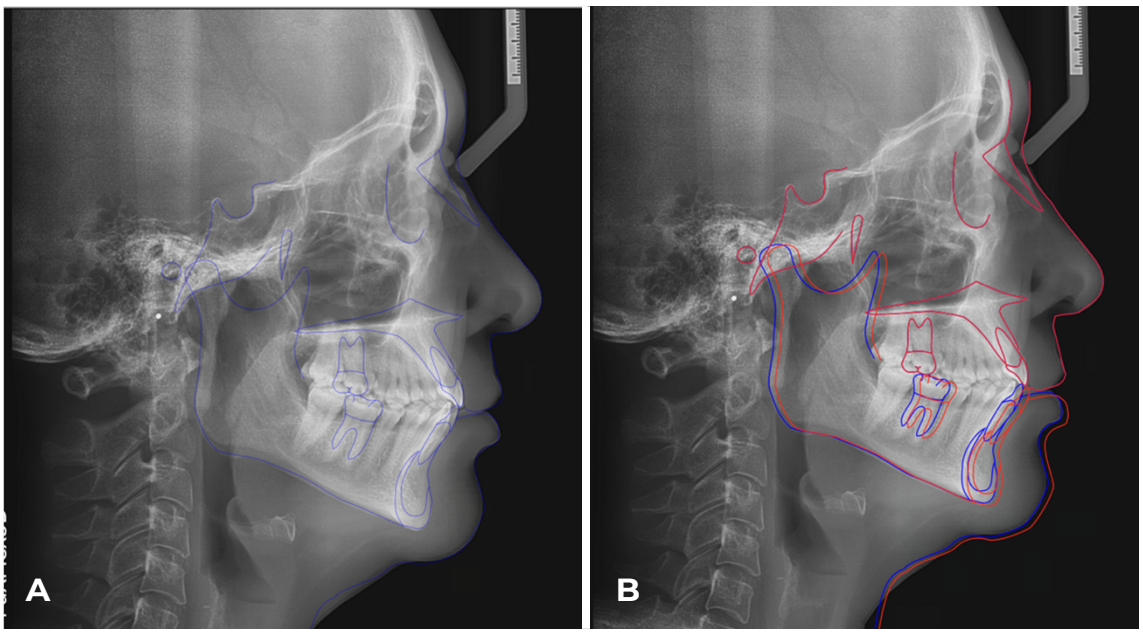

Figure 1. A: cephalometric trace of the structures B: cephalometric trace with conversion to CR

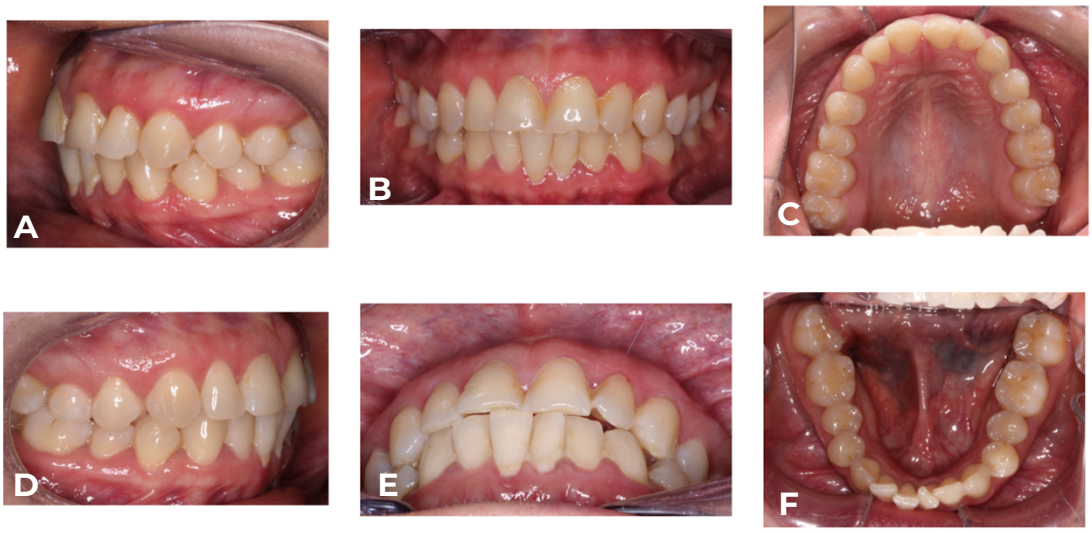

Figure 2. Pre-treatment records A: left bite B: front view of the bite C: Maxillary upper teeth crowding. D: right bite E: Overjet of the front bite F: Mandible lower teeth crowding

Once the lower crowding was addressed, the screws were removed, and composite reconstructions of the incisal edges were performed to restore dental height, allowing for the treatment's final phase. The entire process took 16 months, and at the time of appliance removal, the teeth were prepared for lithium disilicate veneers on the four upper incisors. Removable retention (Axis type) was prescribed, and a one-year follow-up showed micro-adaptations that maintained the orthodontic correction, as well as condylar repositioning in centric relation.

JUSTIFICATION FOR TREATMENT

According to traditional techniques, this case would have required four premolar extractions to achieve the desired outcome. However, new treatment techniques, as promoted by Dr. Ertty Silva, have demonstrated the effectiveness of dental distalization and better three-dimensional control of tooth movement. The treatment duration is also shorter, as distalization distances are between 4 and 6 mm or even less. In cases involving extractions, although crowding can be resolved during the alignment phase, the remaining space to be closed often complicates and extends the treatment time. The patient's age was also a consideration. This approach works well regardless of age but is more effective in adult patients who have already had their third molars extracted or need to be remove. For adolescent patients with more malleable maxillary bones, the position of their third molars can limit this technique. However, if third molar agenesis is present, or extraction is viable, this would be an excellent treatment choice.

Sectional bonding must also be considered in planning, as placing all braces in the system from the start could cause crowded teeth to shift buccally, leading to increased proclination and potentially causing irreversible periodontal damage, as well as likely root shortening due to back-and-forth movement. (Figure 3) In this case, the approach focused on asymmetric distalization of the lower quadrants first, to create enough space to derotate the most affected incisor and align everything properly without causing periodontal harm or back-and-forth root effects.

TREATMENT PROCEDURE

On the day of orthodontic bonding, the extra-alveolar screws were placed, both the infra-zygomatic and those positioned on the external oblique line of the mandible. The bonding process was individualized to avoid placing brackets on the lower incisors initially, as these teeth would otherwise align prematurely and become proincline, exacerbating or causing further periodontal issues. Sliding jigs were also placed, supported from the first molar to distal of the canines, activated with

Figure 3. Beginning of the treatment, A: front view the mouth with all the appliances placed and selective bonding for the beginning of the treatment B: right view of the distalization appliance activation C: left view of the distalization appliance activation x.

a chain providing 500 grams of force from the mini-screw to the sliding jig hook. Bite blocks were placed on the sixes to release the mandible and deprogram it into centric relation. Monthly activations were performed to monitor molar Class I relationships and space creation, a process lasting approximately five months.

When enough space was achieved to align the lower incisors without compromising periodontal health, posterior segments were stabilized with posterior-ligatures, the Class I molar and canine relationships were maintained, and the mini-screws were removed.

The amount of distalization in the upper arch always depends on the lower arch. Once complete derotation of the lower incisor was achieved, addressing the patient's main concern, we proceeded with the progressive arch wire sequence, reaching a 19x25 stainless steel wire, which took approximately 6 months.

Afterward, incisal edge reconstructions were performed to achieve the appropriate tooth height for the finishing phase (Figure 4). At this point, we removed bite blocks to allow the bite to settle and adjust to its rotational axis, with monthly occlusion checks to achieve ideal contacts and complete the case. This process took 5 months.

Once ideal bite contacts were achieved, we removed the braces and referred the patient for the preparation of lithium disilicate veneers. Thanks to the intraoral scanner and drilling machine, the veneers were ready for installation on the same day.

The retainers were worn full-time for 6 months and then only at night for another 6 months, allowing for a perfect micro-adaptation of the teeth and maintaining their relationship without any relapse to this day (Figure 5).

The total treatment time was 16 months from installation to removal.

Figure 4. A: temporary reconstructions to restore teeth height B: before reconstructions

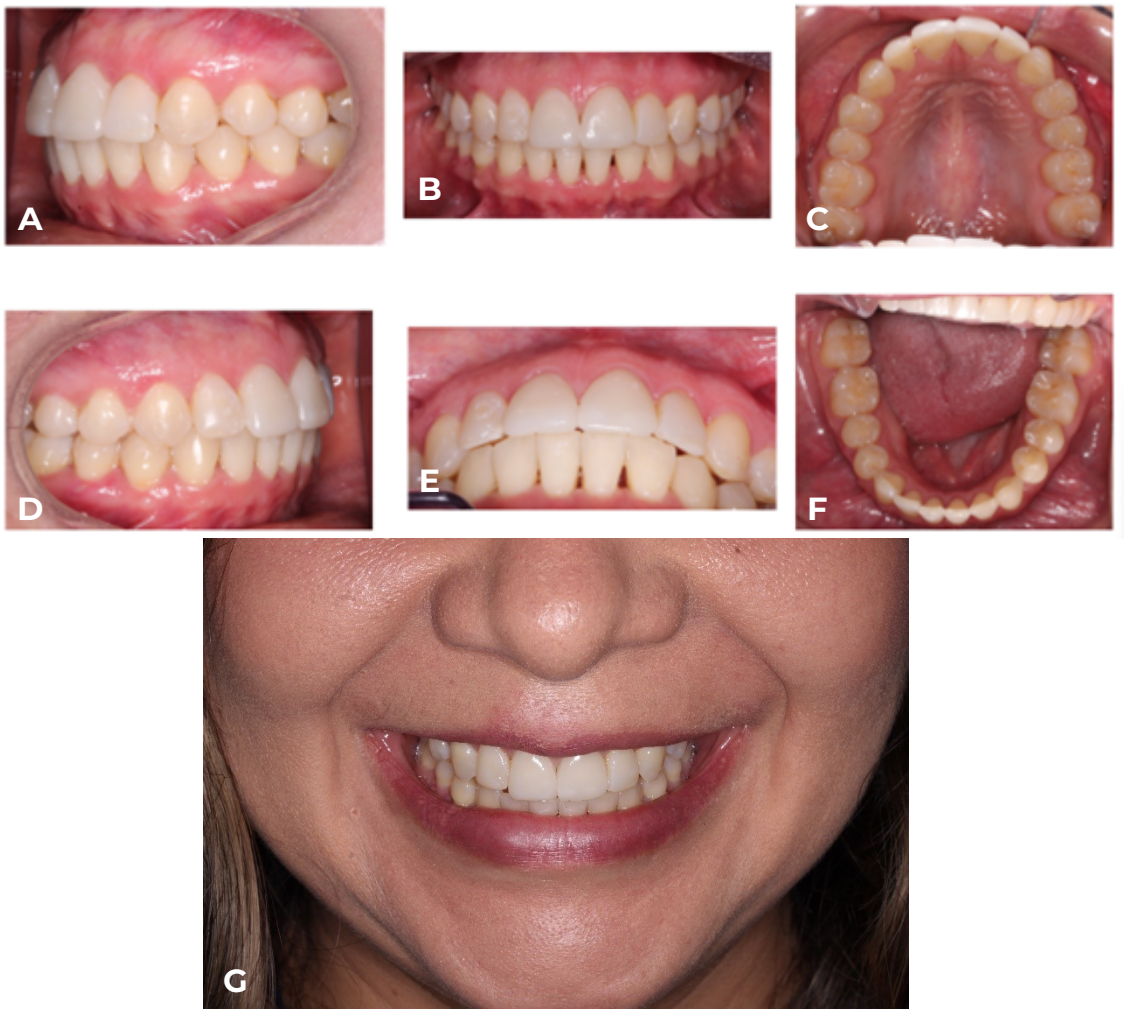

Figure 5. Final records post-treatment with final veneers on A: left side bite B:front bite C:Maxillary upper teeth D: right bite E: overjet bite F: mandible lower teeth G: full smile after treatment.

TREATMENT RESULTS

The patient's concerns were addressed by aligning her teeth without extractions and achieving a faster treatment time compared to a traditional treatment plan.

The need to create space to derotate and align the incisor allowed us to approach the case based on the patient's specific needs.

The occlusal control allowed us to uncover the Class III malocclusion, which involved a posterior impaction of the temporomandibular joints, thereby preventing further wear of the incisors due to this adaptive position.

Facial height was maintained, and incisor height restored, improving both aesthetics and function.

The condyles repositioned correctly, eliminating the zigzag deviation, with no clicking or pain, and stable centric relation was achieved.

DISCUSSION

The classic treatment for crowding suggests creating space to resolve the overcrowding. This can be achieved depending on the amount of space required, either by reducing the interproximal surfaces of the teeth (IPR) or through dental extractions, as per the classical Roth/Andrews technique (15). However, skeletal anchorage, through the use of micro screws, has enabled the application of additional forces to perform complex mass movements towards distal or intrusions, which are not feasible with conventional orthodontic appliances (16).

For patients diagnosed with Class III malocclusion, depending on the degree of crowding, the extraction of the lower first premolars or a single incisor is suggested. Nevertheless, dental extractions, especially in aesthetic zones, are less common and less accepted by patients (17). The use of skeletal anchorage has made it possible to address issues that traditional orthodontics could not resolve, allowing control over treatment in all three planes of space and enabling multiple simultaneous movements such as intrusion, distalization, expansion, or compression. Moreover, it significantly shortens treatment times to less than half compared to traditional cases (16).

Placing a micro screw in the quadrant where we are working provides 100% control over the actions required in that area, whether it involves greater or lesser traction relative to its contralateral side. In traditional treatments, it is possible to control space closure, but this process takes too much time and causes root stress by often forcing mesial closures of the molars (16). This leads to unnatural movements, which frequently result in bowing effects and patient dropout during the final stage of treatment (18).

Because treatment speed is greater with skeletal anchorage, the finishing phase—where patients do not perceive major changes but which is crucial to ensuring occlusal stability—allows us to achieve better results. Patients remain motivated, ensuring the success of the final occlusion in our cases (19).

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Author contributions

Conceptualization, L.V.S.; methodology, L.V.S.; data collection, L.V.S.; validation, L.V.S.; formal analysis, L.V.S.; investigation, L.V.S.; resources, L.V.S.; data management, L.V.S.; drafting of the initial manuscript, L.V.S.; writing—review and editing, L.V.S.; visualization, L.V.S.; supervision, L.V.S.; project administration, L.V.S. The author reviewed and approved the final version of the manuscript.

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Declarations

Ethics Approval and Consent to Participate

Informed written consent to participate was obtained, but ethical approval is not required. Human subjects: consent was obtained or waived by all participants in this study.

Availability of Data and Materials

The authors declare that the data supporting the fndings of this report are available within the paper.

Consent for Publication

Written informed consent was obtained from the patient

for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in Chief of the journal.

Competing Interests

In accordance with the ICMJE uniform disclosure form, the author declares the following: Payment/Services Information: The author confirms that no financial support was received from any organization for the submitted work. Financial Relationships: The author declares no financial relationships with any organizations that could have a potential interest in the submitted work, either at present or within the past three years. Other Relationships: The author states that there are no other relationships or activities that could be perceived as influencing the submitted work.

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References

1. Caro M, Awuapara S. Revisión de los principales manejos ortodónticos interceptivos y correctivos no quirúrgicos de la maloclusión clase III. Rev Asoc Odontológica Argent. 2021;207–12. doi: 10.52979/raoa.1149

2. Avalos-González GM, Paz-Cristóbal AN. Maloclusión Clase III. Rev Tamé. 2014;3(8):279–82.

3. Fawaz V, Purushothaman B, Nizaro Siyo RK, Naseem KT, Ashok A, Bavitha TK. Investigation of the change in the degree of Frankfort mandibular plane angle after levelling the curve of spee in different malocclusion groups. J Orthod Sci. 2023;12(1):65. doi: 10.4103/jos.jos_41_23

4. Dobrzynski W, Stawinska-Dudek J, Moryto N, Lipka D, Mikulewicz M. Floating–Harbor Syndrome: A Systematic Literature Review and Case Report. J Clin Med. 2024;13(12). doi: 10.3390/jcm13123435

5. Han JJ, Jung S, Park HJ, Oh HK, Kook MS. Evaluation of Postoperative Mandibular Positional Changes After Mandibular Setback Surgery in a Surgery-First Approach: Isolated Mandibular Surgery Versus Bimaxillary Surgery. J Oral Maxillofac Surg. 2019;77(1):181.e1-181.e12. doi: 10.1016/j.joms.2018.09.008

6. Teramoto A, Suzuki S, Higashihori N, Ohbayashi N, Kurabayashi T, Moriyama K. 3D evaluation of the morphological and volumetric changes of the tongue and oral cavity before and after orthognathic surgery for mandibular prognathism: a preliminary study. Prog Orthod. 2020;21(1). doi: 10.1186/s40510-020-00331-7

7. Kim HY, Han SB. Soft-Tissue Response following Genioplasty Combined with Anterior Segmental Osteotomy. Plast Reconstr Surg. 2024;153(1):54E-63E. doi: 10.1097/PRS.0000000000010505

8. Sami Q ul ain, Ali B, Farooqui WA. Effects of Alt-RAMEC protocol with facemask therapy in cleft lip palate patients in a sample of Pakistani population. BMC Oral Health. 2023;23(1). doi: 10.1186/s12903-023-03093-w

9. Sun L, Yuan L, Wang B, Zhang L, Shen G, Fang B. Changes of alveolar bone dehiscence and fenestration after augmented corticotomy-assisted orthodontic treatment: a CBCT evaluation. Prog Orthod. 2019;20(1). doi: 10.1186/s40510-019-0259-z

10. Brancher JA, Silva LAM da, Reis CLB, Matsumoto MAN, de Carvalho L, Antunes LS, et al. Calcification patterns and morphology of Sella turcica are related to anteroposterior skeletal malocclusions: A cross-sectional study. Ann Anat. 2024;254. doi: 10.1016/j.aanat.2024.152233

11. Čutović T, Ilić J, Adamović T, Matijević S, Radojičić J, Stošić S. Dental and skeletal changes occurring after orthodontic-surgical treatment of mandibular prognathism; [Dentalne i skeletne promene nastale posle ortodontsko-hirurškog lečenja mandibularnog prognatizma]. Vojnosanit Pregl. 2023;80(3):243–52. doi: 10.2298/VSP220202035C

12. Cherian D, Saeed R, Anusha K, Rag B, Peter T. Management of ankyloglossia by functional frenuloplasty using diode laser. J Orthod Sci. 2023;12(1). doi: 10.4103/jos.jos_20_22

13. Elsayed HS, El-Beialy AR, Alshazly R, Almohammad A, Elazab K, El-Badawy R, et al. Implant-supported canine retraction using different reactivation intervals of elastomeric chains: A CBCT-based split-mouth randomized controlled trial. Dent Press J Orthod. 2023;28(5). doi: 10.1590/2177-6709.28.5.e2123166.oar

14. Habibullah MA, Parmar D. Correction of Anterior Cross Bite in Mixed Dentition period using Quadhelix and Catalans appliance - A Case Report. Bangladesh J Med Sci. 2024;23(Special issue):S43–7. doi: 10.3329/bjms.v23i10.71735

15. Guo Y, Qiao X, Yao S, Li T, Jiang N, Peng C. CBCT Analysis of Changes in Dental Occlusion and Temporomandibular Joints before and after MEAW Orthotherapy in Patients with Nonlow Angle of Skeletal Class III. BioMed Res Int. 2020;2020.

16. Maino GB, Maino G, Cremonini F, Lombardo L. Class III treatment with mini-implants anchorage in young adult patients: short and long-term results. Dent Press J Orthod. 2023;28(2). doi: 10.1590/2177-6709.28.2.e23spe2

17. de Alba y Levy JA, Chaconas SJ, Caputo AA. Effects

of orthodontic intermaxillary class III mechanics on craniofacial structures. Part II - computerized cephalometrics. Angle Orthod. 1979;49(1):29–36. doi: 10.1043/0003-3219(1979)049<0029:EOOICI>2.0.CO;2

18. Mattu N, Virupaksha AM, Belludi A. Comparative study of effect of different lever arm positions and lengths on transverse and vertical bowing in lingual orthodontics – An FEM study. Int Orthod. 2021;19(2):281–90. doi: 10.1016/j.ortho.2021.03.003

19. Matsumoto MAN, Romano FL, Ferreira JTL, Valério RA. Open bite: diagnosis, treatment and stability. Braz Dent J. 2012;23(6):768–78. doi: 10.1590/s0103-64402012000600024

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