CASE REPORT

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Beyond dental alignment: management of a central incisor to achieve function and aesthetics: a case report.

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Abstract
The central maxillary incisor exceeds its visual character, being the element that handles the balance between facial aesthetics and dental functionality. It is not just a tool for incising food but also a "regulator" for mandibular movements. Through its anterior guidance, it prevents the other teeth from excessive masticatory forces. Moreover, it has a very important role in phonetics, being indispensable for the correct pronunciation of letters. From an aesthetic point of view, this tooth masters the success of the entire smile. It supports the architecture of the upper lip, establishing the central axis of the face and the aesthetic gum line, and represents the unit of measurement by which dentists plan the reconstruction or orthodontic treatments. All things considered, this tooth is not just a cosmetic target, but an indispensable landmark. Mastering the reconstruction of the central incisor technique is, in modern dentistry, the main method by which both oral health and the patient's confidence are restored.

Keywords: Central incisor, visual, phonetics, aesthetic, modern, case report.

Introduction

The upper central incisor is the key element of the dento-maxillary system, having a major impact on mastication and speech, and on the aesthetic face balance. Because of its exposure, any morphological or positional abnormality directly influences the way the patient perceives hir or her own image.

To achieve a successful result, it is often necessary to combine both orthodontics and prosthetics. Orthodontics has the potential to align the teeth and optimize the bite (occlusion), and prosthetics intervene to refine the shape and size of the tooth, adapting them in a harmonious way to the patient's unique physiognomy.

This study illustrates the benefit of mixed treatment, demonstrating that these two specialties cand achieve complete full-mouth rehabilitation. The goal is to restore functional efficiency and also the patient's confidence through an improved facial appearance.

Case Presentation

This case presents a 22-years old female patient diagnosed with Class II skeletal anomaly, following a digital analysis using Web Ceph system. The main problem is in sagittal plane, an underdeveloped mandible (reduced effective length) in relation to a correctly positioned maxilla (normal SNA angle). As of key diagnostic features, McNamara analysis indicates a normodivergent pattern, the imbalance is strictly horizontal, without significantly affecting the vertical dimension of the face. A proclination of the lower incisor and a protrusion of the upper ones are observed, compensation that accentuates the facial disharmony. Above average ANB and WITS values confirm the severe gap between the two bone bases.

However, this case demonstrates that a successful therapeutic strategy depends on rigorous cephalometry analysis. Only by distinguishing between bone problems (small mandible) and dental problems (position of the incisor) can a personalized plan which

restores both masticatory function and aesthetic balance of the patience's profile be implemented.

Figure 1. Pre-orthodontic appearance: frontal view, left and right lateral profiles.

Figure 2. Pre-orthodontic appearance: intra-oral view.

This case highlights a major aesthetic problem in the upper left incisor (2.1), caused by pulp tissue death (necrosis) left untreated for several years. The degradation process most likely started from a chronic pulpitis that led to irreversible destruction of the vascular-nerve bundle.

Consequently, the tooth suffered color changing caused by the degradation of necrotic tissue and ischemia released compounds inside the tooth, causing intrinsic dyschromia. Clinically, this translates into an unsightly grayish tint. The chromatic defect is extremely visible in contrast to the healthy central incisor (1.1), severely affecting the 'smile line'. The late approach of the endodontic treatment led to the inconvenience of losing the natural chromatic optics (translucency, value, opalescence) of the enamel and dentin.

Given the fact of its complexity, a simple root canal treatment would not have been enough to restore the aesthetics of the tooth. Therefore, it was necessary to approach a different strategy, combining endodontic treatment with internal whitening interventions. Otherwise, another solution would have been to use prosthetic restorations, such as crowns or veneers to ensure facial harmony.

Planning and Radiographic evaluation. Pre-orthodontic procedures

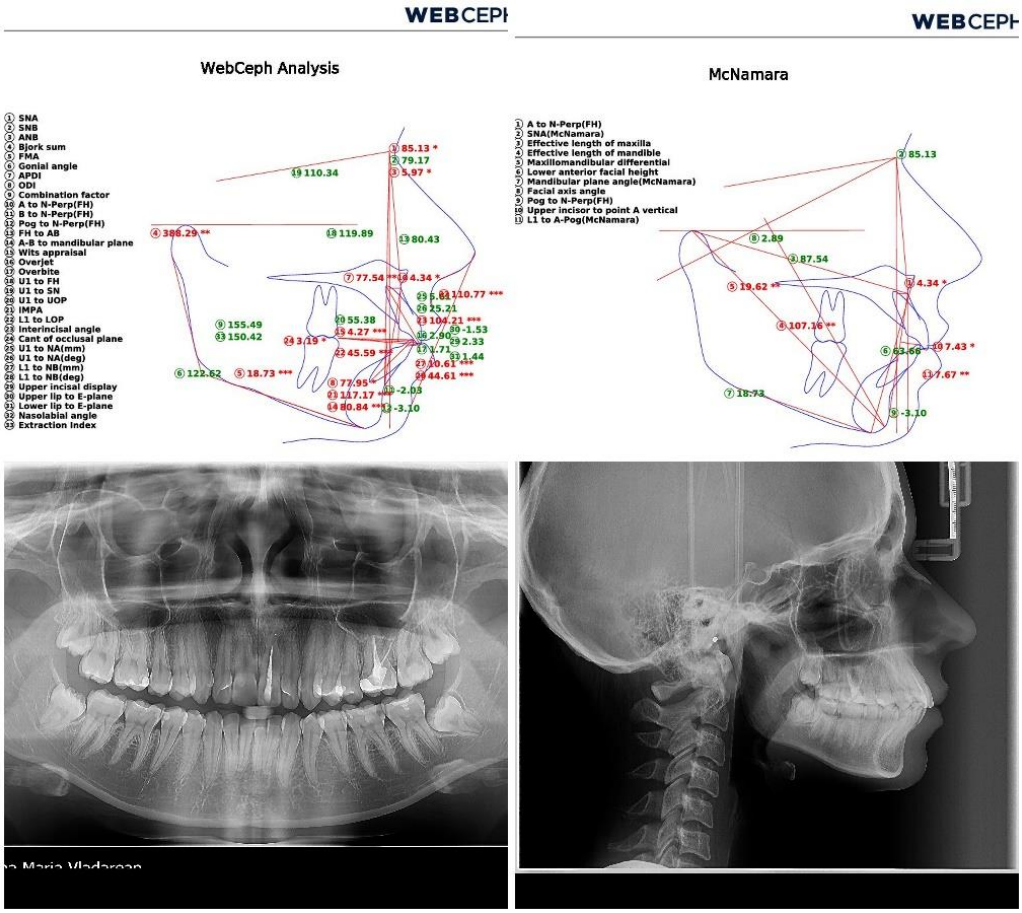

Figure 3. Radiographic evaluation and data analysis of the cephalometric X-ray image.

Ahead of any orthodontic procedure, it is obvious that we need a full protocol. We have to know what we are dealing with in terms of bone, root, and occlusal levels. The cephalometric radiograph confirms our clinical situation: Class II maxillary skeletal malocclusion, combined with a hypodivergent pattern, giving an increased SNA angle (85.13°) suggesting a maxillary protrusion, reduced FMA angle (18.73°) confirming the hypodivergent tendency, also a 2.90 mm overjet and 1.71 mm overbite completing the picture. The incisors, maxillary and mandibular were proclined which is not surprising in this malocclusion.

From an odontological perspective, the situation presented was rather challenging. The patient had multiple carious lesions, some treated previously, and some untreated. The existing ones had marginal integrity compromised, with loss of marginal integrity, and secondary lesions visible. All these together needed previous rehabilitations before orthodontic treatment, while we cannot treat a malocclusion and have the rest of the teeth untreated at the same time.

An important decision in planning the treatment was the extraction of the four wisdom molars. Therefore, our orthodontic approach is the conventional one: creating space in order to correct the malocclusion and facilitate the alignment. Also, we extracted the first upper premolars and secondary lower premolars, for the same reasons. The literature states that extracting these teeth has a significant impact in the position of the incisors and lips profile, which in this case the profile already presented a skeletal defect.

As for the wisdom teeth, their impaction rate is the highest among all permanent teeth, and is influenced by a large number of factors, such as morphology, available retromolar space, and craniofacial growth pattern. Orthodontic treatment involving multiple extractions, in some cases, cand increase retromolar space and reduce the impaction risk. Therefore, our decision was not only therapeutic, but also preventive.

Additionally, in the pre-orthodontic phase, the 2.1 tooth, finally had the endodontic intervention. The root canal treatment was performed using cold lateral condensation technique of gutta-percha, to ensure a complete fulfilment of the endodontic space. A necrotic tooth left untreated cannot remain on the arch during orthodontic treatment for longer than 18 months.

Orthodontic Treatment

A classic approach with elastic ligatures was used, following the MBT protocol with 0.022 inch slot system.

With the aim of ensuring adequate space for alignment and malocclusion correction, it was necessary to extract the upper first premolar and lower second premolar. Also, to facilitate space closure, we used frictional biomechanics allowing a more controlled tooth movement and efficient use of the extraction spaces, followed by a standardized arch wire sequence, starting with flexible and lighter wires providing initial alignment, succeeding by stronger wires offering more torque control and space closure.

Figure 4. Clinical images obtained during various stages of orthodontic treatment.

Using the following dimensions of the arch wires 0.012, 0.016, 0.016x0.022, and 0.017x 0.025 copper nickel titanium succeeded by 0.017x0.025 stainless steel, completing the treatment with 0.019x0.025 stainless steel with posted hooks increasing the anchorage control, simplifying the mechanical space closure.

As we know, the McLaughlin-Bennett-Trevisi 0.022-inch technique, an orthodontic system consisted of manufactured brackets

presenting a predetermined tip with an adjusted straight wire previously ensuring torque and an inside-out value for each tooth. The use of the rectangular arch wires with the dimension of the slot 0.022x0.028 inch in the closing stage of the treatment guarantees

better control of the root positioning and torque.

Modern literature evaluated the clinical behavior of the 0.022-inch slot brackets describing the diversity of the nominal and actual slot dimension, stirring a diverse torque expression. Comparable studies between the slot systems revealed the diversity in the duration of the treatment, the efficacity of the alignment and a reduced clinical relevance.

Research using the three-dimensional imaging has proved that the MBT brackets guarantee the proper management of tooth angulation and inclination when suitable arch wire involvement is accomplished.

The latest evidence from the past five years sustains the MBT 0.022 technique as a diverse and trustworthy system for the purpose of obtaining anticipated outcomes especially in cases that require exact biomechanical control.

Results of the Orthodontic Treatment

After approximately 18 months, the aim of the treatment was met. We finally had an Angle Class I stable occlusion, without detectable occlusal interferences. There was indeed a slight discrepancy between the maxillary and mandibular midline, but with no significant clinical relevance. The patient was satisfied with the results.

The final radiography did not reveal any pathologies. There was no bone resorption, no periapical lesions, and no signs of damage to the temporomandibular joint. Therefore, through the use of radiographic images, we obtained the reassurance of a well-performed and a well-planned treatment.

However, after the orthodontic phase, the properties of the 2.1 tooth remained unchanged, so the grey discoloration had to be addressed during the prosthetic phase.

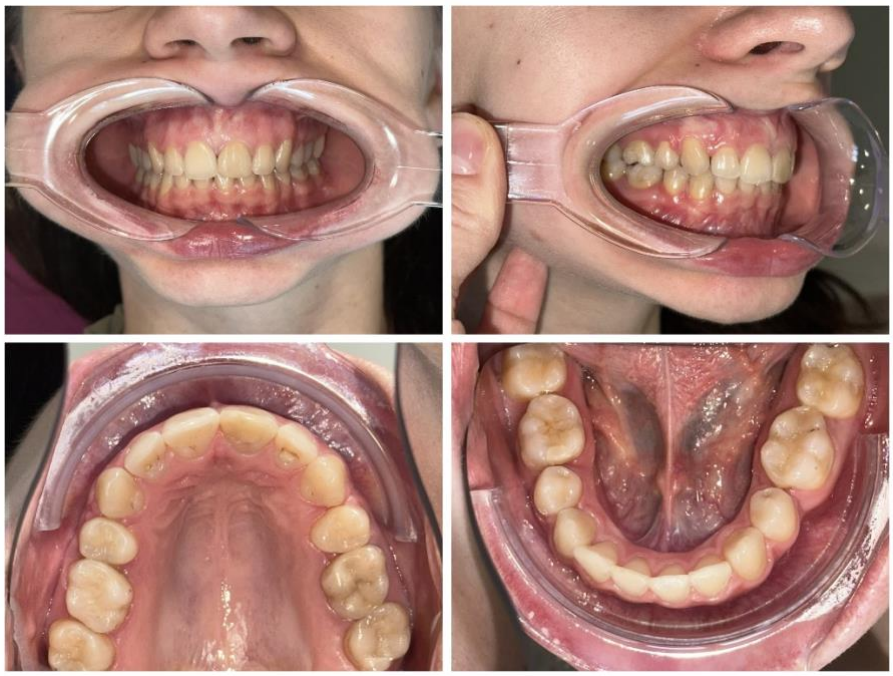

Figure 5. Final intraoral images following orthodontic treatment.

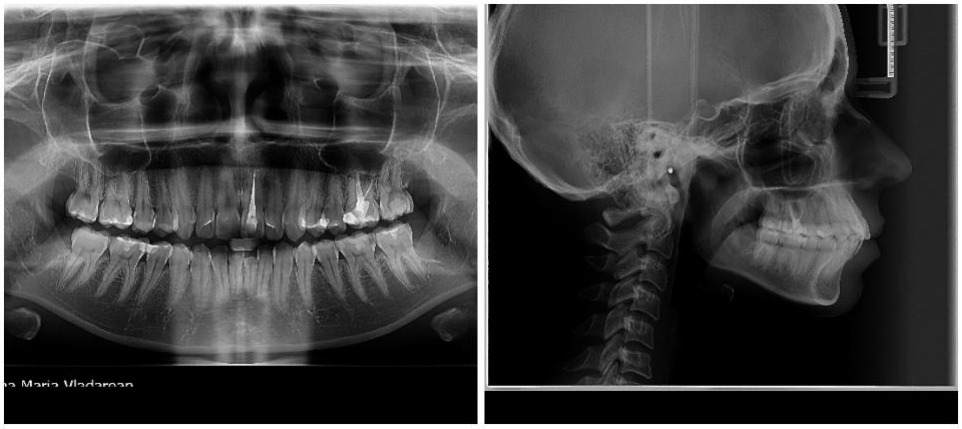

Figure 6. Final x-ray images following orthodontic treatment revealing no abnormalities.

Figure 7. Final extraoral images following orthodontic treatment.

Prosthetic Rehabilitation

In the next phase of the treatment, a prosthetic restoration was cemented on the central maxillary incisor mandatory for the anterior aesthetic appearance achievement.

Consequently, for the accomplishment of an aesthetic outcome of the restoration the election technique was VertiPrep as it is considered the most appropriate approach. The Biologically Oriented Preparation Technique or the VertiPrep consists of shoulderless preparation that conventionally reduces the horizontal finish line.

Defining in this case, are the prosthetic margin and emergency profile by the restoration that presents a connection with the surrounding soft tissues. Latest studies reveal that this technique offers a safer approach of the tooth surface and increases the flexibility of gingival shaping, especially in the aesthetic areas.

For the last five years, clinicians have sustained the idea that manufactured restorations for the teeth that are vertically prepared prove the persistence and accomplishment of the method, compared to the ones obtained using the classical horizontal finish lines, with promising periodontal values when suitable management of the tissue was applied.

The technique simplifies the prosthetic soft-tissue adjustment and contributes to the improvement of the aesthetic incorporation of the final restoration.

Nonetheless, the literature sustains that vertical preparation is sensitive and leads to the best clinical success if a precise execution is used. Even though the VertiPrep viability is currently sustained, it is highly recommended that more studies should be conducted.

Figure 8. Clinical images after preparation of the tooth.

In the following clinical case, the maxillary anterior region rehabilitation involves a prosthetic approach focused initially on the achievement of an ideal aesthetic result and the concordant integration with the surrounding soft tissues. The existence of the gingival discrepancies, combined with the need of meticulous control of the emergence profile, warranted the selection of the vertical preparation.

In line with the latest literature, this technique allows soft tissue shaping through temporary restorations and furnishes greater flexibility of the prosthetic margin position which is fundamental for the anterior restorations.

The use of the Verti Prep technique allowed preservative preparation of the support tooth and the progressive adaptation of the gingival contour, offering a predictable aesthetic result.

The prosthetic proximity was prepared initially using medium-grit cylindrical-conical diamond burs, to ensure uniform axial reduction. The control of the subgingival extension and the axial improvement was accomplished with round-end diamond burs. So as to obtain a smoother surface, diamond burs were used, whereas professionals finishing burs were engaged in the subgingival area to obtain a gradual and immaculate transition between the coronal and subgingival surfaces.

Firstly, an impression of the prosthetic abutment was taken to manufacture a provisional restoration, aiming for the haemostasis achievement and for a guided contour of the gingival adjacent tissue. After the second impression of the abutment, the prosthetic site was obtained by using the wash technique, with the placement of the subgingival cord that ensured the precise replica of the marginal sealing area of the future restoration.

The final restoration was manufactured with zirconia base structure and veneered with ceramic, ensuring an advantageous aesthetic and functional performance. Combining the mechanical resistance of the zirconia framework and the high quality of the ceramic veneer, offering flexibility for the adjustment of the present case.

The prosthetic restoration was secured using glass ionomer cement. After the cementation step, the gingiva properly healed, which was an indication that the restoration had been flawlessly adapted to the surrounding soft tissue, especially the interdental papillae that provided a beneficial anterior aesthetic. Furthermore, the prosthetic restauration presented a remarkable adaptation, also, to the formerly prepared abutment.

The literature states that the clinical durability of the glass ionomer cement is moderate, especially in direct restorations.

Even though the literature suggests that the clinical durability of the glass ionomer cement is moderate, the material is still commonly used among the regular clinical cases.

However, the use of the glass ionomer cement for a definitive cementation on a prepared abutment has presented to be a very suitable material. At the same time, it is fundamental to consider that long-term performance is significantly impacted by a series of clinical factors, such as field isolation, marginal integrity, and occlusal stress.

Figure 9. Clinical images following the definitive cementation on the long-term prosthetic restoration in the oral cavity.

Figure 10. Clinical images at 6 months after treatment.

Post-therapy outcomes

At the medical exam performed six months after the finalization of the orthodontic-prosthetic rehabilitation, the clinical results demonstrated remarkable stability, maintaining both functional and aesthetic balance.

The occlusal rapport remained unchanged, without any interferences or changes in tooth positioning, while the restoration had optimal marginal integrity and a precise adaptation to the prepared abutment.

From a periodontal point of view, the peri-prosthetic gingival tissue healed completely, with well-defined contours and preserved interdental papillae that ensure harmonious aesthetics of the anterior area.

This state of health was also confirmed radiologically, by the lack of inflammation, bone resorption or periapical pathologies, the success of the interdisciplinary approach supported at the same time by the full satisfaction expressed by the patient.

Discussion

The present clinical case highlights the importance of a multidisciplinary orthodontic-prosthetic strategy in achieving functional stability and an optimal aesthetic outcome of the anterior area. The orthodontic step was essential for establishing correct occlusal contacts and for optimizing the substrate required for the following prosthetic intervention.

The choice of the vertical preparation technique, known as VertiPrep was commanded by the need for rigorous soft tissue control and the desire for superior aesthetic integration, because this method offers increased adaptability of the mergence profile and a positive gingival response, by the current clinical research.

The final restoration, made of ceramic coated zirconia framework, combining mechanical strength and aesthetic demands, the success of the treatment plan being confirmed at the six-month follow-up by periodontal stability and patient satisfaction.

The implementation of the VertiPrep concept allowed for prosthetically guided emergence profile and gingival architecture modeling, excluding the restrictions of the conventional horizontal finishing line and also for greater preservation of the tooth structure.

As a result, this approach facilitates a smooth transition between the restoration margin and the gingival sulcus, promoting periodontal stability and outstanding aesthetic integration in the anterior maxillary area.

Conclusions

The results of the present case are in full agreement with the recent literature, which supports the benefits of interdisciplinary approaches in the management of complex dental rehabilitations. According to Ortega et al. (2024), therapeutic strategies that integrate orthodontic rectification, prosthetic planning, and periodontal management, provide superior functional stability, more predictable aesthetic results and an increased level of patient satisfaction compared to monodisciplinary interventions.

In this instance, the orthodontic step ensured optimal tooth positioning and occlusal relationship by means of a vertical prepared abutment and a definitive restoration made of ceramic coated zirconia.

The combination of these disciplines led to the preservation of periodontal health, the achievement of harmonious gingival contours and a favorable aesthetic result, confirmed by the 6-month follow-up. These outcomes strengthen the premise that interdisciplinary treatment protocols represent the appropriate standard of care for cases presenting combined functional, aesthetic, and structural demands.

Author Contributions (CRediT Taxonomy)

Conceptualization and writing-original draft by Obreja Rareş, Conceptualization: R.O. and T-M.C., Writing-original draft: R.O., resources: T-M.C., Supervision, validation, writing and editing: T-M.C. and M.P.

All the authors contributed equally to this work and have read and agreed to publish this version of the manuscript.

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Conflict of interest

None to declare.

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Policy on the Use of Artificial Intelligence (AI) Tools

During the preparation of this work the authors used Gemini 3 Flash in order to improve language, grammar, and structure of specific case report sections, as well as to translate technical terminology. After using this tool, the authors reviewed and edited the content as needed and are fully responsible for the originality and integrity of the content of the manuscript.

References

1.Atik E, Turkoglu H. Does different vertical position of maxillary central incisors in women with different facial vertical height affect smile esthetics perception? Prog Orthod. 2023 Aug 7;24(1):28.
2.Shavakhi, M., Yavari, A. & Tavakoli Tafti, K. Aesthetic perception of maxillary incisor inclination in smiling profile of different facial divergences. BDJ Open 11, 92 (2025).
3.Study on anterior maxillary morpho-functional restoration (2025). Romanian Journal of Medical and Dental Education.
4.McGarty NR, Delre C, Gaeta C, Doldo T. Corrections of Dental Anomalies in the Maxillary Incisors and Their Influence on Perceived Smile Esthetics: A Systematic Review. Bioengineering (Basel). 2025 Mar 6;12(3):262.
5.Samir PV, Mahapatra N, Dutta B, Bagchi A, Dhull KS, Verma RK. A Correlation between Clinical Classification of Dental Pulp and Periapical Diseases with its Patho Physiology and Pain Pathway. Int J Clin Pediatr Dent. 2023 Jul-Aug;16(4):639-644.
6.Peña-Reyes D, Freitas JQ, Freitas KMS, Bellini-Pereira SA, Aliaga-Del Castillo A, Janson G, Freitas MR. Third Molar Comparison in Class I and II Extraction and Non-extraction Orthodontic Treatment: A Retrospective Longitudinal Study. Turk J Orthod. 2024 Mar 28;37(1):7-13.
7.Ekstam M, Sonesson M, Hellén-Halme K. Effects of premolar extraction and orthodontic treatment in adolescents - a retrospective cephalometric study. Acta Odontol Scand. 2024 Mar 26;83:92-100.
8.Divya P, Banswada SR, Kukunuru SR, Kavya KB, Rathod RR, Polavarapu KC. To Compare the Accuracy of 0.022 Inch Slot of Stainless Steel and Ceramic Orthodontic Brackets Marketed by Different Manufacturers. J Pharm Bioallied Sci. 2021 Nov;13(Suppl 2):S1037-S1041.
9.Nahidh M, Yassir YA. Evaluating orthodontic bracket slot dimensions and morphology: A narrative review. J Orthod Sci. 2023 Sep 4;12:40.
10.Scribante A, Pascadopoli M, Gandini P, Mangia R, Spina C, Sfondrini MF. Metallic vs Ceramic Bracket Failures After 12 Months of Treatment: A Prospective Clinical Trial. Int Dent J. 2024 Dec;74(6):1371-1377.
11.Abouwafia, Omar. (2024). Comparison of Alignment Duration Between 0.018" And 0.022" Slot Brackets in Non-Extraction Orthodontic Adult Patients: A Randomized Clinical Study. Future Dental Journal. 10. 49-52. 10.54623/fdj.1018.
12.Modi, Urja & Thakkar, Udita & Naik, Harshit & Patel, Kalpesh. (2025). Evaluation and Comparison of Clinical Bracket Failure Rate of a New Orthodontic Adhesive Modified with Silver Nanoparticles with Conventional Orthodontic Adhesive: An In Vivo Study. Journal of Applied Dentistry and Oral Sciences. 11. 10.1177/30497418251381424.
13.Bonfanti-Gris M, Pradies G, Moron-Conejo B, Gil A, Martinez-Rus F. Vertical Versus Horizontal Finishing Lines for Dental Preparations: A Systematic Review With Meta-Analysis. J Esthet Restor Dent. 2025 Mar;37(3):707-726.
14.Castelo-Baz P, Freire-Álvarez-Blázquez M, Pereira-Lores P, Álvarez-Nóvoa P, Dablanca-Blanco A, Miguéns-Vila R, Martín-Biedma B. Vertical preparation: a new technique for analogical and digital impressions. J Clin Exp Dent. 2023 Jul 1;15(7):e590-e593.

15.Al Moaleem M. Vertical Teeth Preparation: A Comprehensive Systematic Review of Patient Outcomes and Clinical Complications . Open Dent J, 2025; 19: e18742106414012.
16.Al-Haddad A, Arsheed NAA, Yee A, Kohli S. Biological oriented preparation technique (BOPT) for tooth preparation: A systematic review and meta-analysis. Saudi Dent J. 2024 Jan;36(1):11-19. doi: 10.1016/j.sdentj.2023.10.004. Epub 2023 Oct 11.
17.Panetta A, Lopes P, Novaes TF, Rio R, Fernandes GVO, Mello-Moura ACV. Evaluating Glass Ionomer Cement Longevity in the Primary and Permanent Teeth-An Umbrella Review. J Funct Biomater. 2024 Feb 19;15(2):48.
18.Choudhary N, M Hiremath A, P C M, Bullappa D, M VK, Rajeev A. Interdisciplinary and integrated clinical management of complex dental disorders. Bioinformation. 2025 Jul 31;21(7):2075-2079.

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