

INTERDISCIPLINARY ORTHODONTIC-RESTORATIVE MANAGEMENT OF MAXILLARY ANTERIOR AESTHETICS USING MINIMALLY INVASIVE CERAMIC VENEERS: CASE REPORT

MAZLAN, M. K. F.^{1,2*} – JAZAM, I. M.^{1,3} – KOAY, W. L.⁴ – RAZAK, M. S. A.⁵

¹ Restorative Dentistry Specialist Unit, Ministry of Health Malaysia, Sabah, Malaysia.

² Restorative Dentistry Specialist Unit, Ministry of Health Malaysia, Pahang, Malaysia.

³ Restorative Dentistry Specialist Unit, Ministry of Health Malaysia, Kuala Lumpur, Malaysia.

⁴ Orthodontics Specialist Unit, Ministry of Health Malaysia, Sabah, Malaysia.

⁵ Faculty of Dentistry, Universiti Teknologi MARA, Selangor, Malaysia.

*Corresponding author

e-mail: firdausmazlan[at]moh.gov.my

(Received 18th December 2025; revised 20th March 2026; accepted 05th April 2026)

Abstract. Optimizing anterior dental aesthetics in partially edentulous patients presents a complex interplay of biological, functional, and aesthetic considerations. This case report critically examines an interdisciplinary approach integrating limited pre-prosthetic orthodontic alignment with minimally invasive lithium disilicate veneer rehabilitation to address malpositioned, rotated, and diastema-affected maxillary anterior teeth. A 30-year-old patient with incisal edge defects and progressive midline diastema underwent sectional orthodontic alignment to correct rotations and optimize spatial distribution, minimizing enamel reduction and enhancing adhesive bonding for definitive restorations. Subsequent fabrication and placement of veneers, complemented by targeted composite resin build-ups, achieved harmonious aesthetic integration while preserving tooth structure. Post-treatment retention with an upper Essix retainer ensured stability and mitigated relapse risks. This approach demonstrates that judicious orthodontic intervention can expand restorative possibilities, allowing conservative management without compromising functional or aesthetic outcomes. The report underscores the critical importance of treatment sequencing, biological preservation, and interdisciplinary collaboration in contemporary anterior rehabilitation. By situating orthodontics as an enabling modality rather than a peripheral adjunct, the case illustrates how precision in pre-restorative alignment directly influences long-term predictability, structural integrity, and patient-centered outcomes. These findings advocate for broader adoption of integrative protocols, challenging conventional reliance on restorative compensation alone, and provide a model for evidence-informed, minimally invasive anterior aesthetic dentistry.

Keywords: *pre-prosthetic, orthodontic, lithium disilicate veneer, dental aesthetic, minimally invasive dentistry, enamel preservation*

Introduction

Achieving optimal aesthetic outcomes in the maxillary anterior region remains a frequent and complex challenge in restorative dentistry, as it requires careful integration of tooth position, proportion, occlusion, and periodontal health (Siaw, 2018). Ceramic veneers are widely regarded as a predictable and conservative option for the management of anterior aesthetic concerns, including diastema closure, incisal edge defects, and tooth form discrepancies, owing to their favourable optical properties, durability, and strong adhesive bonding to enamel (Magne and Belser, 2003).

Contemporary glass-ceramic systems, particularly lithium disilicate, have further expanded the clinical indications for minimally invasive anterior restorations due to their improved mechanical properties and aesthetic versatility (Stappert et al., 2005). Nevertheless, the long-term success of veneer therapy is highly dependent on appropriate tooth alignment and spatial distribution prior to restoration, as compromised tooth positions may necessitate excessive tooth reduction and compromise biological and aesthetic outcomes (Pini et al., 2012).

In clinical practice, patients frequently present with malposition anterior teeth, residual spacing, or post-extraction changes that complicate direct restorative intervention (Karthi et al., 2023). Attempting to compensate for such discrepancies using restorative materials alone may result in over-contoured restorations, unfavourable emergence profiles, and increased biomechanical risk (Shen et al., 2023). Pre-prosthetic orthodontic intervention has therefore been advocated as an effective means of optimizing tooth position, redistributing space, and establishing a biologically and mechanically favourable foundation for minimally invasive restorations (Spear et al., 2006). Despite its recognized advantages, orthodontic alignment remains underutilized in adult restorative cases, often due to concerns regarding treatment duration, interdisciplinary coordination, or patient acceptance, and its role as an enabling modality for conservative aesthetic dentistry is inconsistently emphasized in published case reports. This case report describes an interdisciplinary orthodontic–restorative approach for the management of maxillary anterior aesthetic concerns, in which limited pre-prosthetic orthodontic alignment was employed to facilitate conservative lithium disilicate veneer rehabilitation. The report highlights the clinical rationale, treatment sequencing, and restorative outcomes associated with this strategy, underscoring the role of orthodontics in enhancing enamel preservation and improving the predictability of anterior veneer therapy.

Materials and Methods

The present case employed a carefully selected combination of orthodontic and restorative materials to achieve biologically conservative and aesthetically predictable outcomes in the maxillary anterior region. Pre-prosthetic orthodontic intervention utilized a sectional fixed appliance with nickel–titanium archwires (0.012-inch and 0.014-inch) to achieve precise rotation correction and spatial optimization for teeth 12–22. Nickel–titanium wires were selected for their superelasticity and low load-deflection properties, allowing controlled tooth movement with minimal risk of root resorption or periodontal compromise, particularly important in a partially edentulous arch with reduced alveolar support (Spear et al., 2006). The sectional appliance minimized patient discomfort, treatment duration, and procedural complexity while enabling targeted correction of anterior malposition without altering posterior occlusion. Restorative materials focused on lithium disilicate ceramic for veneer fabrication, selected due to its combination of high flexural strength, optical translucency, and reliable adhesive bonding to enamel (Alazemi and Rayyan, 2025; Hien et al., 2025). Complementary direct composite resin build-ups addressed residual spacing and minor morphological discrepancies, highlighting a hybrid material approach that balances mechanical robustness with intraoral adaptability (Karthi et al., 2023). Provisional restorations employed bis-acryl temporary materials, allowing functional evaluation and aesthetic preview, informing definitive veneer design (Alfallaj, 2020). Adhesive protocols

incorporated enamel-preserving butt-joint incisal preparations, reflecting minimally invasive principles that prioritize tooth structure preservation, bond longevity, and fracture resistance (Allothman and Bamasoud, 2018; Al Taki, 2015). A digital workflow, including intraoral scanning and interocclusal bite registration, enabled high-precision fabrication of veneers conforming to patient-specific occlusion and aesthetics (Kuliš et al., 2024). The deliberate integration of material properties, biomechanical principles, and aesthetic considerations underscores the necessity of interdisciplinary planning for predictable anterior rehabilitation.

The clinical methodology followed a staged, interdisciplinary sequence designed to maximize predictability, functional stability, and long-term aesthetic outcomes. Initial assessment involved comprehensive extraoral and intraoral examination, supplemented with orthopantomography to evaluate alveolar bone status and identify structural limitations that could influence orthodontic or restorative planning (Karthi et al., 2023). Periodontal stabilization and oral hygiene optimization constituted the foundational phase, ensuring a biologically favorable environment for subsequent interventions. Diagnostic wax-ups were fabricated from alginate impressions to simulate proposed tooth proportions, incisal edge alignment, and diastema closure, with chairside mock-ups transferred intraorally for functional and aesthetic validation (Siaw, 2018). Orthodontic intervention was limited to a three-month window, with controlled rotations and space redistribution prioritized to reduce aggressive enamel reduction during veneer placement (Shen et al., 2023). The use of sectional archwires enabled fine-tuned movements in three-dimensional space while maintaining anchorage integrity, a critical consideration in partially edentulous arches (Chalala, 2012). Following orthodontic correction, veneer preparations adhered to minimally invasive principles, limiting reductions to enamel and employing digital design protocols to achieve precise morphology and occlusion (Stappert et al., 2005; Magne and Belser, 2003). Lithium disilicate veneers were cemented using adhesive systems optimized for enamel-dominant interfaces, ensuring high bond strength, reduced marginal degradation, and fracture resistance (Allothman and Bamasoud, 2018). Residual diastema and minor morphological adjustments were addressed using direct composite build-ups to harmonize tooth contours (Karthi et al., 2023). Post-restorative stability was reinforced with an upper Essix retainer fabricated using digital intraoral scans, mitigating relapse risk and preserving occlusal relationships (Kuliš et al., 2024). This methodology exemplifies an evidence-informed interdisciplinary approach, positioning pre-prosthetic orthodontics as integral to conservative, predictable, and aesthetically superior outcomes. Critical evaluation of material selection, biomechanical sequencing, and digital integration underscores the importance of harmonizing biological preservation with mechanical resilience, offering a replicable model for patient-centered anterior aesthetic rehabilitation (Al Taki, 2015; Pini et al., 2012).

Results and Discussion

A 30-year-old Dusun male was referred for interdisciplinary orthodontic–restorative management of aesthetic concerns involving the maxillary anterior region, including altered tooth position, incisal edge discrepancies, and a progressively widening midline diastema following extraction of the maxillary right first premolar. The patient was medically fit and a non-smoker. Extraoral examination revealed no abnormal findings. Intraoral assessment revealed uncomplicated incisal edge fractures of teeth 11 and 21, a

median diastema between the maxillary central incisors, mesio-palatal rotation of teeth 11, 21, and 15, and a partially edentulous maxillary arch with missing tooth 14 (*Figure 1*). All remaining teeth were vital. Localized mild attrition was present in the mandibular anterior region, and generalized gingival recession without deep periodontal pockets was noted in the maxillary posterior region. Orthopantomographic evaluation demonstrated generalized alveolar bone loss on posterior region (*Figure 2*). The diagnoses included generalized dental biofilm-induced gingivitis on a reduced periodontium, uncomplicated crown fractures of teeth 11 and 21, Class III malocclusion on a Class I skeletal pattern, partial edentulism of the maxillary arch, and localized mild anterior attrition. Critically, the patient's presentation reflects a convergence of functional, biological, and aesthetic challenges that necessitate an integrated management approach. The presence of midline diastema, incisal edge fractures, and mesio-palatal rotations underscores the potential compromise of both occlusal function and anterior smile aesthetics, with implications for phonetics, mastication efficiency, and psychosocial perception. The partially edentulous maxillary arch further complicates space management and load distribution, demanding careful orthodontic evaluation prior to any restorative intervention. Periodontal assessment revealed reduced periodontium stability, highlighting the necessity for pre-prosthetic periodontal optimization to mitigate the risk of exacerbating gingival recession or compromising adhesive outcomes. Moreover, the patient's occlusal pattern: a Class III malocclusion superimposed on a Class I skeletal framework; presents biomechanical challenges, as anterior guidance and overbite/overjet relationships must be carefully analyzed to prevent post-restorative functional disharmony. The combination of enamel-dominant fractures, localized attrition, and rotational misalignment indicates that a purely restorative approach would necessitate aggressive tooth reduction, risking long-term structural integrity and compromising adhesive bonding.



Figure 1. Pre-operative assessment. (A) Area of complaint; (B) Frontal view; (C) Maxillary occlusal view; (D) Right lateral view; (E) Left lateral view.

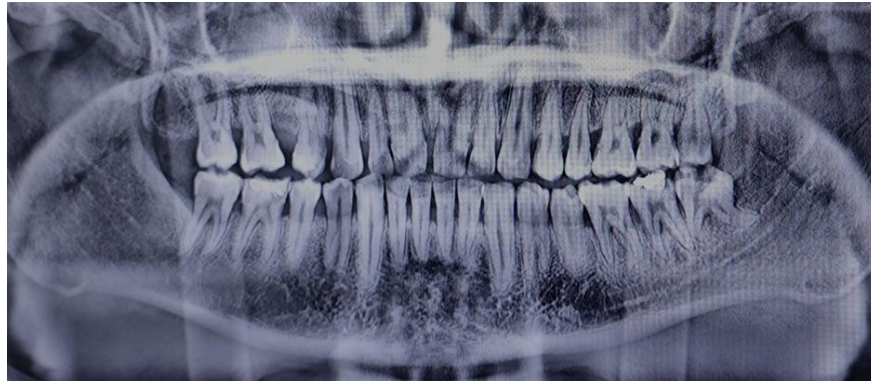


Figure 2. Orthopantomogram radiograph.

From a strategic perspective, this clinical scenario emphasizes the critical value of an interdisciplinary orthodontic–restorative workflow. Pre-prosthetic orthodontic alignment is required to optimize tooth positions, reduce rotational discrepancies, and establish favorable interproximal spacing, thereby minimizing unnecessary tooth preparation and enhancing long-term adhesive stability. The comprehensive evaluation, incorporating both extraoral and intraoral assessments, alongside orthopantomographic imaging, provides a robust foundation for planning conservative yet effective interventions (*Figure 1* and *Figure 2*). This approach integrates biological preservation with functional optimization and aesthetic refinement, aligning with contemporary minimally invasive principles and evidence-based restorative protocols. By contextualizing tooth morphology, occlusal dynamics, and periodontal health within an interdisciplinary treatment framework, clinicians can anticipate potential complications, enhance restorative predictability, and deliver patient-centered outcomes that harmonize structural integrity, functional performance, and anterior aesthetics. Following comprehensive assessment and diagnosis, treatment was delivered in a staged interdisciplinary sequence. The initial preventive and stabilization phase focused on optimizing periodontal health and included individualized oral hygiene instruction and non-surgical periodontal therapy. Clinical reassessment confirmed adequate plaque control and periodontal stability prior to initiation of active treatment. The pre-prosthetic diagnostic phase was performed to guide restorative planning. Primary impressions were made using alginate, and a diagnostic wax-up from teeth 13 to 23 was fabricated on the study casts to establish the proposed tooth proportions, incisal edge position, and space distribution. A chairside mock-up based on the diagnostic wax-up was then transferred intraorally to allow functional and aesthetic evaluation, with patient approval obtained prior to definitive treatment. Subsequently, a pre-prosthetic orthodontic phase was undertaken to correct unfavourable tooth positions and reduce the need for aggressive restorative preparation. A sectional fixed appliance was bonded from teeth 12 to 22, and alignment was initiated using a 0.012-inch nickel–titanium arch wire, followed by a 0.014-inch nickel–titanium arch wire after one month. Controlled orthodontic movement over a three-month period resulted in correction of the mesio-palatal rotation of teeth 11 and 21 and improved anterior alignment (*Figure 3*). Upon achieving the desired tooth position, the sectional appliance was debonded, and orthodontic retention was deferred until completion of the definitive restorative phase.

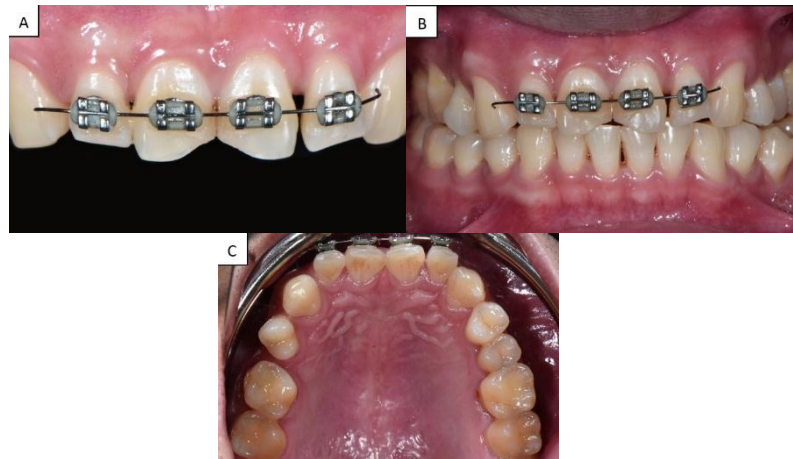


Figure 3. Post-orthodontic assessment. (A) Area of complaint; (B) Frontal view; (C) Maxillary occlusal view.

The definitive restorative phase commenced with minimally invasive veneer preparation of teeth 12 to 22, employing a butt-joint incisal design to preserve enamel and optimize ceramic bonding (Figure 4). The use of a butt-joint design is particularly significant in anterior aesthetic rehabilitation, as it concentrates adhesive interfaces on enamel-dominant surfaces, enhancing bond strength and long-term restoration stability while minimizing the need for aggressive tooth reduction (Allothman and Bamasoud, 2018; Al Taki, 2015). Prior to fabrication of definitive restorations, digital intraoral scanning and interocclusal bite registration were performed, facilitating accurate three-dimensional mapping of occlusal relationships and tooth morphology. Provisional splinted veneers were fabricated chairside using bis-acryl temporary material to maintain both tooth position and aesthetics during the laboratory phase (Figure 5). The selection of bis-acryl was intentional, providing sufficient mechanical stability and color fidelity for patient evaluation, while allowing easy modification if minor adjustments were required. This step represents a critical interface between diagnostic planning and definitive restoration, ensuring that functional and aesthetic parameters could be verified in situ. By integrating a digital workflow, the treatment strategy leveraged precision dentistry principles to enable laboratory-fabricated lithium disilicate veneers that conformed to optimized tooth positions achieved through pre-prosthetic orthodontics (Kuliš et al., 2024). The incorporation of digital scanning also facilitated future monitoring and reproducibility, creating a baseline for maintenance and long-term assessment. This methodology reflects a synthesis of minimally invasive, adhesive-driven restorative principles with technologically guided precision, demonstrating that careful material selection and pre-restorative evaluation are central to predictable outcomes in complex anterior cases (Alfallaj, 2020).

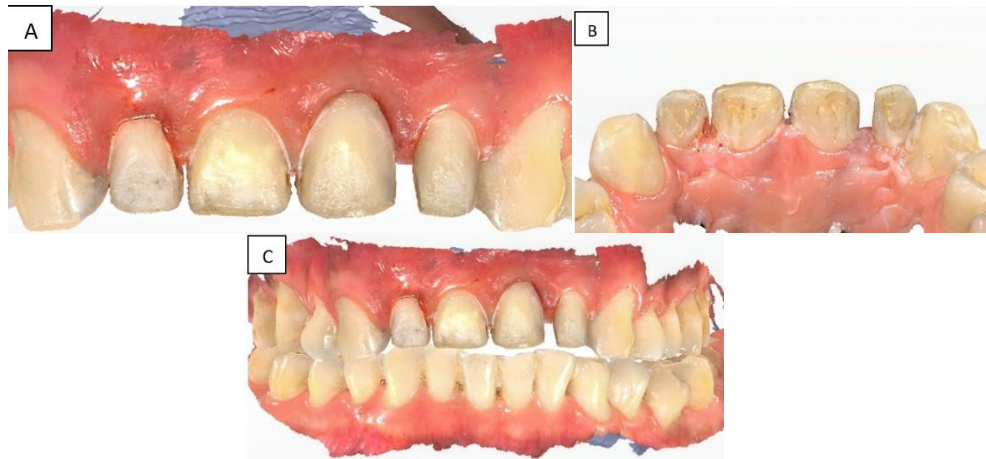


Figure 4. Digital intraoral scanning. (A) Labial view; (B) Palatal view; (C) Bite registration.

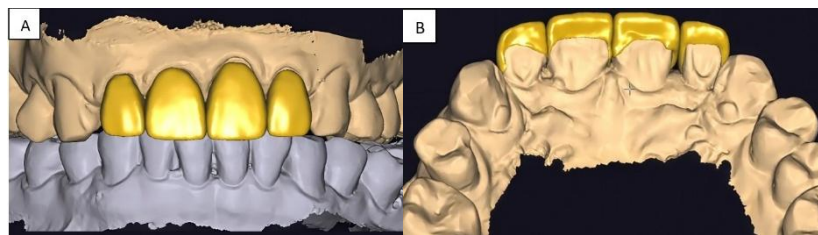


Figure 5. Digital design of Lithium Disilicate veneer 12 to 22. (A) Frontal view; (B) Occlusal view.

The definitive veneers were digitally designed by the dental laboratory and fabricated in lithium disilicate ceramic, chosen for its unique combination of mechanical resilience, optical translucency, and color stability, which collectively support both functional and aesthetic demands of the anterior dentition (Figure 5). Lithium disilicate allows for conservative restoration of incisal edge defects without necessitating full-coverage crowns, thereby aligning with minimally invasive dentistry principles and emphasizing biologically sound outcomes. During veneer delivery, adhesive bonding protocols were meticulously followed to ensure maximum interface integrity, prioritizing enamel bonding over dentin contact to reduce marginal degradation, improve fracture resistance, and enhance long-term survival rates (Allothman and Bamasoud, 2018). Residual spacing, which could not be fully corrected orthodontically, was harmonized with direct composite resin build-ups on teeth 15, 13, and 23 (Figure 6). This hybrid approach, combining lithium disilicate veneers with targeted composite build-ups; demonstrates a critical strategy for balancing optical integration, structural preservation, and functional adaptation. The methodology reflects evidence-informed decision-making that prioritizes material properties, biological preservation, and patient-centered aesthetics. By correcting tooth position and spacing through limited pre-prosthetic orthodontics, the restorative phase could be executed conservatively, avoiding over-contoured restorations and unnecessary structural compromise that would otherwise occur in malpositioned anterior teeth (Shen et al., 2023).



Figure 6. Post-operative assessment. (A) Area of complaint; (B) Frontal view; (C) Maxillary occlusal view; (D) Right lateral view; (E) Left lateral view.

Post-restorative stability was reinforced through the fabrication of an upper Essix retainer, obtained via a digital intraoral scan, delivered two days following veneer cementation. The retainer serves a dual purpose: maintaining orthodontic correction to prevent relapse and supporting the long-term stability of veneer positioning, ensuring that functional occlusal relationships and aesthetic alignment are preserved. This structured maintenance protocol included six-monthly reviews for monitoring periodontal health, occlusion, restoration integrity, and retainer compliance, reflecting a comprehensive, interdisciplinary approach to patient care. Sequencing of orthodontic and restorative phases was critical; completing orthodontic correction prior to veneer preparation allowed diagnostic wax-ups and mock-ups to be based on optimally aligned teeth, minimizing post-restorative adjustments and enhancing predictability (Alfallaj, 2020; Chalala, 2012). Furthermore, the case illustrates the biological rationale for integrating orthodontics with adhesive-driven restorative dentistry: enamel-dominant bonding surfaces were maximized, reducing the risk of adhesive failure, over-reduction, and structural compromise, which are common challenges in restoring malpositioned teeth without pre-prosthetic alignment (Kuliš et al., 2024). The methodology demonstrates the critical interplay between material science, biomechanical planning, and digital precision workflows, emphasizing the importance of interdisciplinary collaboration in complex anterior rehabilitation. By leveraging minimally invasive design principles, high-strength ceramic materials, and precise sequencing of pre-prosthetic orthodontics and restorative interventions, the approach ensures functional, aesthetic, and biologically sound outcomes. While this single-case report inherently limits generalizability, it provides a framework for evidence-informed protocols that balance structural conservation with predictable aesthetic results, advocating for broader adoption of integrative strategies in contemporary restorative and aesthetic dentistry (Al Taki, 2015; Shen et al., 2023).

Conclusion

This case demonstrates that limited pre-prosthetic orthodontic alignment can profoundly enhance the predictability, conservatism, and overall success of anterior aesthetic rehabilitation using lithium disilicate veneers. By strategically correcting tooth rotations and optimizing interproximal spacing prior to restorative intervention, the need for aggressive enamel reduction was minimized, thereby preserving tooth structure and maximizing the integrity and longevity of adhesive bonds. Such preconditioning allows veneers to be applied in a biologically sound manner, reducing the risk of over-contouring, marginal failure, and mechanical compromise that often occur when restorations attempt to compensate for malpositioned teeth alone. The interdisciplinary orthodontic–restorative approach exemplifies how functional and aesthetic outcomes can be achieved concurrently, addressing occlusal harmony, anterior guidance, and diastema closure while simultaneously considering periodontal health and enamel preservation. Careful sequencing of treatment phases, from orthodontic alignment to provisional mock-ups and definitive restoration; ensures that each intervention supports the next, enhancing predictability and reducing the likelihood of post-restorative adjustments or relapse. Furthermore, the approach aligns with contemporary minimally invasive principles, emphasizing conservation of natural tissues and long-term stability over mere restorative thickness or purely aesthetic correction. By integrating evidence-based material selection, adhesive protocols, and biomechanical planning, the strategy highlights the importance of collaborative treatment planning, demonstrating that limited, targeted orthodontic intervention can serve as a pivotal enabling modality in complex anterior rehabilitation. This case underscores that interdisciplinary coordination, combined with biologically guided techniques and meticulous planning, can deliver durable, patient-centered, and aesthetically superior outcomes. It further provides a reproducible framework for clinicians managing similar complex anterior presentations, advocating for a shift away from restorative-only approaches toward integrated, conservative, and functionally optimized solutions in contemporary aesthetic dentistry.

Acknowledgement

The authors wish to thank the Director General of Health Malaysia for granting permission to publish this case report. Special thanks to Artistry Dental Laboratory for the fabrication of the final prosthetic restoration. The authors also acknowledge the use of ChatGPT (OpenAI, GPT-5, March 2026) as a writing assistance tool to enhance the clarity, organization, and linguistic precision of this manuscript. All content generated with its aid was critically reviewed, edited, and verified by the authors, who assume full responsibility for the accuracy, interpretation, and integrity of the final work.

Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

REFERENCES

- [1] Alazemi, B.M., Rayyan, M.R. (2025): Translucency and color stability of advanced lithium disilicate ceramic material: An in vitro study. – *Journal of Conservative Dentistry and Endodontics* 28(1): 33-38.
- [2] Alfalaj, H. (2020): Pre-prosthetic orthodontics. – *Saudi Dental Journal* 32(1): 7-14.
- [3] Alothman, Y., Bamasoud, M.S. (2018): The success of dental veneers according to preparation design and material type. – *Open Access Macedonian Journal of Medical Sciences* 6(12): 2402-2408.
- [4] Al Taki, A. (2015): Orthodontic Considerations Prior to Ceramic Veneers Placement: An Updated Review. – *EC Dental Science* 3: 472-482.
- [5] Chalala, C. (2012): How orthodontics can facilitate restorative dentistry. – *International Arab Journal of Dentistry* 3(2): 66-73.
- [6] Hien, N.T.M., Lam, T.H., Viet, H., Thao, D.T., Hoang, V. (2025): Clinical Performance of Lithium Disilicate Ceramic Veneers Cemented With Light-Cured Resin Cements: An Observational Study. – *Cureus* 17(5): 8p.
- [7] Karthi, M., Maria, R., Momin, Z. (2023): Post-orthodontic recontouring of anterior teeth using direct composite injection technique: a case report. – *International Journal of Oral Health Dentistry* 9: 74-77.
- [8] Kuliš, A., Kuliš Rader, K., Kopač, I. (2024): Minimally invasive prosthodontics using the concept of prosthetically guided orthodontics. – *Journal of Esthetic and Restorative Dentistry* 36(10): 1370-1380.
- [9] Magne, P., Belser, U.C. (2003): Porcelain versus composite inlays/onlays: Effects of mechanical loads on stress distribution, adhesion, and crown flexure. – *The International Journal of Periodontics & Restorative Dentistry* 23(6): 543-555.
- [10] Pini, N.P., Aguiar, F.H., Lima, D.A., Lovadino, J.R., Terada, R.S., Pascotto, R.C. (2012): Advances in dental veneers: Materials, applications, and techniques. – *Clinical, Cosmetic and Investigational Dentistry* 4: 9-16.
- [11] Shen, Y., Jiang, X., Yu, J. (2023): The combined orthodontic and restorative treatment for patients with malocclusion and dentition defects: A randomized controlled trial. – *Medicine* 102(35): 6p.
- [12] Siaw, Y.K. (2018): Achieving the optimal esthetic outcome of anterior restorations: Traditional or digital approach? – *Journal of Indian Prosthodontic Society* 18(Suppl 1): S3-S4.
- [13] Spear, F.M., Kokich, V.G., Mathews, D.P. (2006): Interdisciplinary management of anterior dental esthetics. – *Journal of the American Dental Association* 137(2): 160-169.
- [14] Stappert, C.F., Ozden, U., Gerds, T., Strub, J. R. (2005): Longevity and failure load of ceramic veneers with different preparation designs after exposure to masticatory simulation. – *The Journal of Prosthetic Dentistry* 94(2): 132-139.