e-ISSN 3050-9432
Journal of Dental Health and Oral Research

ATHENAEUM SCIENTIFIC PUBLISHERS

Case Report

Dual-Wing Zirconia Maryland Bridge: A Real Solution for Anterior Tooth Replacement

Rim Bourgi[1,2*], Carlos Enrique Cuevas-Suárez[3,4], Naji Kharouf[2,5], Mohammed Al Hasani[6], Amer R Dana[7], Youssef Haikel[2,5,8], Louis Hardan[1]

[1]Department of Restorative and Esthetic Dentistry, Faculty of Dental Medicine, Saint-Joseph University of Beirut, Beirut 1107 2180, Lebanon
[2]Department of Biomaterials and Bioengineering, INSERM UMR_S 1121, University of Strasbourg, 67000 Strasbourg, France
[3]Dental Materials Laboratory, Academic Area of Dentistry, Autonomous University of Hidalgo State, San Agustín Tlaxiaca 42160, Mexico
[4]Dental Materials and Biomaterials Laboratory Faculty of Stomatology, Meritorious Autonomous University of Puebla, Puebla 72570, Mexico
[5]Department of Endodontics and Conservative Dentistry, Faculty of Dental Medicine, University of Strasbourg, 67000 Strasbourg, France
[6]Private Practice, 51001 Babil, Iraq
[7]Dental Ceramist and Designer, AlcheDent Laboratory, Beirut 1105, Lebanon
[8]Pôle de Médecine et Chirurgie Bucco-Dentaire, Hôpital Civil, Hôpitaux Universitaire de Strasbourg, 67000 Strasbourg, France

***Correspondence author:** Rim Bourgi, Department of Restorative and Esthetic Dentistry, Faculty of Dental Medicine, Saint-Joseph University of Beirut, Beirut 1107 2180, Lebanon and Department of Biomaterials and Bioengineering, INSERM UMR_S 1121, University of Strasbourg, 67000 Strasbourg, France;
E-mail: rim.bourgi@hotmail.com

Citation: Bourgi R, et al. Dual-Wing Zirconia Maryland Bridge: A Real Solution for Anterior Tooth Replacement. J Dental Health Oral Res. 2026;7(1):1-14.

https://doi.org/10.46889/JDHOR.2026.7127

Received Date: 09-02-2026
Accepted Date: 23-03-2026
Published Date: 30-03-2026

Abstract

Replacement of a missing anterior tooth represents a clinical challenge due to functional, esthetic and psychological considerations. Although implant-supported restorations are commonly regarded as the treatment of choice, clinical limitations such as bone deficiency, previous implant failure and patient preference may restrict their use. Minimally invasive prosthetic alternatives, including resin-bonded fixed dental prostheses, have gained interest. Advances in zirconia biomaterials and digital dentistry have improved the predictability of conservative anterior restorations. This case report aimed to evaluate the clinical feasibility of a dual-wing zirconia Maryland bridge fabricated through a fully digital workflow for anterior tooth replacement following implant failure. A 60-year-old female patient presented with an unesthetic smile due to the loss of a maxillary anterior tooth following implant failure. After clinical and radiographic assessment and a healing period, prosthetic rehabilitation was performed using a computer-aided design and computer-aided manufacturing fabricated zirconia Maryland bridge with dual-wing retention. Surface conditioning was achieved using airborne-particle abrasion (50 µm Xpedent Aluminum Oxide Abrasive Powder at 2.5 bar using a dedicated device (Chair-Side Micro Etching Master 2-in-1, Xpedent Austria GmbH, Lustenau, Austria)) followed by application of a phosphate monomer primer containing 10-methacryloyloxydecyl dihydrogen phosphate (Stela primer (SDI Limited, Bayswater, Victoria, Australia)). Cementation was performed using a dual-cure self-adhesive resin cement (Set Maxx, Southern Dental Industries, SDI Limited, Bayswater, Victoria, Australia) under controlled polymerization conditions. Objective esthetic evaluation was conducted using a digital shade measurement system Cobra Shade Scanner (Borea S.A.S, Limoges, France). The dual-wing zirconia Maryland bridge demonstrated excellent marginal adaptation, mechanical stability and favorable esthetic integration. Minor occlusal refinements enhanced functional harmony and surface appearance. The restoration showed satisfactory clinical performance during the observation period. Dual-wing zirconia Maryland bridges fabricated using a digital workflow may represent a conservative and predictable option for long-term provisional anterior tooth replacement in selected clinical situations. Proper adhesive protocol, digital planning and material selection are critical factors for clinical success.

Keywords: Esthetics; Maryland Bridge; Zirconia

Introduction

The loss of an anterior tooth does not only compromise oral function but also exerts a significant psychological and social impact on the patient [1,2]. Several therapeutic options are available for the replacement of missing anterior teeth, including removable partial dentures, conventional fixed partial dentures and implant-supported restorations. Although dental implants are often considered the treatment of choice, their indication depends on multiple factors such as bone availability, systemic conditions, financial considerations and patient acceptance. Implant therapy may also be complicated by biological or mechanical failures, leading clinicians and patients to reconsider alternative restorative strategies [2-4].

Long-term use of removable partial dentures may accelerate alveolar bone resorption, while conventional fixed partial dentures require extensive tooth preparation, resulting in irreversible loss of healthy dental tissues. In this context, resin-bonded fixed dental prostheses represent a minimally invasive alternative that preserves tooth structure while providing favorable esthetic and functional outcomes [5,6].

Compared with conventional fixed bridges, Resin-Bonded Winged Bridges (RBWBs), commonly known as Maryland bridges, offer a conservative and cost-effective approach for replacing missing teeth, as they require minimal or even no tooth preparation, thereby preserving the integrity of the abutment teeth and reducing the risk of biological complications such as endodontic damage or adverse soft tissue responses [7,8].

The minimally invasive nature of RBWBs also contributes to their clinical safety, as it decreases the likelihood of catastrophic failures and loss of abutment teeth that may occur with more aggressive prosthodontic approaches. In addition, RBWBs can serve as a valuable treatment option for young patients in whom implant placement must be postponed, as well as in situations where anatomical limitations restrict implant therapy [9]. Another important advantage of this treatment modality is its reversibility and retrievability, allowing clinicians to easily modify or replace the restoration if required [10]. High levels of patient satisfaction with RBWBs have also been reported in the literature, further supporting their role as a viable restorative option in clinical practice [1,4,11].

Despite these advantages, certain limitations have been reported. Debonding of the prosthesis remains the most frequently observed complication and represents the principal cause of failure of RBWBs [6]. Consequently, their survival rates have sometimes been reported to be lower than those of conventional fixed dental prostheses and implant-supported crowns [12,13]. Moreover, traditional metal-retained winged bridges may present esthetic limitations due to the possible greyish shine-through effect of the metal framework through the abutment tooth structure, which can compromise the esthetic outcome in the anterior region [7].

With the growing demand for metal-free and highly esthetic restorations, contemporary research has focused on the development of all-ceramic resin-bonded prostheses capable of combining minimal invasiveness with improved optical properties [1,4]. Advances in dental ceramics have significantly enhanced the mechanical performance of these materials, transforming previously brittle ceramics into reliable restorative options with improved strength, fracture resistance and toughness. Among available ceramics, etchable materials such as lithium disilicate have demonstrated favorable outcomes for single-unit restorations in both anterior and posterior regions due to their adhesive bonding capability [14,15]. However, the evidence supporting their use for fixed bridgework, particularly in posterior edentulous areas, remains limited [16,17].

Conversely, polycrystalline ceramics such as zirconia offer superior mechanical properties and high fracture resistance, making them suitable for single crowns as well as short- and medium-span fixed dental prostheses. Although early zirconia systems presented limitations such as opacity and veneering ceramic chipping, ongoing improvements in zirconia formulations and Computer-Aided Design and Computer-Aided Manufacturing (CAD-CAM) fabrication techniques have significantly enhanced their clinical performance and esthetic potential [18-22].

With the evolution of digital dentistry and CAD-CAM technologies, all-ceramic resin-bonded restorations, particularly zirconia Maryland bridges, have emerged as predictable and efficient solutions for anterior tooth replacement. CAD is a digital process that enables the creation of a Three-Dimensional (3D) virtual model of the prosthetic restoration based on the patient's clinical data [19,20]. Using specialized software, clinicians and dental technicians can design and optimize the prosthesis while considering anatomical, functional and esthetic parameters [19]. The process begins with digital data acquisition through intraoral scanning, capturing the morphology of the abutment teeth and surrounding tissues. The restoration is then virtually designed and adjusted to ensure optimal fit, occlusion and esthetic integration. This digital planning stage allows simulation of the final restoration and identification of potential limitations before manufacturing, thereby improving treatment predictability and efficiency [20].

This article describes, from a clinician's perspective, the restoration of a missing maxillary anterior tooth following implant failure using a fully digital workflow and a CAD-CAM-fabricated zirconia Maryland bridge, highlighting the role of modern biomaterials, adhesive protocols and streamlined clinician-laboratory communication in achieving functional and esthetic success.

Case Presentation: Initial Clinical Situation

A 60-year-old female patient presented to the clinic with the chief complaint of an unesthetic smile resulting from the loss of a maxillary anterior tooth following implant failure. The patient reported a previous implant placement with immediate provisionalization. However, approximately six weeks after surgery, the implant failed and was lost, which was associated with significant alveolar bone resorption in the esthetic zone. A Cone Beam Computed Tomography (CBCT) scan was initially performed to evaluate the extent of bone loss. After a healing period of three months, a second CBCT examination revealed partial spontaneous bone regeneration in the affected area. During the healing period, a provisional restoration was maintained to preserve the soft tissue contours and gingival architecture. Once soft tissue stability was achieved, a comprehensive clinical evaluation was performed (Fig. 1).

Figure 1: Initial intraoral situation. A retracted intraoral photograph illustrates the edentulous space corresponding to the missing maxillary lateral incisor and the compromised esthetic zone.

Digital Workflow and Diagnostic Planning

An intraoral photograph was captured using a dedicated dental photography system and a digital intraoral scan was performed using an intraoral scanner to initiate treatment planning. A 3D-printed model was fabricated based on the digital scan to allow diagnostic evaluation and prosthetic planning. This step facilitated visualization of the edentulous area and enabled precise communication with the dental laboratory during the digital design phase (Fig. 2).

Figure 2: Three-dimensionally (3D)-printed model. The 3D-printed model was used for diagnostic evaluation and prosthetic planning. This step allowed precise visualization of the edentulous area and facilitated communication with the dental laboratory during the digital design phase.

All treatment options were discussed with the patient, including:

- Implant replacement
- Conventional fixed dental prosthesis
- Removable partial denture
- Resin-bonded fixed dental prosthesis

Considering the patient's preference for a minimally invasive, fixed and time-efficient solution, a resin-bonded prosthetic approach using a zirconia Maryland bridge was selected.

Digital Design of the Restoration

Following the acquisition of the intraoral scan, the prosthetic rehabilitation was planned to use a fully digital workflow. The digital data were transferred to dental CAD software (Exocad software (Exocad GmbH, Darmstadt, Germany)) to allow virtual design of the definitive restoration. This step enabled precise evaluation of the prosthetic space, pontic morphology, emergence profile and integration within the anterior esthetic zone (Fig. 3). The digital design also facilitated communication with the dental laboratory and allowed the optimization of the framework geometry before manufacturing.

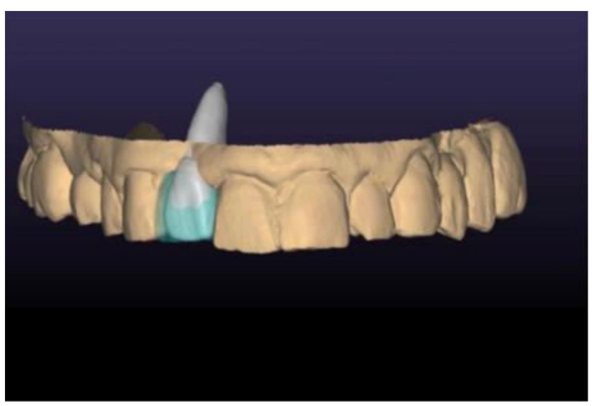

Figure 3: Digital prosthetic design. The definitive restoration was digitally designed using a Computer-Aided Design (CAD) software, allowing the visualization of the pontic morphology, emergence profile and integration within the anterior esthetic zone.

Cutback Design and Framework Preparation

The restoration was planned as a zirconia Maryland bridge fabricated through CAD-CAM technology. A cutback design was implemented to create adequate space for veneering a feldspathic ceramic in the esthetic zone while preserving sufficient zirconia thickness to ensure structural strength (Fig. 4).

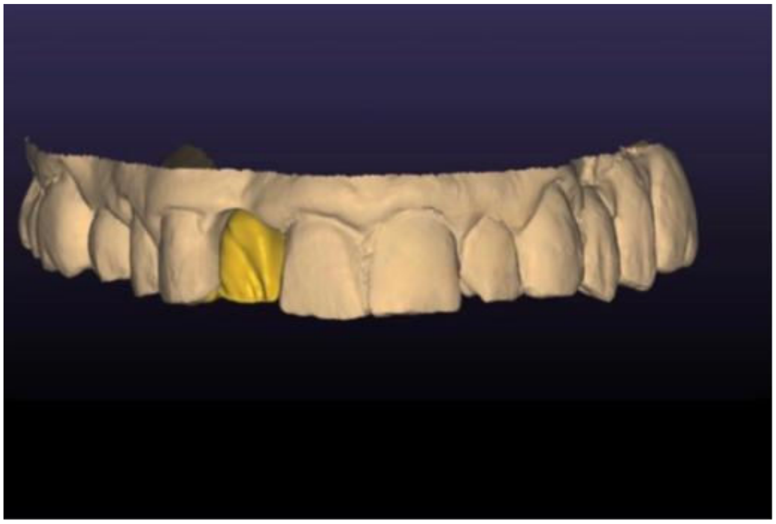

Figure 4: Cutback design of the zirconia framework. The digital cutback design defined the zirconia framework geometry while creating space for ceramic layering to enhance esthetic integration.

Dual-Wing Zirconia Bridge Design

A dual-wing configuration was selected to enhance prosthesis stability and improve retention by distributing functional forces between the adjacent teeth (Fig. 5). The design of the wings was carefully adapted to respect the available occlusal clearance, ensuring adequate space while maintaining proper occlusal relationships.

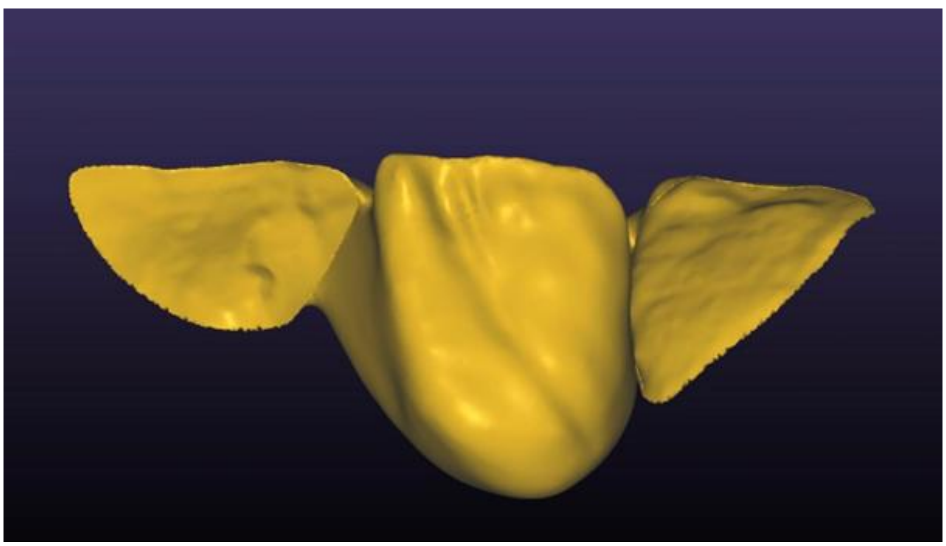

Figure 5: Dual-wing zirconia Maryland bridge design. The restoration was designed with two zirconia wings to be bonded to the adjacent teeth. While single-retainer designs are commonly described in the literature, the dual-wing configuration was selected in this case to increase retention and structural stability.

Try-In of the Restoration

Following the CAD-CAM manufacturing process, the definitive zirconia restoration was evaluated on the model and clinically before the adhesive cementation procedure. This step is essential to verify the passive fit of the prosthesis, assess marginal adaptation and confirm the esthetic integration of the pontic within the anterior dentition. Particular attention was given to the alignment of the pontic, the adaptation of the zirconia wings on the abutment teeth and the harmony of the restoration with the surrounding dentition (Fig. 6).

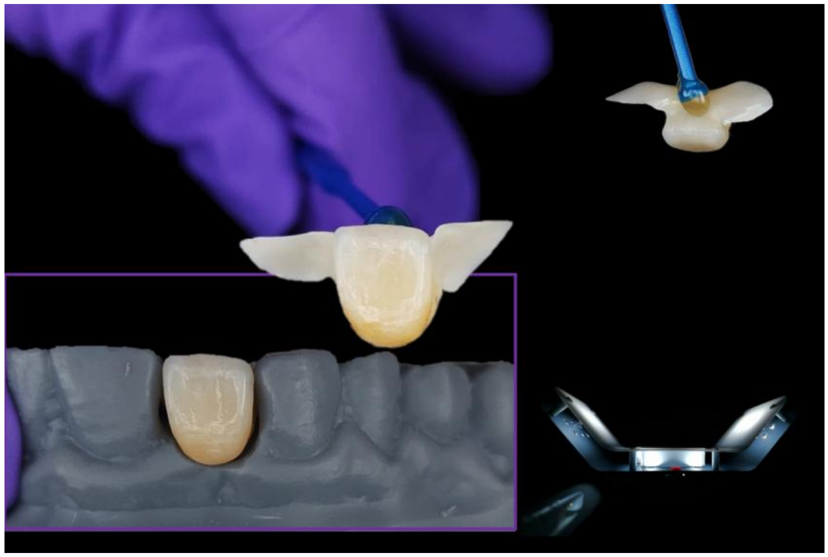

Figure 6: Clinical and model try-in of the restoration. All clinical photographs were captured using Smile Lite MDP2 (Smile Line SA, Saint-Imier, Switzerland). Following CAD-CAM fabrication, the zirconia restoration was evaluated on the model and intraorally to verify marginal adaptation, esthetics and passive fit prior to bonding.

Adhesive Protocol and Cementation

In the presented case, a zirconia Maryland bridge was fabricated with two wings that were both bonded to the abutment teeth. This design provided enhanced stability, improved load distribution and optimal retention. Such an approach is particularly advantageous for minimally prepared or non-prepared anterior teeth (Fig. 7).

Figure 7: Two-Wing zirconia bridge.

Resin Positioning Guide

A 3D-printed resin guide was fabricated to ensure precise seating of the restoration during cementation. The guide provided:

- Structural stability during bonding
- Translucency to allow light polymerization
- Minimal occlusal coverage to maintain rubber dam isolation
- Support points on the pontic and wing edges for controlled positioning

Zirconia Surface Treatment

The intaglio surfaces of the zirconia wings were prepared using the following protocol:

1. Airborne-particle abrasion with 50 µm Xpedent Aluminum Oxide Abrasive Powder (Fig. 8) at 2.5 bar using a dedicated device to create micromechanical retention on the intaglio surface
2. Ultrasonic cleaning in ethanol to remove residual contaminants

3. Application of a phosphate monomer primer containing 10-Methacryloyloxydecyl Dihydrogen Phosphate (10-MDP) using the SDI microapplicators (Fig. 9). In this case the Stela primer (SDI Limited, Bayswater, Victoria, Australia) was used. The Stela Primer (SDI Limited) is formulated without tertiary amines and contains glycerol dimethacrylate. It has been specifically recommended for use with the Stela self-cure composite system (SDI Limited). Previous investigations evaluating this combination have demonstrated that the use of Stela Primer with Stela composite resulted in the highest degree of conversion, which was attributed to a synergistic interaction between the primer and the restorative material [23,24]. The manufacturer also recommends the use of Stela Primer in conjunction with Set Maxx resin cement. According to the manufacturer, polymerization can be initiated through chemical interaction between the primer and the resin material, which may enhance bonding performance to dental tissues. In addition, the manufacturer indicates that light-curing may not be required when the primer is used, as the polymerization process is chemically activated upon contact with the restorative material [24]

Figure 8: Two-Wing Zirconia Bridge and 50 µm xpedent aluminum oxide abrasive powder.

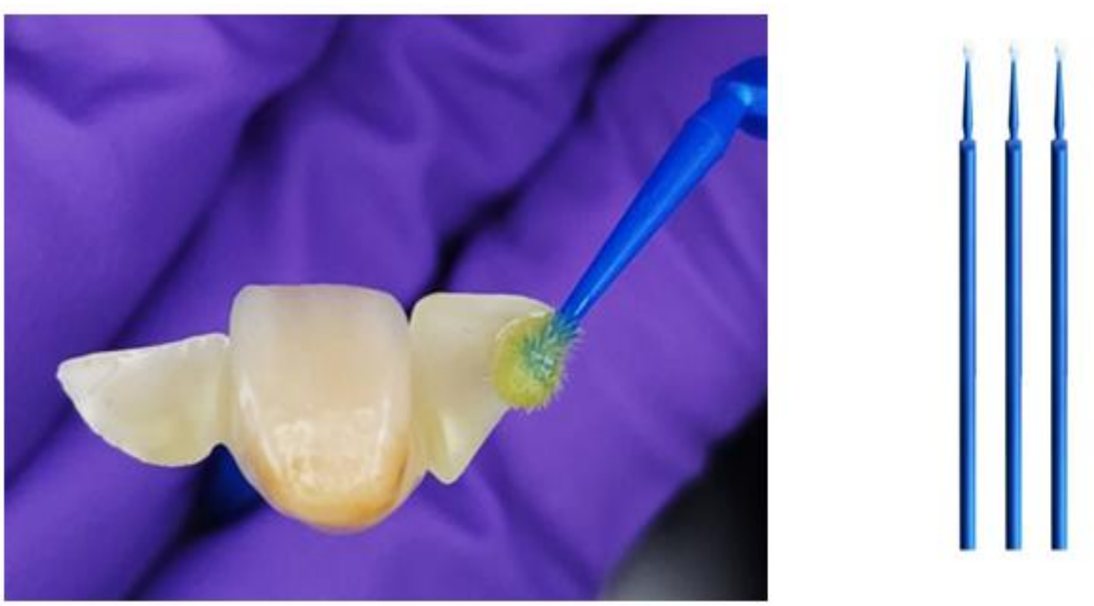

Figure 9: Two-Wing Zirconia Bridge with the SDI microapplicators.

It has been demonstrated that SDI microapplicators exhibit superior structural stability and resistance to deformation compared with other microapplicators. Therefore, they were used for primer application on the retainer wing to ensure precise material placement and to minimize the risk of bristle detachment, thereby promoting optimal bonding performance [25].

Tooth Surface Preparation

The abutment teeth were prepared using a conventional adhesive protocol:

1. Cleaning with pumice
2. Etching enamel with 37% phosphoric acid (Fig. 10) for 30 seconds (SDI (Super Etch, Southern Dental Industries- SDI, Bayswater, Victoria 3153, Australia)
3. Application of a compatible adhesive primer

Figure 10: SDI etchant gel (Super Etch, Southern Dental Industries- SDI, Bayswater, Victoria 3153, Australia) applied for etching the teeth surface.

Cementation Procedure

For cementation, a dual-cure self-adhesive resin cement containing 10-MDP (Set Maxx, Southern Dental Industries, SDI Limited) was applied to the zirconia intaglio surfaces. The use of a dual-cure resin cement, rather than a purely light-cured system, is recommended to ensure sufficient polymerization beneath zirconia restorations due to the material's relatively high opacity, which may limit light transmission [26]. In addition, the application of a total-etch, multi-step adhesive protocol allows greater control over each stage of the bonding procedure, thereby contributing to improved adhesion and overall bond reliability [27]. The restoration was positioned using the 3D-printed guide, ensuring precise alignment. Initial light curing was performed through the translucent guide. After removal of excess cement, final polymerization was completed under a glycerin layer to prevent formation of an oxygen-inhibited layer (Fig. 11).

Figure 11: The two-wing zirconia cantilever bridge demonstrated excellent marginal adaptation, stability and esthetics. Occlusion and pontic function were preserved, with no adhesive failures. The dual-wing design provided maximal retention and predictable long-term performance in this minimally invasive restoration. Additionally, the transitional lines between the

pontic and the adjacent teeth were refined using composite resin (Luna 2 SDI composite, Victoria, Australia) on teeth 11 and 13 to improve the overall esthetic integration.

Final Outcome

Minor occlusal adjustments were performed at the mesial and distal connectors and transitional lines between the pontic and adjacent teeth were refined using composite resin (Luna 2 SDI composite, Victoria, Australia) to enhance esthetics on tooth 11 and 13 (Fig. 11,12). The figures clearly illustrate the adjusted concavity and its harmonious transition with the adjacent teeth, which was achieved using a sectional matrix system (SwissMat™, Produits Dentaires, Switzerland). Final polishing was performed using zirconia polishing systems to achieve optimal surface luster. The restoration demonstrated excellent marginal adaptation, stability and esthetic integration within the anterior dentition (Fig. 12).

Figure 12: Final clinical outcome. Before and after restoration of the missing lateral incisor using a zirconia Maryland bridge with dual wings bonded to the adjacent teeth.

Post-cementation instructions were provided to the patient, including avoiding eating or drinking for 60-90 minutes and refraining from biting hard or sticky foods with the anterior teeth. The patient was also advised to use dental floss in the proximal areas to prevent food impaction and reduce the risk of secondary caries. In the event of prosthesis debonding, the patient was instructed to return promptly for clinical evaluation. Periodic follow-up visits were scheduled to monitor the restoration. During follow-up, no debonding of the dual-wing zirconia Maryland bridge was observed and the patient reported satisfaction with the treatment. The overall outcome of the procedure was esthetically satisfactory and resulted in an improved appearance.

Objective color evaluation was performed using the Cobra Shade Scanner (Borea S.A.S, Limoges, France) to quantify shade matching and validate the esthetic integration of the restoration with adjacent natural teeth. The digital shade assessment helped overcome the limitations of subjective visual shade selection and provided reproducible color measurement data for clinical documentation [28]. The restoration demonstrated excellent marginal adaptation, mechanical stability and favorable esthetic integration within the anterior dentition (Fig. 13).

Figure 13: Final color outcome. Objective esthetic evaluation using the Cobra Shade Scanner (Borea S.A.S, Limoges, France) for digital shade measurement and verification of color matching between the zirconia restoration and adjacent natural teeth.

Discussion

Tooth loss remains a common clinical condition worldwide and may result from dental caries, periodontal disease, trauma or congenital absence. In addition to esthetic and psychological implications, missing teeth can negatively affect mastication, speech and occlusal stability [29-31]. Prosthodontic rehabilitation aims to restore these functions through several treatment modalities, including removable prostheses, conventional fixed dental prostheses and implant-supported restorations.

Among these approaches, fixed partial dentures remain widely used to restore partially edentulous spaces while reestablishing functional and esthetic harmony [29,30]. However, conventional multi-unit bridges often require substantial tooth preparation, which may compromise healthy dental structures. For this reason, minimally invasive alternatives such as resin-bonded fixed dental prostheses have gained increasing attention in contemporary prosthodontics. In particular, cantilevered Maryland bridges represent a conservative treatment option that relies on adhesive bonding to the abutment tooth, thereby preserving enamel and reducing biological risks associated with extensive tooth preparation [32-34].

Recent developments in ceramic biomaterials and adhesive dentistry have further expanded the clinical indications of these restorations, particularly with the use of high-strength materials such as zirconia. Consequently, evaluating the adhesive performance and clinical behavior of zirconia- and ceramic-based resin-bonded restorations has become an important focus in modern prosthodontic research [4].

Previous studies have reported satisfactory survival rates of zirconia resin-bonded bridges when appropriate case selection and adhesive protocols are applied [29,35]. The clinical performance of zirconia frameworks has also been enhanced by CAD-CAM technologies, which enable precise reproduction of prosthetic morphology and improved marginal adaptation [19,20].

The biomechanical rationale of the dual-wing design used in this case is related to improved stress distribution across adjacent abutment teeth. By bonding zirconia wings to both the central incisor and canine, rotational displacement forces may be reduced, potentially increasing resistance to debonding. Although single-retainer cantilever designs are commonly reported due to reduced differential tooth movement, dual-retainer configurations may provide additional mechanical stability in selected clinical situations [36,37].

Adhesive interface optimization plays a critical role in the longevity of zirconia resin-bonded restorations. Since zirconia cannot be conditioned using hydrofluoric acid etching, chemical bonding strategies are required. Airborne-particle abrasion using aluminum-oxide followed by 10-MDP primer application has been shown to enhance bond strength and interfacial durability. Phosphate monomer-based primers containing 10-MDP promote stable chemical interaction with zirconium oxide surfaces through the formation of insoluble zirconium-phosphate complexes [38].

Tanis and Akcaboy reported that the incorporation of 10-MDP monomers, including within resin cements, significantly improved the bond strength to sandblasted zirconia substrates [39]. Similarly, Byeon, et al., demonstrated that the application of 10-MDP-containing primers following airborne-particle abrasion with aluminum oxide significantly enhanced the resin bond strength to yttria-stabilized Tetragonal Zirconia Polycrystal (Y-TZP) [40]. In addition to chemical bonding strategies, surface pretreatment protocols have been shown to influence the quality of zirconia adhesion. Kern, et al., suggested that reducing the pressure during sandblasting may help minimize adverse surface alterations while still providing sufficient micromechanical retention [41]. Consistent with these findings, several studies investigating bonding to Y-TZP zirconia have employed airborne-particle abrasion using 50 µm aluminum oxide at a pressure of approximately 0.25 MPa and an operating distance of 10 mm to increase surface roughness and enhance bond strength between the ceramic and resin-based materials [42,43].

The selection of dual-cure self-adhesive resin cement is supported by polymerization kinetics demonstrating the influence of temperature, light exposure and molecular mobility on degree of conversion [24]. Increased temperature enhances radical propagation and monomer diffusion, resulting in improved polymerization efficiency. Performing polymerization under conditions approximating intraoral temperature may improve clinical performance. Dual-cure systems are particularly advantageous in areas with limited light penetration [24,44-46]. Set Maxx (SDI Limited, Bayswater, VIC, Australia) is a dual-cure, self-adhesive resin cement developed for the luting of various indirect restorative materials, including metals, glass ceramics, zirconia, lithium disilicate, resin composites and alumina-based ceramics.

Applying Stela Primer before Set Maxx increased the percentage of degree of conversion [24], this might enhance the bond of the dual wing zirconia.

The present case also demonstrates the clinical value of digital dentistry. The integration of intraoral scanning, 3D printing and CAD-CAM fabrication enables high-precision prosthetic production and improves clinician-laboratory communication. The use of a 3D-printed positioning guide improved seating accuracy, reduced cementation errors and facilitated controlled removal of excess resin cement [19,20].

Esthetic evaluation was supported by objective digital color assessment using the Cobra Shade Scanner (Borea S.A.S, Limoges, France). Digital shade measurement reduces observer bias associated with conventional visual shade selection and provides reproducible data. Objective color analysis is particularly valuable in anterior restorations where minor color discrepancies may influence patient satisfaction [28,47].

Despite favorable clinical outcomes, resin-bonded prostheses remain technique-sensitive. Long-term success depends on strict adherence to adhesive protocols, adequate enamel bonding and controlled occlusal loading. Further longitudinal clinical investigations are required to validate the durability of dual-wing zirconia Maryland bridges. Additionally, this study evaluated the effect of a dedicated primer used in combination with a resin cement system from the same manufacturer. Although this approach may limit the generalizability of the findings to other cement systems, it reflects routine clinical practice, where manufacturers recommend the use of compatible materials to achieve optimal performance. Clinicians are therefore advised to follow the manufacturer's instructions for use and avoid off-label combinations. Further investigations are necessary to evaluate the performance of other resin cement systems that may also incorporate specific primers.

Conclusion

This case demonstrates that a zirconia Maryland bridge with dual wings bonded to the adjacent central incisor and canine provides a minimally invasive, esthetic and highly stable solution for long-term provisional anterior tooth replacement. The use of a 3D-printed positioning guide ensures precise placement, while surface treatment with a phosphate monomer containing 10-MDP allows reliable adhesion to zirconia. Minor occlusal and esthetic refinements at the distal and mesial connectors and transition lines enhance both function and appearance. Given its mechanical strength, fracture resistance and esthetic versatility, zirconia can indeed be considered a real panacea in carefully planned anterior restorations. When proper bonding protocols and clinical techniques are applied, it offers predictable short-term or long-term performance, preserves tooth structure and maintains occlusal function, making it an excellent choice for minimally invasive prosthodontics.

Conflict of Interest
The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding Statement
This research did not receive any specific grant from funding agencies in the public, commercial or non-profit sectors.

Acknowledgement
None.

Data Availability Statement
Not applicable.

Ethical Statement
The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore, was exempt.

Informed Consent Statement
Informed consent was taken for this study.

Authors' Contributions
All authors contributed equally to this paper.

References
1. Mainjot AK. No-prep zirconia cantilever resin-bonded fixed dental prostheses: A noninvasive, simple approach to replacing a single missing tooth. J Esthet Restor Dent. 2025;37(1):68-84.
2. Clark D, Levin L. In the dental implant era, why do we still bother saving teeth? J Endod. 2019;45(12 Suppl):S57-65.
3. Negi P, Jaikaria A. Rehabilitation of patient with missing anterior tooth with Maryland bridge: A case report. Int J Res Rev. 2020;7(6):1-3.
4. Ahmad M, Naim H, Adawi AM, Siddiq A, Mayidi HM, Hakami YH. A conservative approach to replace missing teeth in the aesthetic zone with Maryland bridge: A case report. Dent Oral Craniofac Res. 2017;3(4):131.
5. Lemrichi M, El Yamani A. Full zirconia resin-bonded fixed dental prosthesis: A clinical report. Clin Case Rep. 2025;13(7):e70590.
6. Kern M. Resin-bonded fixed dental prostheses: Minimally invasive–esthetic–reliable. Quintessenz Verlag. 2019.
7. Cheung GS, Lai SC, Ng RP. Fate of vital pulps beneath a metal-ceramic crown or a bridge retainer. Int Endod J. 2005;38(8):521-30.
8. Schätzle M, Lang NP, Ånerud Å, Boysen H, Bürgin W, Löe H. The influence of margins of restorations on the periodontal tissues over 26 years. J Clin Periodontol. 2001;28(1):57-64.
9. Barwacz CA, Hernandez M, Husemann RH. Minimally invasive preparation and design of a cantilevered, all-ceramic, resin-bonded fixed partial denture in the esthetic zone: A case report and descriptive review. J Esthet Restor Dent. 2014;26(5):314-23.
10. Miettinen M, Millar BJ. A review of the success and failure characteristics of resin-bonded bridges. Br Dent J. 2013;215(2):E3.
11. Creugers NH, De Kanter RJ. Patients' satisfaction in two long-term clinical studies on resin-bonded bridges. J Oral Rehabil. 2000;27(7):602-7.
12. Pjetursson BE, Tan WC, Tan K, Brägger U, Zwahlen M, Lang NP. A systematic review of the survival and complication rates of resin-bonded bridges after an observation period of at least 5 years. Clin Oral Implants Res. 2008;19(2):131-41.
13. Pjetursson BE, Brägger U, Lang NP, Zwahlen M. Comparison of survival and complication rates of tooth-supported fixed dental prostheses and implant-supported fixed dental prostheses and single crowns. Clin Oral Implants Res. 2007;18(Suppl 3):97-113.
14. Gracis S, Thompson VP, Ferencz JL, Silva NR, Bonfante EA. A new classification system for all-ceramic and ceramic-like restorative materials. Int J Prosthodont. 2015;28(3).

15. Fabbri G, Zarone F, Dellificorelli G, Cannistraro G, De Lorenzi M, Mosca A, et al. Clinical evaluation of 860 anterior and posterior lithium disilicate restorations: retrospective study with a mean follow-up of 3 years and a maximum observational period of 6 years. Int J Periodontics Restorative Dent. 2014;34(2):165-77.
16. Solá-Ruiz MF, Lagos-Flores E, Román-Rodriguez JL, Del Rio Highsmith J, Fons-Font A, Granell-Ruiz M. Survival rates of a lithium disilicate-based core ceramic for three-unit esthetic fixed partial dentures: A 10-year prospective study. Int J Prosthodont. 2013;26(2).
17. Teichmann M, Göckler F, Weber V, Yildirim M, Wolfart S, Edelhoff D. Ten-year survival and complication rates of lithium-disilicate tooth-supported crowns, implant-supported crowns and fixed dental prostheses. J Dent. 2017;56:65-77.
18. Sorrentino R, De Simone G, Tetè S, Russo S, Zarone F. Five-year prospective clinical study of posterior three-unit zirconia-based fixed dental prostheses. Clin Oral Investig. 2012;16(3):977-85.
19. Jain P, Rathee M, Mittal S, Tomar SS. Rehabilitation of anterior esthetics using CAD-CAM fabricated zirconia Maryland bridge: A case report. Acta Stomatol Marisiensis. 2018:37.
20. Fahd D, Sara M. Zirconia resin-bonded bridges: an alternative approach for minimally invasive dental prostheses using CAD-CAM technology: A case report. CODS J Dent. 2025;16(2):66-70.
21. Larsson C, Wennerberg A. The clinical success of zirconia-based crowns: A systematic review. Int J Prosthodont. 2014;27(1).
22. Pjetursson BE, Sailer I, Makarov NA, Zwahlen M, Thoma DS. All-ceramic or metal-ceramic tooth-supported fixed dental prostheses? Part II: Multiple-unit FDPs. Dent Mater. 2015;31(6):624-39.
23. Guarneri JA, Maucoski C, Ghaffari S, Macneil BD, Price RB, Arrais CA. Ability of a novel primer to enhance the polymerization of a self-cured resin composite. Dent Mater. 2025;41(1):42-50.
24. Maucoski C, Guarneri JA, Farrar P, Price RB. Influence of temperature and primer application on setting time and degree of conversion of a dual-cure self-adhesive cement. J Dent. 2025;160:105859.
25. Bourgi R, Klein CA, Rebelo Allram L, Gonçalves Heck L, Hardan L, Cuevas-Suárez CE, et al. Bioengineering perspectives on adhesive delivery: Performance analysis of dental microapplicators. Front Dent Med. 2025;6:1698820.
26. Quigley NP, Loo DS, Choy C, Ha WN. Clinical efficacy of methods for bonding to zirconia: A systematic review. J Prosthet Dent. 2021;125(2):231-40.
27. Piascik JR, Swift EJ, Braswell K, Stoner BR. Surface fluorination of zirconia: Adhesive bond strength comparison to commercial primers. Dent Mater. 2012;28(6):604-8.
28. Bourgi R, Hardan L, Al Hasani M, Kharouf N, Haïkel Y. In-office tooth whitening using 6% hydrogen peroxide: A case report emphasizing digital shade analysis and optical magnification. 2026;7(1):1-16.
29. Shah R, Laverty DP. The use of all-ceramic resin-bonded bridges in the anterior aesthetic zone. Dent Update. 2017;44(3):230-8.
30. Thoma DS, Sailer I, Ioannidis A, Zwahlen M, Makarov N, Pjetursson BE. A systematic review of the survival and complication rates of resin-bonded fixed dental prostheses after a mean observation period of at least 5 years. Clin Oral Implants Res. 2017;28(11):1421-32.
31. Su N, Yue L, Liao Y, Liu W, Zhang H, Li X, et al. The effect of various sandblasting conditions on surface changes of dental zirconia and shear bond strength between zirconia core and indirect composite resin. J Adv Prosthodont. 2015;7(3):214.
32. Valente F, Mavriqi L, Traini T. Effects of 10-MDP based primer on shear bond strength between zirconia and new experimental resin cement. Materials (Basel). 2020;13(1):235.
33. Scaminaci Russo D, Cinelli F, Sarti C, Giachetti L. Adhesion to zirconia: A systematic review of current conditioning methods and bonding materials. Dent J (Basel). 2019;7(3):74.
34. Habibzadeh S, Khamisi F, Mosaddad SA, Fernandes GV, Heboyan A. Full-ceramic resin-bonded fixed dental prostheses: A systematic review. J Appl Biomater Funct Mater. 2024;22:22808000241250118.
35. Bhansali H, Vedant K, Datta P. Restoring smiles conservatively: Maryland bridge. Guident. 2025;18(11).
36. Kurian N, Varghese KG, Wadhwa S, Abraham G, Varghese VS. Reverse Anterior Maryland Bonded (RAMBO) bridge for replacing a tooth with extended pontic space: A case report. Dent Update. 2025;52(6):429-32.
37. Trushkowsky RD, Medianti DR, Giotopoulos PL, Prathompat S, Zhang Y. Conservative esthetic replacement of a missing anterior tooth using a one-wing fixed dental prosthesis made of monolithic zirconia with an intaglio of glass infiltration. Compend Contin Educ Dent. 2021;42(9):e9.
38. Tanış MÇ, Akçaboy C. Effects of different surface treatment methods and MDP monomer on resin cementation of zirconia ceramics: An *in-vitro* study. J Lasers Med Sci. 2015;6(4):174.
39. Byeon SM, Lee MH, Bae TS. Shear bond strength of Al2O3 sandblasted Y-TZP ceramic to the orthodontic metal bracket.

Materials (Basel). 2017;10(2):148.
40. Kern M, Barloi A, Yang B. Surface conditioning influences zirconia ceramic bonding. J Dent Res. 2009;88(9):817-22.
41. Valandro LF, Della Bona A, Bottino MA, Neisser MP. The effect of ceramic surface treatment on bonding to densely sintered alumina ceramic. J Prosthet Dent. 2005;93(3):253-9.
42. Blatz MB, Alvarez M, Sawyer K, Brindis M. How to bond zirconia: The APC concept. Compend Contin Educ Dent. 2016;37(9):611-7.
43. Vrochari AD, Eliades G, Hellwig E, Wrbas KT. Curing efficiency of four self-etching, self-adhesive resin cements. Dent Mater. 2009;25(9):1104-8.
44. Aldhafyan M, Silikas N, Watts DC. Influence of curing modes on conversion and shrinkage of dual-cure resin cements. Dent Mater. 2022;38(1):194-203.
45. AlShaafi MM. Effects of different temperatures and storage time on the degree of conversion and microhardness of resin-based composites. J Contemp Dent Pract. 2016;17(3):217-23.
46. Hein SC. Advancing visual-instrumental agreement in dental colorimetry: development and validation of novel assessment methodologies. University of Leeds. 2024.
47. Hampé-Kautz V, Salehi A, Senger B, Etienne O. A comparative *in-vivo* study of new shade matching procedures. Int J Comput Dent. 2020;23(4):317-23.