Journal of Oral and Dental Sciences, 12 (2) (2026) 5-11

Journal of Oral and Dental Sciences

https://www.sciencepubco.com/index.php/JODS
https://doi.org/10.14419/bwg52492
Research paper

Minimally Invasive Aesthetic Rehabilitation in Pediatric Patients- A Case Series

Dr. Monideepa Mitra [1] *, Dr. Ankit Bapat [2], Dr. Shreyasi Chakraborty [3], Dr. Soumen Pal [4]

[1] *Post Graduate Trainee, Department of Pediatric and Preventive Dentistry, Dr. R. Ahmed Dental College and Hospital, Kolkata*
[2] *Post Graduate Trainee, Department of Pediatric and Preventive Dentistry, Dr. R. Ahmed Dental College and Hospital, Kolkata*
[3] *Associate Professor, Department of Pediatric and Preventive Dentistry, Dr. R. Ahmed Dental College and Hospital, Kolkata*
[4] *Associate Professor, Department of Pediatric and Preventive Dentistry, Dr. R. Ahmed Dental College and Hospital, Kolkata*
**Corresponding author E-mail: monideepa.mitra@gmail.com*

Received: 24-05-2026, Accepted: 31-07-2026, Published: 24-09-2026

Abstract

Loss of anterior teeth due to trauma, caries, or developmental anomalies may lead to functional impairment and significant psychosocial distress in children and adolescents, affecting esthetics, self-esteem, and social interaction. This report describes three clinical cases of young patients presenting with missing maxillary anterior teeth, where minimally invasive prosthetic rehabilitation was planned using Maryland bridge designs as a conservative treatment approach. After thorough clinical and radiographic evaluation, treatment was undertaken with two different approaches: in two cases, a resin-reinforced fiber splint–based Maryland bridge was fabricated to enhance retention and stress distribution, while in one case a conventional tooth preparation design was used for retentive wing placement. All procedures were carried out with strict emphasis on preservation of enamel, minimal tooth preparation, and esthetic rehabilitation. The prostheses were evaluated for fit, function, esthetics, and patient satisfaction, and followed up over a short-term period, during which all restorations remained stable without debonding, fracture, or biological complications. Patients reported improved confidence and satisfactory esthetic and functional outcomes. Within the limitations of this case series and short follow-up duration, minimally invasive Maryland bridge designs, particularly those reinforced with fiber, appear to be a reliable and conservative treatment option for replacement of missing anterior teeth in young patients.

Keywords: *Maryland Bridge, Resin-Bonded Bridge, Fiber-Reinforced Composite, Minimally Invasive Dentistry, Anterior Tooth Replacement, Esthetic Rehabilitation*

1. Introduction

A technique for splinting mandibular teeth using a resin-bonded fixed partial denture (RBFPD) was first described by Rochette in 1973. Since then, resin-retained prostheses have gained considerable popularity because of their conservative nature and favorable aesthetics. These prostheses consist of one or more pontics supported by thin metal or fiber retainers bonded to the lingual and/or proximal surfaces of abutment teeth.[1] Predictable success of RBFPDs relies on appropriate case selection, proper enamel modification, and ideal framework design.[2]

Fiber reinforced composite bridges (FRCBs) are considered a suitable alternative to conventional fixed partial dentures and removable prostheses in children and adolescents. They can be fabricated directly or indirectly using acrylic teeth, composite build-ups, or even the patient's natural tooth as pontic. FRCBs are minimally invasive, reversible, and economical.

2. Case 1

A 13-year-old female reported to the Department of Paediatric and Preventive Dentistry with the chief complaint of a missing anterior tooth causing significant social anxiety. Clinical examination revealed a missing permanent maxillary right central incisor- tooth 11, which had been extracted previously because of gross caries rendering it non-restorable. [Fig. 1]

Copyright © Authors. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Fig. 1: Pre-Operative Frontal View Showing Missing Maxillary Right Central Incisor- Tooth 11.

A conventional Maryland bridge involving teeth 12 and 21 was planned. Diagnostic impressions were made and a cast was prepared to design the palatal wing preparation. Shade selection was performed. The palatal surface was minimally prepared with a small round bur and subsequently refined using a dumbbell-shaped finishing bur. Care was taken to avoid excessive preparation and dentinal sensitivity. Impression was made using addition silicone material. After laboratory fabrication, trial fit and occlusal adjustments were carried out. Final cementation of Metal wing Maryland Bridge (Resin bonded) was done using dual-cure resin cement. [Fig. 2, 3] The patient and parents were satisfied with the esthetic outcome. [Fig. 4]

Fig. 2: Post-Operative Frontal View Showing Conventional Maryland Bridge.

Fig. 3: Post-Operative Palatal View Showing Conventional Maryland Bridge

Fig. 4: Post-Operative Extraoral View After Esthetic Rehabilitation Using Maryland Bridge.

3. Case 2

A 10-year-old female presented with a missing maxillary left central incisor- tooth 21 following traumatic avulsion. [Fig. 5–7] A minimally invasive fiber splint-retained Maryland bridge was planned. Shade matching, photographs, and primary impressions were obtained. An acrylic tooth of appropriate size and shape was selected and modified to resemble the contralateral central incisor.

Fig. 5: Pre-Operative Intraoral Frontal View Showing Missing Maxillary Left Central Incisor- Tooth 21.

Fig. 6: Pre-Operative Intraoral Lateral View Showing Missing Maxillary Left Central Incisor- Tooth 21.

Fig. 7: Pre-Operative Extraoral Frontal View Showing Missing Maxillary Left Central Incisor- Tooth 21.

On the diagnostic cast, a fiber splint extending from tooth 11 to 22 was adapted. [Fig. 8] The acrylic tooth was attached to the splint using flowable composite resin. [Fig. 9] Intraoral trial fit was performed, and the palatal surfaces of 11 and 22 were polished with pumice to optimize bonding. Following etching and bonding procedures, the splint was cemented with flowable composite resin. [Fig. 10, 11]

Fig. 8: Fiber-Reinforced Splint Positioned on the Maxillary Cast For Fabrication of the Maryland Bridge Framework.

Fig. 9: Pontic Positioning And Adaptation on the Maxillary Cast During Fabrication of the Fiber-Reinforced Maryland Bridge.

Fig. 10: Intraoral Post-Cementation View of the Fiber-Reinforced Maryland Bridge.

Fig. 11: Extraoral Post-Cementation View of the Fiber-Reinforced Maryland Bridge.

At one-year follow-up, the prosthesis remained satisfactory with minor composite loss repaired by re-bonding.

4. Case 3

An 11-year-old boy reported with a missing anterior tooth due to failure of eruption of tooth 11. [Fig. 12] Clinical examination revealed mesial tilting of tooth 12 with associated space loss. Radiographic examination showed an impacted and malformed 11 with incomplete root formation. [Fig. 13] History revealed trauma to anterior teeth at around 4 years of age.

Fig. 12: Pre-Operative Intraoral Frontal View Showing Missing Maxillary Right Central Incisor- Tooth 11.

Fig. 13: Radiograph Showing Malformed Maxillary Right Central Incisor- Tooth 11.

The treatment plan included extraction of the impacted tooth, orthodontic space regaining, and prosthetic rehabilitation using the extracted natural tooth as pontic in a Maryland bridge.

Following parental consent, the impacted tooth was surgically removed under local anesthesia while preserving the crown structure. The tooth was cleaned and stored in normal saline. After healing, fixed orthodontic treatment was initiated to regain space.

After adequate space creation, a diagnostic cast was prepared. [Fig. 14] The extracted tooth was disinfected with 5.25% sodium hypochlorite, trimmed, and adapted on the cast. [Fig. 15] The pontic was shaped into an ovate form. Palatal surfaces of teeth 12, 21, and 22 were roughened and polished with pumice. A fiber splint of appropriate length was adapted and bonded to the pontic and abutment teeth using composite resin. [Fig. 16, 17] Occlusion was carefully evaluated to eliminate traumatic contacts. The prosthesis was bonded after achieving the desired orthodontic space; however, the fixed orthodontic appliance had not yet been debonded at the time the clinical photograph was obtained. Final finishing, polishing, and appliance removal were carried out subsequently.

Fig. 14: Space Gained by Fixed Orthodontic Treatment After Extraction of Malformed Tooth.

Fig. 15: Patient's Natural Tooth Positioned on the Maxillary Cast for Pontic Adaptation During Maryland Bridge Fabrication.

Fig. 16: Intraoral Post-Cementation View of the Fiber-Reinforced Maryland Bridge.

Fig. 17: Extraoral Post-Cementation View of the Fiber-Reinforced Maryland Bridge.

The patient was reviewed after 12 months, and the restoration remained functional with satisfactory esthetics and no evidence of debonding or framework fracture.

5. Discussion

Replacement of missing anterior teeth in children requires careful treatment planning because of ongoing growth and the need to preserve tooth structure. Removable partial dentures are economical and non-invasive but demand high patient compliance and are often associated with fracture or loss in pediatric patients.

Conventional fixed partial dentures are generally contraindicated in young permanent teeth due to large pulp chambers and the risk of pulpal damage during tooth preparation.[3] Therefore, minimally invasive alternatives such as resin-bonded bridges and FRCBs are preferred.

FRCBs offer several advantages including conservative tooth preparation, superior esthetics, lower cost, chairside fabrication, and easy repairability. Frese et al. [4] reported promising clinical performance of FRC bridges with satisfactory survival after a median follow-up of 4.5 years. A systematic review involving 592 FRC bridges reported an overall survival rate of 94.4% after 4.8 years.[5] The most common complications were debonding and delamination of veneering composite; however, most failures could be repaired intraorally without laboratory procedures. [6], [7]

Implant-supported prostheses are generally postponed until completion of craniofacial growth because early implant placement may result in infraocclusion and esthetic discrepancies over time.[8] Consequently, interim conservative restorations such as Maryland bridges and FRCBs are highly valuable during the growth period.

In the present case series, Maryland bridges provided functional and esthetic rehabilitation with minimal intervention. Particularly in Case 3, the prosthesis also acted as an esthetic space maintainer following orthodontic space regaining. Use of the patient's own tooth as pontic provided superior esthetics.

Although both metal-framed Maryland bridges and fiber-reinforced composite bridges (FRCBs) are conservative resin-bonded treatment options, they exhibit distinct biomechanical and clinical characteristics. Metal-framed Maryland bridges possess greater rigidity and fracture resistance, making them suitable for single-tooth replacement in patients with stable occlusion and limited functional demands. However, the metal framework may compromise anterior esthetics because of possible shine-through or greying of the abutment tooth. In contrast, FRCBs have an elastic modulus closer to that of dentin, allowing more favorable stress distribution and improved esthetics owing to their metal-free construction. In growing children, FRCBs also permit easier chairside modification and intraoral repair, enabling adaptation to minor occlusal changes during craniofacial growth. Nevertheless, their increased flexibility makes them more susceptible to adhesive debonding and veneering composite delamination under excessive occlusal loading. Therefore, while metal-framed Maryland bridges may provide superior rigidity, FRCBs offer distinct advantages in esthetics, reparability, and adaptability, making them particularly suitable as interim restorations in pediatric patients. [11], [12]

Advantages of Maryland bridges include minimal enamel preparation, reduced pulpal trauma, improved esthetics, better patient acceptance, and preservation of gingival health. These restorations are also reversible and usually do not require local anesthesia.

Despite their advantages, debonding remains the most common complication associated with FRCBs, particularly at the adhesive interface.[5] In pediatric patients, additional factors such as poor compliance with postoperative instructions, inconsistent oral hygiene, accidental trauma during play or sports, nail biting, pencil or pen chewing, object biting, and developing parafunctional habits may increase functional stresses on the prosthesis and compromise bond durability.[9], [11] Furthermore, erupting teeth and ongoing occlusal changes during craniofacial growth may alter occlusal contacts over time, increasing the risk of premature loading and adhesive failure. Therefore, careful occlusal adjustment, patient and parent education, and regular follow-up are essential to maximize restoration longevity. Nevertheless, the reparability of these restorations significantly improves their long-term clinical usefulness.

Replacement of missing teeth using fiber reinforced composite bridges represents a conservative and effective alternative to conventional fixed prostheses in growing children. Careful case selection, proper bonding protocol, and regular follow-up are essential for long-term success.[10]

Contemporary digital workflows and advances in adhesive dentistry have further improved the predictability of resin-bonded fixed partial dentures by enabling accurate CAD/CAM fabrication, optimized framework design, and reliable adhesive bonding protocols, making them increasingly suitable as interim restorations in growing patients.[13]

References

[1] Rosenstiel SF, Land MF, Fujimoto J. *Contemporary fixed prosthodontics*. 5th ed. St. Louis: Elsevier; 2016.
[2] Shillingburg HT Jr, Hobo S, Whitsett LD, Jacobi R, Brackett SE. *Fundamentals of fixed prosthodontics*. 4th ed. Chicago: Quintessence Publishing Co; 2012.
[3] Dean JA, Jones JE, Sanders BJ, Vinson LA. *McDonald and Avery's dentistry for the child and adolescent*. 10th ed. St. Louis: Elsevier; 2021.
[4] Frese C, Schiller P, Staehle HJ, Wolff D. Fiber-reinforced composite fixed dental prostheses in the anterior area: a 4.5-year follow-up. *J Prosthet Dent*. 2014;112(2):143-149. https://doi.org/10.1016/j.prosdent.2013.10.019.
[5] Ahmed KE, Li KY, Murray CA. Longevity of fiber-reinforced composite fixed partial dentures (FRC FPD)-systematic review. *J Dent*. 2017;61:1-11. https://doi.org/10.1016/j.jdent.2016.08.007.
[6] Kumbuloglu O, Özcan M. Clinical survival of indirect, anterior 3-unit surface-retained fiber-reinforced composite fixed dental prosthesis: up to 7.5-years follow-up. *J Dent*. 2015;43(6):656-663. https://doi.org/10.1016/j.jdent.2015.04.006.
[7] Heo G, Lee EH, Kim JW, Cho KM, Park SH. Fiber-reinforced composite resin bridges: an alternative method to treat root-fractured teeth. *Restor Dent Endod*. 2020;45(1):e8. https://doi.org/10.5395/rde.2020.45.e8.
[8] Thilander B, Odman J, Lekholm U. Orthodontic aspects of the use of oral implants in adolescents: a 10-year follow-up study. *Eur J Orthod*. 2001;23(6):715-731. https://doi.org/10.1093/ejo/23.6.715.
[9] Van Heumen CCM, Kreulen CM, Creugers NHJ. Clinical studies of fiber-reinforced resin-bonded fixed partial dentures: a systematic review. *Eur J Oral Sci*. 2009;117(1):1-6. https://doi.org/10.1111/j.1600-0722.2008.00595.x.
[10] Balasubramaniam GR. Predictability of resin bonded bridges - a systematic review. *Br Dent J*. 2017;222(11):849-858. https://doi.org/10.1038/sj.bdj.2017.497.
[11] Miettinen, M., & Millar, B. J. (2013). A review of the success and failure characteristics of resin-bonded bridges. *British dental journal*, *215*(2), E3. https://doi.org/10.1038/sj.bdj.2013.686.
[12] Gupta, A., Yelluri, R. K., & Munshi, A. K. (2015). Fiber-reinforced Composite Resin Bridge: A Treatment Option in Children. *International journal of clinical pediatric dentistry*, *8*(1), 62–65. https://doi.org/10.5005/jp-journals-10005-1285.
[13] Wang, Q., Zhong, S., Zhang, C. D., Hu, Y., Liu, F., & Wu, L. A. (2023). *Zhonghua kou qiang yi xue za zhi = Zhonghua kouqiang yixue zazhi = Chinese journal of stomatology*, *58*(11), 1116–1121.