

Fiber-reinforced composite bridge: The new alternative – A case report.

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Abstract

Interest in metal-free prostheses is still growing. With many benefits over conventional full-coverage fixed partial dentures, fiber-reinforced composite (FRC) resin has become a popular option for repairing edentulous spaces. Notably, they are less expensive, frequently result in high patient satisfaction, require little preparation to maintain tooth structure, and can attach to the abutment teeth. Fiber composites are used to construct the framework of prostheses, whereas hybrid or micro fill particulate composites are used to make the external veneer surface.

Key Words: Composite resin, Fiber-reinforced composite bridges, Metal free prosthesis.

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Introduction

Replacement of a lost tooth remains a common yet complex task in contemporary prosthodontic practice. Different clinical paths can be taken for the rehabilitation of a congenitally or traumatically missing tooth in young and adolescents.^[1] Several treatment modalities are available, including dental implants, removable partial dentures, and conventional fixed partial dentures. Each of these options has its own advantages and limitations, and the choice of treatment is often influenced by factors such as patient age, economic considerations, esthetic demands, and the condition of the adjacent teeth. Dental implants are generally considered the gold standard for single-tooth replacement, owing to their high success rates and their ability to preserve the integrity of adjacent tooth structures. However, their use is limited in younger patients where craniofacial growth is incomplete, and in situations with inadequate bone volume or financial constraints.^[2] Traditional fixed partial dentures, such as Maryland bridges and porcelain-fused-to-metal (PFM) dentures,

yield predictable results but frequently necessitate extensive tooth preparation, which results in the irreversible loss of sound dental structure. Despite being more affordable, patients typically find removable partial dentures less acceptable because of discomfort, diminished aesthetics, and less compliance.

The fiber-reinforced composite (FRC) bridges represent a promising shift from the conventional, classic treatment i.e. metal bridges.^[3] These restorations utilize fiber materials embedded within a composite resin matrix, which significantly enhances the mechanical properties such as fracture resistance, flexural strength, and durability compared to conventional composite restorations.^[4]

Advanced multi-shade composite resins enable to achieve lifelike aesthetic by replicating the optical properties of natural tooth, especially in the incisal region of anterior teeth.^[5]

The use of non-reinforced composite resins as the primary structural material in bridge fabrication frequently leads to fracture. These

materials are inherently brittle and may contain voids, microcracks, and other defects that can initiate or promote crack propagation, ultimately resulting in structural failure. It has been demonstrated that the reinforcement of a composite resin by fibers increases the fracture toughness and resistance.^[6] The integration of an esthetic, wear-resistant composite resin, and resilient fiber material offers a durable and modern solution for short-span composite bridge fabrication.^[7]

FRC bridges are especially appropriate for young patients and temporary restorations because they provide a number of clinical benefits, including as minimal or no tooth preparation, better aesthetics, shorter chairside time, and the potential for reversibility. Furthermore, bonding efficacy has been further enhanced by developments in adhesive dentistry, enabling these restorations to be reliably retained on enamel surfaces.

The present article aims to report a clinical case managed using minimally invasive fiber-reinforced composite bridges, highlighting their clinical applicability, esthetic outcomes, and conservative nature.

Case report

A 17-year-old female patient came with complaint of missing tooth in upper right front tooth region due to trauma. In the clinical evaluation, it was noticed that there was missing Right lateral Incisor tooth, unhealed soft tissue and lack of bone width and adequate mesio-distal space [Figure 1]. Following radiographic assessment, it was determined that bone augmentation would be necessary to proceed with conventional treatment options such as implant placement. As the patient was young; invasive treatment options like implants and conventional bridge were excluded. Partial removable denture is often recommended for young patients but she refused it due to esthetic concern and comfort. Hence, a fiber-reinforced composite bridge was selected as the treatment modality for

replacing the missing tooth, offering a solution that is both esthetically pleasing and minimally invasive. Minimal preparation was done to the adjacent abutment teeth and butt joint margins were placed in enamel. 37% phosphoric acid etchant was applied to the palatal surfaces of the abutment teeth to facilitate effective adhesive bonding of the restoration.. Fiber band (Interlig Glass Fiber, Angelus) was adapted carefully to the lingual area [Figure 2] by using a flowable composite and it was polymerized by using curing light. Fiber band was placed horizontally to the long axis of abutment teeth [Figure 3]. Then, composite resin pontic was formed by using the incremental technique [Figure 4]. Subsequently, occlusal contacts were evaluated and adjusted as necessary. Final finishing and polishing were performed using composite finishing burs, polishing discs, and rubber polishers to achieve a smooth and well-contoured surface.

Discussion

There are several treatment alternatives available for replacing a permanent anterior tooth that was lost due to trauma or congenital defects. Among these choices are fixed FRC bridges, which have a number of benefits such as bondability, reparability, ease of production, and relative lifespan. With little to no tooth reduction, this treatment is regarded as non-invasive or minimally invasive. A fiber-reinforced composite bridge is typically low-cost and less laborious than conventional prosthetic solution.

FRC can be done using a direct and indirect technique or both.^[8] In direct technique, controlling undercuts is a challenging task. The indirect method facilitates the construction of a core framework effortlessly, as limited visibility in the mouth may result in fiber exposure, which in turn impacts the bridge's strength. However, the direct technique helps reduce laboratory costs and time, and it also simplifies shade matching.^[9]

In FRC bridges, pontic can be made up with composite or using the natural tooth or a acrylic tooth; natural tooth as a pontic has the advantage of patient's acceptance and psychological benefit. But the main disadvantage is the change in colour of non-vital tooth. Acrylic tooth are often faster and easier than direct build-up, but the limitation in customizing the exact color and shape of patient's unique dentition often act as a deterrent.^[10] Direct composite build-up has the advantage of more esthetic and easier to match natural adjacent teeth.^[11]

Fiber-reinforced composite (FRC) bridges offer an effective medium-term treatment option for the replacement of single missing teeth in both anterior and posterior regions. These restorations demonstrate a dependable, minimally invasive, aesthetically pleasing, and cost-effective method for restoring individual missing teeth with consistent clinical results and patient oriented outcomes. Various kinds of fabrication techniques, whether direct or indirect, different retention options through surface, inlay or hybrid retainers, and the facility to easily rebuild or adjust in-situ, are all emphasizing several benefits justifying the clinical adoption of FRC bridges.^[12]

Conclusion

Considering the limitations inherent to these case reports, minimally invasive fiber-reinforced composite (FRC) bridges demonstrated a dependable and conservative approach for the replacement of missing anterior teeth. The technique preserves maximum tooth structure, offers excellent esthetic outcomes, and can be completed with reduced chairside time and cost compared to conventional prosthetic alternatives. FRC bridges are particularly advantageous in young patients or in situations where implant therapy is contraindicated or deferred. The positive functional and esthetic outcomes seen in these cases emphasize the value of FRC

restorations as viable options for both temporary and definitive treatment. Nevertheless, achieving long-term success depends on appropriate case selection, meticulous clinical execution, and consistent follow-up care.

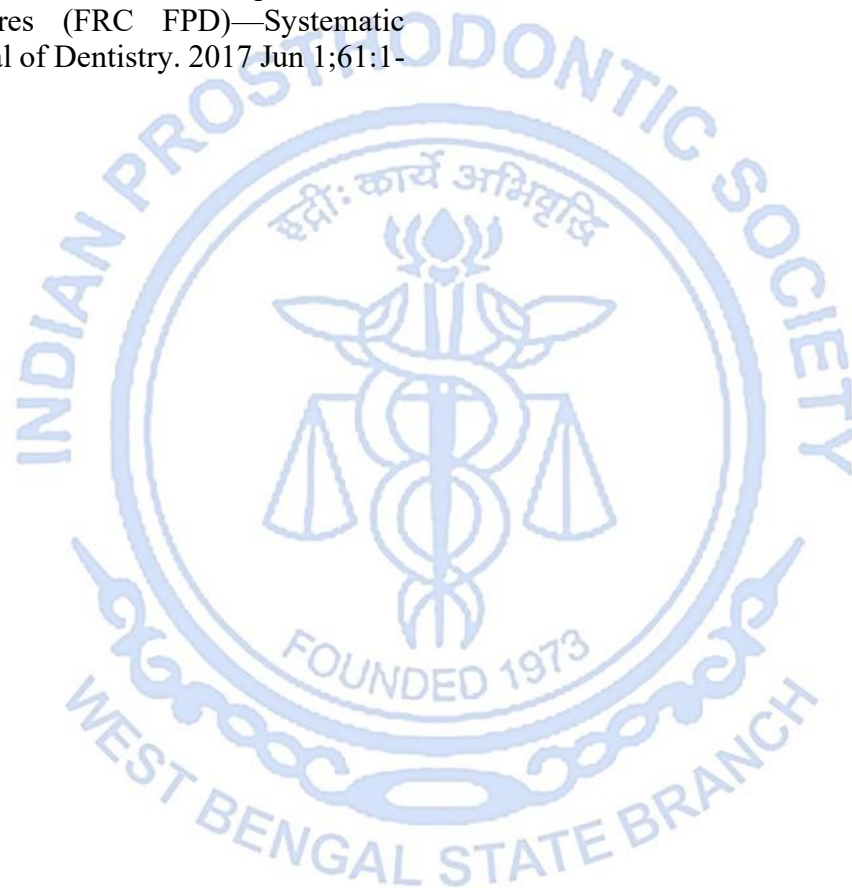
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FIGURES



Figure 1



Figure 2



Figure 3



Figure 4

