Applications of Fiber reinforcement composite in fixed dental prosthesis

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Introduction:
Metal/ceramic restorations have successful clinical results for many years, but they have various significant disadvantages, like allergic reactions, aesthetic dissatisfaction, and the color of the metal substructure. To eliminate such disadvantages, interest in full ceramic systems and fiber-reinforced composites (FRC) is increasing rapidly. The most important advantage of FRC over conventional materials is their easy manipulation, so most of the FRC applications done in chairside, with minimal or without laboratory work. FRC has high mechanical properties, especially under dynamic loading conditions.

Objective:
This review aims to explain the physical and mechanical properties of FRC, their types using in dentistry, and their applications in fixed dental prostheses (FDP), based on current literature knowledge.

Method:
A thorough literature search, with no limitation, was done up to July 2019.

Indications & contraindications for FRC FDP

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<th>Indication</th>
<th>Contraindication</th>
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<tr>
<td>Optimal aesthetic result</td>
<td>Inability to maintain fluid control</td>
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<td>Metal free</td>
<td>Long span needed</td>
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<td>Decrease wear to opposing teeth</td>
<td>Patient with parafunctional habit</td>
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<td>Use of an adhesive luting technique</td>
<td>Opposing unglazed porcelain</td>
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Discussion:
The most important aim of prosthetic dentistry is to replace the lost teeth and related surrounding tissues with suitable artificial materials for various reasons. FRC bridge adopts the concept of minimum intervention dentistry and makes the most of the technology advance in adhesive dentistry. Implant supported and implant-retained: implant restorations are well indicated; however, issues of time and budget can be obstacles for the patient. Fast, successful, and reliable techniques using adhesive procedures have been applied during the last 3 decades. Standard bridge or cantilevered designs are alternative treatment options, however, additional laboratory procedures (ceramic layering) can offer a good option for challenges related to time. Chairside CAD-CAM procedures are a good option to make one appointment restorations, but the interconnector zone requires at least 4.0 mm space to make long-lasting restorations. Many factors impact the survival of the FRC, including the type and quality of the fiber material and the overall design, orientation and volume of the framework. Even though FRCs are used as an alternative to replacing missing teeth, their clinical effectiveness has not always been ideal. Common failures occur from delamination of the veneering material and fracture of the pontic. Adhesive failures are reported as the main clinical problem. Adhesive and cohesive failures commonly occur at the pontic site. Different pontic designs, enhanced FRC-adhesive resin interfaces and improved inlay preparations are ways to decrease failures. Bonding often requires replacing the veneering material or rebonding the framework. Water sorption, loss of surface luster and fatigue resistance of adhesive interfaces over time are other possible concerns. Despite these disadvantages, the advantages posed by the structural and mechanical aspects of FRC FDP support their clinical application. While FRCs are an ideal choice for dental applications, the failure patterns localized at the pontic site reflects the structural considerations that need to be examined when creating these kinds of prostheses.

Result:
Fiber-reinforced restorations have become an option for metal-free prosthetic restorations. Although FRC bridges offer effective solutions for both patients and dentists, more long-term clinical studies are needed to improve the success of the technique.

Types of fibers using in dentistry

References: