CASE REPORT


Dr. Neeraj Mishra1, Dr. Sunit K Jurel2, Dr. Raghuwar Dayal Singh3, Dr Durga Shanker Gupta4
1, 2, 3, M.D.S, Assistant Professor, Department of Prosthodontics, Faculty Of Dental Sciences (KGMC), Lucknow, Uttar Pradesh, India.
4, M.D.S, Reader, Department of Oral & Maxillofacial Surgery, Teerthanker Mahaveer Dental College and Research Center, Moradabad, Uttar Pradesh, India.

Abstract
In some cases a conservative approach can be made for replacing missing teeth as well as to overcome some of the drawbacks of the conventional fixed prosthesis. Fiber reinforced composite fixed prosthesis is an innovative alternative to the conventional metal ceramic restorations. Reinforcement of the fibers into the composite resins affords an increase in certain physical properties and more durable tooth stabilization. The prosthesis consists of fiber reinforced composite (FRC) structure supporting pontic. The most commonly used fibers in dental applications are glass, polyethylene and carbon fibers. The FRC fixed prosthesis is specially indicated for replacing one or two teeth and for the young patients having large pulp chambers and short clinical crowns. Many older patients having periodontally hopeless mobile teeth are the prime candidates for FRC fixed prosthesis since splinting can be incorporated with the bridge simultaneously. This paper presents a case of a young patient, demonstrating chairside fabrication of glass FRC fixed partial denture using acrylic denture tooth as a pontic as a conventional fixed partial denture was contraindicated.

Key-words- Fiber reinforced composite, Denture acrylic tooth pontic, Wide pulp chamber.


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Introduction:

In most patients, wherever conventional fixed prosthesis are contraindicated, but patients desire a fixed prosthesis, a conservative approach can be made for replacing missing tooth.

Fiber reinforced composite fixed prosthesis is a conservative and an innovative alternative to the conventional fixed restorations. The most commonly used fibers in dental applications are glass, polyethylene and carbon fibers.1 Young patients having edentulous space no wider than one or two teeth and short clinical crowns with wide pulp chambers are the prime candidates of FRC fixed prosthesis.

Fiber reinforced composites:

With the advent of adhesive dentistry, Clinicians and Researchers, investigated the imbedding of reinforcement materials into composite resins and found that they provided an increase in certain physical properties and more durable tooth stabilization. Different types of materials have been reinforced into the composite resins include stainless steel wire rods, wire mesh, nylon mesh, woven polyethylene ribbon and woven and straight glass fiber.2,3,4

Since 1991, a leno-woven polyethylene ribbon (Ribbond Bondable Reinforcement Ribbon) and glass woven fibers have been used successfully for a
variety of clinical techniques, including tooth splinting, replacement of missing tooth, orthodontic retention, and other clinical applications. Two of the mechanisms by which high strain to failure fibers exert a load-enhancing effect on brittle matrix composite materials are by acting as stress-bearing component and crack-stopping or crack-deflecting mechanisms. Different FRC materials exhibit different handling and mechanical properties. Fiber types, fiber orientation and quality of fiber impregnation with the resin matrix have a sustained impact on handling characteristics and physical properties. Because of their good handling and physical characteristics, the braided and woven polyethylene and glass fibers are very useful for the fiber reinforced composite fixed prosthodontic restorations.

Case report:
This case report presents a case demonstrating chairside fabrication of fiber reinforced fixed partial dentures using impregnated glass woven fiber (Interlig, Angelus, Brasil) (Fig.1) to reinforce composite resin (3M ESPE, Germany) and acrylic denture tooth as pontic.

(Figure.1 Glass fiber )

FRC fixed prosthesis with acrylic denture tooth pontic is sometimes used as an interim prosthesis and is called as temporary bridge. In this reported case a permanent mandibular right and left central incisors are missing (Fig.2). As the patient was young with wide pulp chamber and periodontal condition of abutment teeth was not satisfactory, conventional fixed partial denture was contraindicated. There were two teeth missing but space was less, therefore, missing teeth were planned to replace by one acrylic denture tooth pontic FRC bridge since splinting can be performed simultaneously with bridge.

Technique:
During the first appointment the shade and mold of the denture tooth are selected. Tissue side of the pontic should be contoured to a modified ridge lap configuration, smoothed and highly polished. Because composite does not normally bond to acrylic resin, large class 3 conventional preparation in the pontic was completed in the laboratory that will mechanically retain the composite material. Space of approximately 0.5mm should exist between the pontic and the abutment teeth, because stronger connectors are provided by additional bulk of composite material. The involved proximal surfaces on both the abutment teeth and the pontic are roughened and the denture tooth pontic was stabilized with adhesive composite resin on the facial interproximal surfaces in the connector region. A lingual channel, 3mm wide and equal to the width of reinforcement fiber was formed into the pontic and abutment teeth. The length of glass fiber was measured and cut (Fig.3).

Flowable composite was applied on the bonding surfaces prior to placing the fiber bundle. The purpose of the flowable (Filtek, 3M ESPE, Germany) composite was to seal the space between the fiber frame and the enamel surface. Fiber-framework was fully covered with a thin layer of flow composite resin and denture acrylic tooth pontic was attached properly with the fiber and abutment teeth. Successful chemical
bond between fiber framework and pontic was achieved after curing. Thus contoured and cured completed prosthesis was finished and polished with defining facial, incisal and gingival embrasures (Fig.4 and (Fig.5). Occlusion was carefully adjusted (Fig.6) and oral hygiene measures were instructed.

Discussion:
Coordinated periodontal and restorative treatments with careful consideration of patients’ expectations and requests, are critical for a successful outcome and patient satisfaction. Fiber reinforced composite restorations are important not only because of esthetic and functional concerns, but also there may be a perceive psychological impact for the patient. With the introduction of bondable poly ethylene and glass woven fibers many of the problems with older types of reinforcement were solved and splinting teeth with reinforcement fibers that can be embedded in composites has gained popularity. Procedures can often be completed in a single appointment. It also has an acceptable strength because of good integration of fibers with the composite resin, this lead to clinical longevity. In addition, the appliance can easily be repaired in case of fracture due to wear-and-tear. Moreover, it meets patients’ esthetic expectations.

The strength of FRCs is often reported with values at the ultimate flexural strength of the final fracture, which is somewhat questionable for clinical use. Exposure of the fiber to the oral environment could increase the degradation of the fiber-reinforced structure and result in a surface difficult to polish. Glass fibers, in contrast to polyethylene fibers, must be protected from environmental damage. The strength of glass fibers are rapidly degraded on exposure to moisture and humidity. When the fiber is exposed, manufacturer recommends the removal of the exposed portion and repairing it with composite.

Strict adherence to oral hygiene instructions is critical to maintain the health and the appearance of treatment results.

Conclusion:
The natural, esthetic appearance and its conservative and inherent adhesive nature make the fiber reinforced prosthesis a successful fixed tooth replacement. It can be viable alternative to conventional fixed prosthesis in circumstances where age, expense, or clinical impracticality are considerations. Because of the conservative preparation and bonded nature of all these fixed prosthesis type, retention is never as strong as for a conventional fixed prosthesis. Multilayer clinical studies are currently in progress to determine the value and efficacy of the FRC fixed prosthesis as a long term tooth replacement.

References:

Address of correspondence

Dr. Sunit Kumar Jurel, MDS
C/O Sr. R. B. Singh, 18/373, Indira Nagar, Lucknow, Uttar Pradesh, India.
Mobile : +919453604322;+918853725087
E-mail: dentistmj1110@yahoo.co.in

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