

## Fiber-reinforced Direct Composite Restoration: An Alternative to Onlay

Suwidhi Ranka<sup>1</sup>, Ajay Singh Rao<sup>2\*</sup>, Unnati Shah<sup>1</sup> and Dikshit Solanki<sup>1</sup>

<sup>1</sup>Post Graduate Student, Department of Conservative Dentistry and Endodontics, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth, Vadodara, India

<sup>2</sup>Reader, Department of Conservative Dentistry and Endodontics, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth, Vadodara, India

**\*Corresponding Author:** Ajay Singh Rao, Reader, Department of Conservative Dentistry and Endodontics, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth, Vadodara, India.

**Received:** April 20, 2022

**Published:** May 19, 2022

© All rights are reserved by **Ajay Singh Rao, et al.**

### Abstract

Aesthetic dentistry continues to evolve through innovations in bonding agents, restorative materials and various techniques. Fiber-reinforced composite (FRC) restorations are resin-based restorations containing fibers aimed at enhancing their physical properties [1]. The fibers increase the structural properties of the material by acting as crack stoppers [2].

A variety of therapeutic modalities are available to restore teeth with moderate to severe caries. For patients who refuse inlay or onlay restorations or when minimal tooth reduction is preferred, FRC restoration can be a good alternative to conventional restorative techniques.

This article is based upon a case report to present the Clinical illustrations and step-by-step description and its results [3,4].

**Keywords:** Aesthetic Dentistry; Crack Stoppers; Fiber Reinforced Composites (FRC); Onlay

### Introduction

Various restorative substitutes are currently existing to restore teeth with moderate coronal defects in the posterior region of the dentition. Selection of the best substitute is reliant on the assessment and fulfillment of numerous criteria. Additionally, Fiber reinforced composites (FRC's) are metal free, esthetic, and allow a minimally invasive treatment technique [5].

Ever X Flow, a newly introduced material contains E-glass microfiber has high wear resistance, superb esthetic, excellent fracture toughness close to that of dentin, all because of the high number of short fibers strongly bonded to the resin matrix and that has made it as good choice for Dentine replacement such as a) Beneath any posterior cavity, including large and deep cavities b) Following crack diagnosis. c) Following amalgam removal

where inlays and onlays would also be recommended d) Beneath any direct composite or indirect ceramic restoration under heavy occlusal load [6].

The present clinical work describes the use of a fiber-reinforced composite resin restoration using FRC with the aim of improving the load-bearing capacity of the restoration without interfering with esthetics.

### Case Report

Case Presentation: A 19-year-old male patient reported to the department complaining of decayed tooth in upper left posterior region of jaw. An oral examination revealed moderate Class II caries on 26 with severe caries involving palatal cusp, which is ideally indicated for indirect restoration but because of the financial

reason patient denied. So, direct cuspal coverage restoration with Fiber reinforced composite resin was planned (Figure A). A finalized treatment plan was accepted, and informed consent was secured from the patient.

### Restorative procedure

A single tooth rubber dam (nictione) isolation was done on teeth #26 (Figure A). The cavity preparation was done in a very conservative manner; removing caries (soft leathery dentin) with a #245 bur and rounding the internal sharp line and point angles with a #2 and #4 tapered fissure bur. After gross caries removal (Figure B), Caries disclosing dye (Caries indicator dye -Prime dental products) was applied with the help of applicator tip (Figure C). After waiting for 20 secs the dye was then rinsed and cavity was dried (Figure D). Remaining Caries was excavated using a spoon excavator (Hu -Friedy) (Figure E). The prepared cavity was sterile using a 2% chlorhexidine antibacterial solution. After that the selective etching technique was carried out by using a 37% phosphoric acid (D-Tech) (Figure F). After 1 minute, etchant was removed by water spray and the cavity was air dried with 3-way syringe (Figure G). Then the bonding agent (Palfique Universal Bond) was applied on enamel and dentin surface with the help of applicator tip (Figure H). The bonding agent was gently dried until its milky appearance disappeared. It was light cured for 20 seconds. In Dentin layer, fiber reinforced composite was placed (Ever X Flow) (Figure I) and cured for 20sec, which was followed by mesial and palatal wall build up (G aenial Universal Injectable Composite) (Figure J). Then Oblique layer was formed first (Figure K), followed by incremental layering starting with the disto- buccal cusp followed by each successive cusp with composite (Figure L). Each increment was cured for 20 seconds. Tint (Kolar+Plus: Kerr, Corp) (white colour) was applied on the grooves and fissure area with the microbrush cusps (Figure M).

As maximum of the occlusal surface was lost, maximum consideration was given in creating suitable and accurate anatomy, using proximal and facial surfaces as superior references.

The rubber dam was removed, the occlusion was checked, and the restoration was finished using the Shofu Super snap mini kit (Figure N). Polishing was done by polishing paste and cotton buff and final restoration is achieved (Figure O).

### Discussion

- Fiber-reinforced composite restorations are resin-based restorations containing fibers aimed at enhancing their physical properties. The fibers increase the structural properties of the material by acting as crack stoppers. The presence of fibers in the resin increases resistance to microcracking; while reducing shrinkage and creep. It can be stated that the effectiveness of fiber reinforcement depends on many factors including the resin used; length, form, quantity and orientation of the fibers; and the impregnation and adhesion of the fibers to the resin matrix [7].
- G-aenial universal injectable has been introduced to offers a good strength, better finishing and tooth-blending esthetics. It is together injectable and shapeable at the similar time period. It will acclimatize to the cavity floor and permits to effortlessly build outlines, cusps and proximal walls [8].

A- Pre Operative.

B- Gross Caries Removal.

C- Application of Caries Detection Dye.

D- Stained carious dentin after removal of Caries Detection Dye.

E- Completed removal of Remaining Carious Dentin.

F- Selective Etching.

G- Frosty white appearance after etching.

H- Application of Bonding Agent.

I- Placement of Fiber Reinforced Composite.

J- Palatal and mesial wall build-up.

K- Oblique ridge build-up.

L- Incremental cuspal build-up.

M- Application of tint on Cusps and Grooves.

N- Finishing and Polishing of restoration.

O- Immediate Post-Operative.

P- 1 year follow up.

## Acknowledgement

NIL.

## Bibliography

1. Butterworth C., *et al.* "Fibre-reinforced composites in restorative dentistry". *Dental Update* 30.6 (2003): 300-306.
2. Garoushi S., *et al.* "Short glass fiber reinforced restorative composite resin with semi-inter penetrating polymer network matrix". *Dental Materials* 23.11 (2007): 1356-1362.
3. Sadr A., *et al.* "Effects of fiber reinforcement on adaptation and bond strength of a bulk-fill composite in deep preparations". *Dental Materials* 36.4 (2020): 527-534.
4. Garoushi SK., *et al.* "Fiber-reinforced composite substructure: load-bearing capacity of an onlay restoration and flexural properties of the material". *Journal of Contemporary Dental Practice* 7.4 (2006): 1-8.
5. Sufyan Garoushi BD., *et al.* "Fiber-reinforced onlay composite resin restoration: a case report". *The Journal of Contemporary Dental Practice* 10.4 (2009): 104-110.
6. Garoushi S., *et al.* "Short fiber-reinforced composite restorations: a review of the current literature". *Journal of Investigative and Clinical Dentistry* 9.3 (2018): e12330.
7. Lassila L., *et al.* "Characterization of restorative short-fiber reinforced dental composites". *Dental Materials Journal* 39.6 (2020): 992-999.
8. Lassila L., *et al.* "Fracture behavior of Bi-structure fiber-reinforced composite restorations". *Journal of the Mechanical Behavior of Biomedical Materials* 101 (2020): 103444.

## Conclusion

Clinicians tend to emphasize on tooth function and form when assessing the accomplishment and failure of subsequent resins, the importance must remain in proceeding our considerate and knowledge of the complicated and intricate features of the restoration-tooth junction. Using the fiber reinforced composite (Ever X Flow), restoration is achievable, simple and practical, and result in a very accurate anatomical restoration. Also, it has lower cost, reduced chair-time and sound tooth structure will be preserved.