

FIBRE REINFORCEMENT IN A STRUCTURALLY COMPROMISED ENDODONTICALLY TREATED MOLAR- A CASE REPORT

AUTHORS :

DR.K.VINOTHINI, PG STUDENT

DR.B.RAMAPRABHA, MDS,PROFESSOR

DR. KAVITHA.M, MDS, PROFESSOR AND HOD

DEPARTMENT OF CONSERVATIVE DENTISTRY AND ENDODONTICS,

TAMILNADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL, CHENNAI

INTRODUCTION

The biomechanics of an Endodontically treated teeth are primarily altered by tissue loss due to prior pathologies, endodontic treatment and invasive restorative procedures (1). After endodontic therapy, selecting the appropriate reconstruction for each root canal treated tooth should be based on the remaining hard tooth structure, the number and thickness of the residual cavity walls, the position of the tooth in the arch and the load implied (2). With the use of improved adhesive systems in the last decade, clinicians started proposing alternative techniques to reconstruct severely damaged teeth; the main goal of the new build-up protocol is preservation and reinforcement of the remaining sound tooth structure (3).

Fibre reinforced direct composite restorations are indicated to reinforce lost cusps, Pulp chamber, Wide proximal box, Wide buccal and palatal extension, lost oblique ridge, continuous reinforcement along the lost cusps and marginal ridge in deep dentinal cavities in both vital and endodontically treated teeth (4).

The present case report describes a conservative technique for the restoration of a badly broken-down endodontically treated molar by direct fibre –reinforced composite restoration.

CASE REPORT

A 14 year old male patient presented to the Department of Conservative Dentistry and Endodontics with a chief complaint of replacing the existing filling material in right lower back tooth region. The patient underwent root canal treatment in 46 in a private dental college. The patient neglected to visit the dentist for follow up visits for post endodontic management. Patient had complaints of dislodged restorative material and food impaction in 46 for the past 6 months. Upon clinical examination there was extensive loss of coronal tooth structure with partially dislodged temporary restoration in 46 (Fig. 1A) with intact seal in the floor of the pulp chamber and partially erupted 47. There was absence of tenderness on palpation and percussion and the periodontal status was apparently normal. Radiographic examination revealed satisfactory Root canal treated 46 with no evidence of periapical lesion (Fig. 1B). The diagnosis was made as previously treated tooth with normal apical tissues in 46.

TREATMENT PLAN

- Post endodontic management by Direct Fiber-reinforced Composite Restoration In 46 was decided considering the patient's age and tooth structure loss.
- Regular follow up visits to evaluate the outcome and the need for conventional restoration after complete eruption of teeth in all quadrants.



FIGURE 1. A) PREOPERATIVE IMAGE B) PREOPERATIVE RADIOGRAPH

CASE DESCRIPTION

OCCLUSAL STAMP PREPARATION

A diagnostic wax up was done using the study models in 46 (Fig. 2A). Flowable composite (GC G-aenial flo) and microbrush was used to create an occlusal stamp which could serve as a template for the final composite restoration (Fig. 2 B,C)

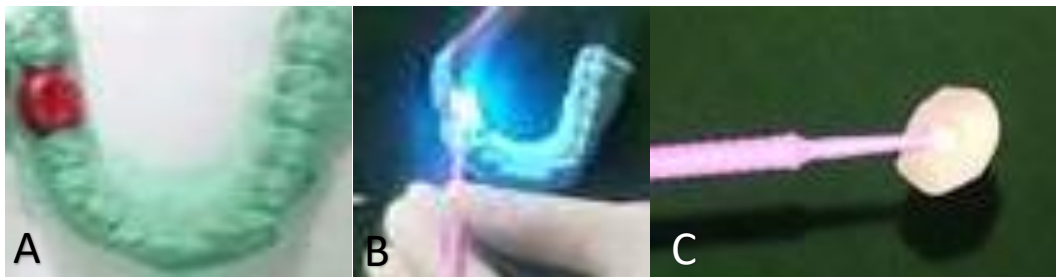


FIGURE 2. A) STUDY MODEL B AND C) OCCLUSAL STAMP PREPARED USING FLOWABLE COMPOSITE AND MICROBRUSH

CLINICAL PROCEDURE

Remaining carious tooth structure and temporary restoration was removed using round bur (BR 40: Mani, Inc., Tochigi, Japan) and glass ionomer cement (GC fujiCEM) was used to flatten the pulpal floor in 46 (Fig. 3A). Etching of the cavity walls was done with 37% phosphoric acid (Ivoclar N etchant gel) for 20 seconds followed by thorough washing with water for 30 seconds and brief blot drying (Fig. 3B). Bonding agent (GC G-Premio BOND) was applied with the applicator tip, gently air-dried for 10 seconds, and light-cured for 20 seconds. The Short Fibre Reinforced Composite (EverX Posterior .GC Dental Products Corp., Aichi, Japan) was extruded from the compoule and compacted into the cavity incrementally (Fig. 3C). Light curing of SFRC was done upto a depth of about 2mm for 20 seconds as per the protocol.



FIGURE 3. A) GIC GIVEN AS BASE B) ACID ETCHING WITH 37% PHOSPHORIC ACID C) SFRC EXTRUDED FROM THE COMPOULE

This was followed by cutting 3mm * 11mm and 3mm * 10mm FRC fibres (everstick C& B) of 2 pieces each to give a discontinued reinforcement for the mesiodistal and buccolingual lengths of the occlusal surface respectively. FRC Fibres were wetted using bonding agent (GC G-Premio BOND) and were adapted to the tooth surface both mesiodistally and buccolingually with the help of the flowable composite (GC G-aenial flo) (Fig. 4 A,B) and the combination was cured for 40 seconds. The overlying 2 mm of the occlusal surface was reconstructed using nanohybrid composite restoration (GC G-aenial Sculpt) and the occlusal stamp was used as a guide to reproduce the morphology (Fig. 4C) .Finishing and polishing of the restoration was carried out using finishing bur (mani diamond TF 12 EF) and polishing kits (shofu composite polishing)

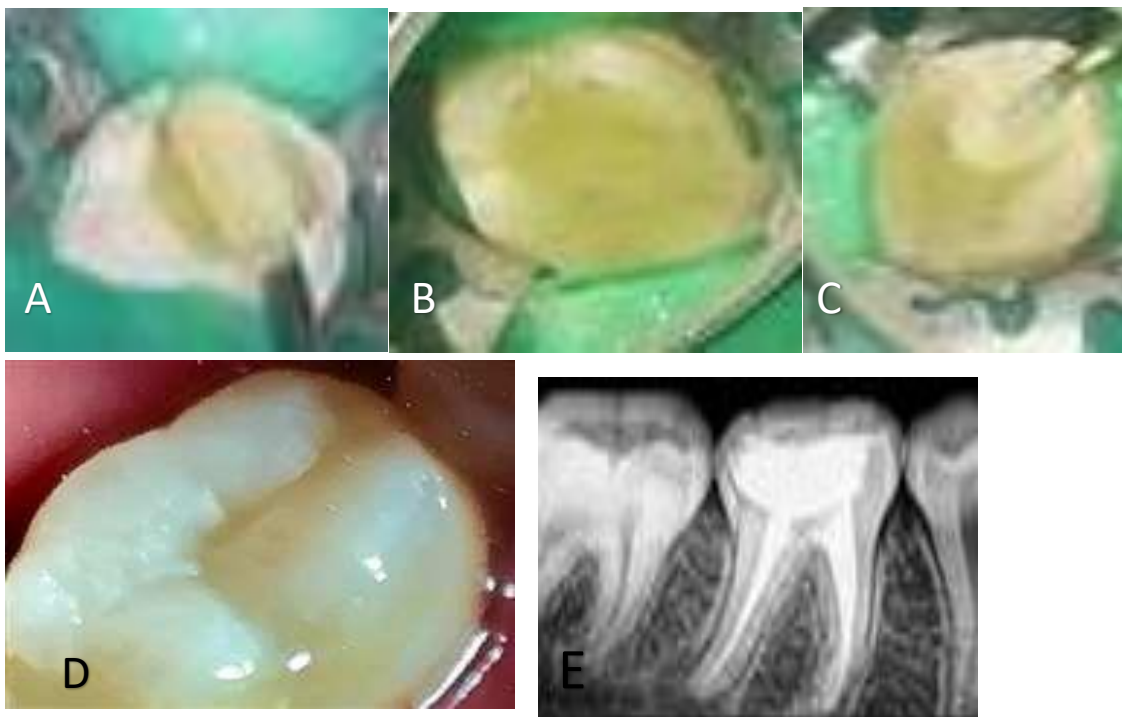


FIGURE 4. A & B) FRC FIBRES PLACED IN THE OCCLUSAL SURFACE C) NANOHYBRID COMPOSITE PLACEMENT D) POSTOPERATIVE IMAGE E) POSTOPERATIVE RADIOGRAPH

POST OPERATIVE FOLLOW UP

The clinical and radiographic follow up after 6 months showed good outcome of the restoration both functionally and esthetically showing satisfactory results with this new reinforcing technique (Fig. 5 A,B).

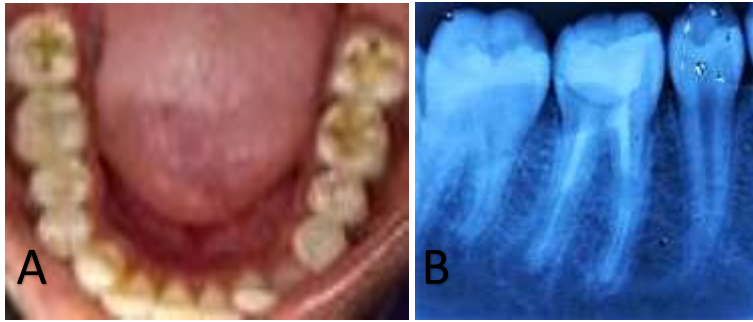


FIGURE 5. A) FOLLOW UP IMAGE B) FOLLOW UP RADIOGRAPH

DISCUSSION

With the growing advances in adhesive techniques over the past few decades, conservative restoration of Endodontically treated teeth is now a practical alternative. Bonded coronal restorations are preferred over the more radical full-crown preparations to prevent further loss of healthy tissues, as adhesion ensures sufficient material retention and eliminates the need for aggressive macroretentive features, thereby providing a more economical and time-saving option.

Glass ionomer cement is used as a base under posterior composites as it is a great restorative solution on many levels, with advantages including the ability to bulk fill with no shrinkage stress. When SFRCs (everX posterior) is used as a substructure under conventional composite, not only is strength significantly improved, but also the fracture pattern under load is changed. If the restoration is loaded till failure, the path of a fracture changes and is deflected away from the roots (5).

Two of the mechanisms by which fibres exert high strain to failure on a brittle composite matrix are by acting as a stress-bearing component and by arresting crack propagation or by crack deflection. Thus, the fracture pattern under load is changed resulting in a favourable mode of failure that is easily restorable, and the teeth concerned may be maintained in clinical service without any additional treatment. Directional orientation of the fiber's long axis of Fibre Reinforced composites (Everstik c and b fibres) perpendicular to an applied force will result in strength reinforcement (6). Placing fibers in the occlusal third of the cavities significantly increased fracture resistance. (7) The fiber positioning in a buccopalatal and mesiodistal orientation in the occlusal area showed higher fracture resistance (8). Hence the fibres are placed both mesiodistally and buccolingually in the occlusal third perpendicular to the long axis in this case. The advantages of using stamp technique are minimal requirement of finishing and polishing, minimal voids and reproduction of optimally polymerized occlusal surface due to the exclusion of air. (9)

CONCLUSION

This technique allowed the conservation of sound dentin and peripheral enamel, thereby influencing the marginal stability and also suitable for this patient's developing dentition. This technique can be considered to be an economical, practical, and tooth-saving alternative to the more expensive and invasive process of prosthetic rehabilitation.

REFERENCES

1. Rocca GT, Rizcalla N, Krejci I. Fibre-reinforced resin coating for endocrown preparations: a technical report. *Oper Dent* 2013;38:242-248.
2. S Deliperi. Direct Fiber-reinforced Composite Restoration in an Endodontically-treated

Molar: A Three-year Case Report . Operative Dentistry, 2008 , 33-2, 209-214

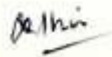
3. Butterworth, Chris & Ellakwa, Ayman & Shortall, Adrian. Fibre-Reinforced Composites in Restorative Dentistry. Dental update. 30. 300-6. 10.12968/denu.2003.30.6.300.
4. Belli S, Erdemir A, Ozcopur M, Eskitascioglu G. The effect of fiber insertion on fracture resistance of root filled molar teeth with MOD preparations restored with composite. International Endodontic Journal 2005;38:73-80
5. Lammi M, Tanner J, Le Bell-Rönnlöf A-M, Lassila L, Vallittu P. Restoration of endodontically treated molars using fiber reinforced composite substructure. J Dent Res 2011 90 (Spec Iss A): 2517
6. DeBoer J, Vermilyea SG, Brady RE. The effect of carbon fiber orientation on the fatigue resistance and bending properties of two denture resins. J Prosthet Dent 1984;51:119-21. 19
7. Rashidan N, Esmaeili V, Alikhasi M, Yasini S. Model system for measuring the effects of position and curvature of fiber reinforcement within a dental composite. J Prosthodont 2010;19:274
8. Moezizadeh M, Shokripour M. Effect of fiber orientation and type of restorative material on fracture strength of the tooth. *J Conserv Dent*. 2011;14(4):341–345.
9. Alshehadat SA, Halim MS, Carmen K, Fung CS. The stamp technique for direct Class II composite restorations: A case series. *J Conserv Dent [serial online]* 2016 [cited 2019 Sep 16];19:490-3.


Contributors' Form


I / We certify that I/we have participated sufficiently in the intellectual content, conception and design of the work or the analysis and interpretation of the writing of the manuscript, to take public responsibility for it and have agreed to have my/our name listed as a contributor. I/we certify that all the data collected during the study is presented in this manuscript and no data from the case report has been or will be published by the editors. I/we will provide the data/information or will cooperate fully in obtaining and providing the data/information on which the manuscript is based, their assignees.

We give the rights to the corresponding author to make necessary changes as per the request of the journal and do the rest of the correspondence on guarantor for the manuscript on our behalf.

All persons who have made substantial contributions to the work reported in the manuscript, but who are not authors, are named in the Acknowledgment permission to be named. If I/we do not include an Acknowledgment that means I/we have not received substantial contributions from non-authors and Non-Signature Date signed

1 Dr. K. VINOOTHINI MDS, Ph student  21.11.2019

2 Dr. R. RAMAPRASHA MDS, Professor  21.11.2019

3 Dr. M. KAVITHA MDS, Professor & HOD  21.11.2019

4 _____

(up to four authors for case report)