GOLDEN, SILVER or WHITE which choice for Molar's Restoration? - A Case Report

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INTRODUCTION:

Endodontically treated teeth often lose substantial tooth structure from previous caries, pre-existing restorations, and/or endodontic procedures (1). Reduction in tooth bulk and loss of sound dentin resulting from tooth preparation causes weakening of teeth (2). Reeh et al (3) reported that endodontic procedures reduced the relative cuspal stiffness of premolar teeth by only 5%, in contrast to an occlusal cavity preparation 20%, a mesio - occusal -distal (MOD) cavity preparation 63%. For these reasons, preservation of tooth structure is important for its protection against fracture under occlusal loads and for its survival (2).There is no consensus regarding the preferred type of final restoration for endodontically treated posterior teeth. Some authors claim that only complete cast coverage will provide the needed protection and will ensure the clinical success of the restoration (4, 5). Others recommend the use of a complex amalgam restoration (6, 7), indirect cast covering the cusps (8) or composite materials (9, 10).

With recent advancements in adhesive technology and new and stronger composite materials, it is possible to create conservative, highly esthetic restorations that are bonded directly to teeth. They are more practical, less expensive, and in some situations, less invasive than other techniques. In recent years, the development of Fibre - reinforced composite technology has also created newness in metal free, adhesive, restorative dentistry (1). Reinforcement means structural materials have atleast two distinct constituents. The reinforcing component provides strength and stiffness while the surrounding matrix support s the reinforcement and provides workability. In fibre reinforced composites, fibres provide strength and rigidity while surrounding polymer matrix supports the fibre framework. an

Following case report relates the accomplishment of a fibre- reinforced Endocrown composite resin restoration using unidirectional Glass fibres (SPLINT IT), with the aim of improving the mechanical properties of the restoration without interfering in its aesthetics. Endocrown preparation was done in the presented case report which consists of circular equigingival butt- joint margin and a central retention

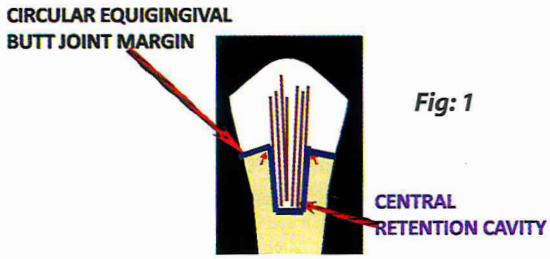


Fig: 1

Case Report: An 18 years old male reported to the department of conservative dentistry and endodontics, college of dental sciences with a chief complaint of food lodgment in lower right back tooth region.

Clinically: He presented an endodontically treated mandibular right first molar with extensive destruction of the coronal tooth structure.

Radiographically: no fault was found in root canal treatment (Fig 1).

Based on clinical and radiographic findings the fabrication of conventional crown supported by post and core was ruled out in order to conserve remaining tooth structure. Patient presented a favorable occlusion and an acceptable level of oral hygiene which provided a favorable environment for an indirectly fabricated fibre reinforced composite's endocrown

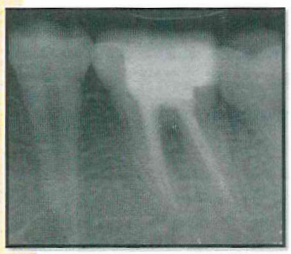


Fig: 2

Treatment: Occlusal analysis using articulating paper was useful information for adhering to the biomechanical principles governing indirect cavity preparations to ensure occlusal and axial reductions were approximately 1.5mm to provide sufficient space for placement of the fibres and composite resin veneer (Fig 2).

Since the retention of the prosthesis is dependent on adhesive luting and cavity retention form, instead of this, walls were minimally tapered just sufficient to remove undercut. Cervical margin was a shoulder style and all internal line angles were rounded *Impression and temporization:* after the tooth preparation, gingival retraction was carried out, using ultrapak TM gingival retraction cord (ultradent products, Inc, south Jordan, UT, and USA). The cord was positioned 0.5mm subgingivally and retained for five minutes (Fig 3). The cord was then carefully removed and a full arch impression was made using Aquasil (putty) and Aquasil (light) elastomer materials (Densply Deltrey, Germany).

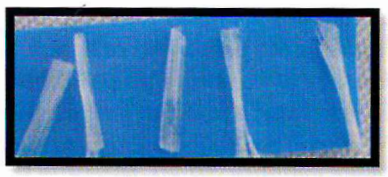
Fig: 3

Fig: 4

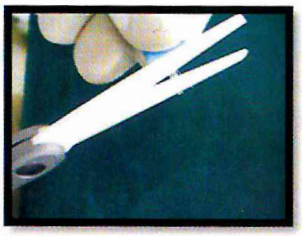
Fig: 5

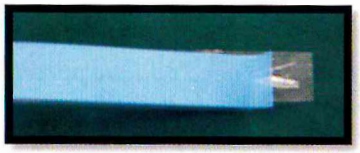
The cavity preparation was provisionally restored using (ProtempTM II 3M ESPE)
The shade of final veneered composite resin was selected using (vita Shade Guide)
Prosthesis Fabrication: Die stone was poured and the casts were mounted in a semi- adjustable articulator (Fig 4).
A thin coat of cold mould seal was painted on the die to within 1mm of the finish

Splint IT (unidirectional glass fibres) were taken out of its packet and cut with the help of Ceramic Scissors of approximately 2- 3mm in length (fig 5).



Figures: 6





The fiber substructure was constructed by placing cut fibres into central cavity by using tweezer and flowable composite (FiltekTM Flow, 3M ESPE) was used to seal the spaces between fibre frame and cavity walls (Fig 6.a). As many as possible fibres were placed to get maximum reinforcement (Fig 6.b). Finally, fibre substructure was finished and veneered with hybrid composite (filtek 350 universal restorative,3M ESPE).

Fig: 7

Fibre Reinforced substructure and veneered composite were polymerized with a hand held curing unit (3M, Curing light 2500) for 40 seconds per layer of resin

Prosthesis was then finished and polished.

Fig: 8

Fig: 9

Fig: 8 Undersurface , Fig: 9 Occlsusal surface of finished prosthesis
Try In and Adhesive Luting: Temporary restoration was removed with a scaler and the preparation was cleaned with polishing paste and finishing brush. Prosthesis was evaluated intraorally to assess marginal fit, occlusion and esthetics before final cementation. For cementation purpose, tooth was etched with 37% phosphoric acid, rinsed and lightly dried. Then a Scotchbond Multipurpose adhesive layer (3M ESPE, St paul, MN, USA) was applied. The cementation of the restoration was done with Rely XTM luting 2(3M ESPE) following the manufacturer's instructions . After removing excess cement, adjusting the occlusion using articulating paper, the prosthesis was finally finished and polished.
The treatment was accomplished in 2 visits. The outcome has been monitored over six months and is still under observation

Fig: 10

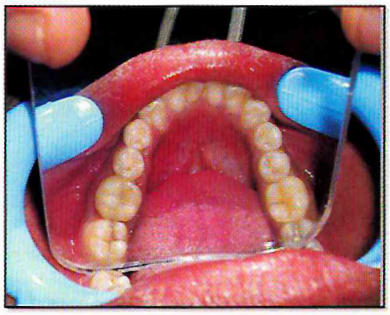


Fig: 11

Discussion: *the restoration of badly damaged teeth is challenge for clinicians specially when teeth are endodontically treated and cast crown restorations are not an option for the patient.*

Moreover, many authors discourage the use of post and core, especially for two reasons. One is lateral perforation during post preparation and second is usually dramatic failure mode of teeth restored with post and core (16).

So an Endocrown preparation was done in the presented case report which consists of circular equigingival butt-joint margin and a central retention cavity of the entire pulp chamber instead of intracanalicular posts (16). Fibres were reinforced in the composite substructure in order to get the mechanical advantages of FRCs as their flexural strength are comparable to metal , elastic modulus is close to that of dentin (11). The reinforcing component (fibres) provides strength and stiffness while the surrounding matrix supports the reinforcement and provides workability. The use of these materials is new to dentistry.

Moreover, by using resin modified GIC as luting cement alongwith standard bonding agent, one unit prosthesis (17) can be obtained as bond strength between metal and tooth will be less as compared to bond strength between FRCS substructure and tooth.

Metal ceramic crowns have superior durability but they need opaque porcelain to mask metallic substructure (13) while esthetically pleasing all ceramic crowns exhibit low resilience and toughness- therefore, these are susceptible to fracture (14). With high wear resistance, they can damage opposing teeth (15). In addition, all ceramic crowns may be difficult to repair if fracture.

Indirect technique was used for getting greater degree of conversion during polymerization which further improves the load bearing capacity of prosthesis with more wear resistance (compatible with opposing natural dentition). Moreover, by indirect method an excellent control over anatomic morphologies like contacts and contours can be obtained. Marginal integrity will be better.

Margins were kept at equigingival level and shoulder in configuration. However deep chamfer canal so be given, studies showed that marginal integrity of shoulder finish line is better than chamfer finish line and fracture strength of the chamfer finish line is better than shoulder finish line (12).

Conclusion:

Fibre Reinforced Endocrown may be a rational restorative alternative for restoring badly damaged endodontically treated teeth with good esthetic and mechanical properties.

REFERENCES:

1. *Abdulkadir Sengun,Funda kont Cobankara, Hasan Orucoglu. Effect of a new restoration technique on fracture resistance of endodontically treated teeth. Dent Traumtol 2008;24:214-219.*
2. *Assif D, Nissan J, gafni Y, Gordon M. Assessment of the resistance to fracture of endodontically treated molars restored with amalgam. J Prosthet Dent 2003;89:462-5*
3. *Reeh ES, Messer HH, Douglas WH. Reduction in tooth stiffness as a result of endodontic and restorative procedure. J Endod 1989;15:512-6*
4. *Goerig AC, Mueninghoff LA. Management of the endodontically treated tooth. Part II:technique. J prosthet Dent 1983; 49:491-7*
5. *Soresen JA, Martinoff JT. Intracoranal reinforcement and coronal coverage: a study of endodontically treated teeth. J Prosthet Dent 1984;51:780-4.*
6. *Libermann R, Judes H, Cohen E, Eli I. Restoration of posterior pulpless teeth: amalgam overlay versus cast gold*