

## Case Report

### **Intra-radicular Rehabilitation of Tooth Using Composite Resin with Light Transmitting Post –A Case Report**

Chandu GS<sup>\*1</sup>, Hema BS<sup>2</sup>, Hombesh MN<sup>3</sup>, Dayanand Huddar<sup>4</sup>

<sup>1</sup>Professor, Dept of Prosthodontics, Rishiraj College of Dental Sciences and Research Centre, Bhopal, Madhya Pradesh, India.

<sup>2</sup>Reader, Dept of Conservative Dentistry, Rishiraj College of Dental Sciences and Research Centre, Bhopal, Madhya Pradesh, India.

<sup>3</sup>Reader, Dept of Prosthodontics, S J M Dental College and Hospital, Chitradurga, Karnataka, India.

<sup>4</sup>Reader, Dept of Prosthodontics, B V P Dental College and Research Centre, Sangli, Maharashtra, India.

#### **\*Corresponding author**

Dr. Chandu GS

Email: [chandugs@gmail.com](mailto:chandugs@gmail.com)

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**Abstract:** This case report highlights the management of structurally compromised fractured anterior tooth. The canal was reinforced intraradicularly with flowable composite and light transmitting glass fibre post, rendering the endodontically treated root capable of supporting the post and core and thereby ensuring continued function of badly damaged tooth.

**Keywords:** Intra- radicular rehabilitation, Glass fibre post, Flowable composite.

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#### **INTRODUCTION**

The functional and esthetic rehabilitation of compromised endodontically treated teeth presents a unique challenge to the clinician. The flared canal arising as a result of carious extension, trauma to immature tooth, pulpal pathosis, iatrogenic or endodontic misadventure or idiopathic causes, can present a difficult restorative problem to the practising dentist[1]. An increase in predictability of an endodontically treated tooth has led to an increase in the need to restore such teeth.

For many years, cast post were most commonly used for the treatment of endodontically treated teeth with flared canal. It resulted in catastrophic root fracture with reduced remaining dentinal thickness, shadowing and graying of root and discoloration at the tooth's gingival margins[2,3].

Factors such as location and quantity of remaining healthy dentinal structure and the internal configuration and morphology of the root affect the choice of post system. Also the principal for retention of post such as length, diameter and surface configuration should be considered. Remaining dentin thickness < 2 mm should be ideally reinforced before post placement. Light polymerized composite resin can be used for this purpose. Composite resin absorbs and distributes forces in a more uniform manner as

compared to metals and increases resistance to fracture, thus providing improved prognosis. Introduction of commercially available light transmitting posts allow light polymerization by transillumination that effectively polymerises the composite along the entire length of the radicular preparation[4]. Luminex aesthetic post system (Dentatus, USA) has been developed specifically for the purpose of rehabilitating such weak teeth, and it involves the use of light transmitting post, composite resin reinforcement of the canal and subsequent rehabilitation.

The objective of this case report is to describe a step by step approach of rehabilitating a fractured anterior tooth with flared root canal using flowable composite resin and Glass fibre post.

#### **CASE REPORT**

A 21 year old male patient reported to the department of Prosthodontics for the treatment of fractured and discoloured anterior teeth. Patient gave history of trauma to the front teeth 2 years back. Patient had no complaint of pain, sensitivity or any incidence of intra or extra oral swelling. Clinical examination revealed Ellis class III fracture to maxillary right central incisors (Fig 1). An intra oral periapical radiograph showed periapical radiolucency with a flared canal due to internal resorption (Fig 2). The tooth tested negative on vitality testing. Since the remaining

dentinal thickness was very less, intra-radicular resin reinforcement with the new Luminex light transmitting post was planned for this patient. Root canal treatment of the tooth was carried out and sectional obturation was done using thermoplasticized gutta purcha system (obtura II). A radiograph was taken to ensure the adequacy obturation (Fig3). Luminex aesthetic post system (Dentatus, USA) and a matching diameter light transmitting plastic post was selected (Fig 4) . The canal was etched with 35% phosphoric acid (EtchRite, Pulpdent, USA) for 15 sec, was rinsed with an endodontic irrigation syringe, and was dried. A thin coat of dentin bonding agent (Excite, Ivoclar Vivadent) was applied using a microapplication brush and was light cured for 20 sec. A flowable composite resin was placed into the canal. The plastic light transmitting post was centred, and the resin was cured for 40 sec. (Fig 5 & 6 ).The post was taken out, an identical diameter glass fibre post was first coated with a silane coupling agent (Monobond-S, Ivoclar Vivadent). The post was then cemented into the canal with dual cure resin

cement (Wetbond Embrace, Pulpdent, USA), which was cured for another 40 sec. Core build up was done using hybrid composite resin (Charisma, Heraeus Kulzer, Inc) in an incremental pattern, and was light-cured every time for 20sec (Fig 7). Next, the central incisor was prepared to receive all ceramic crown (Cergo, Degudent, USA). Gingival retraction was done using a knitted cord (Ultradent Products Inc., Salt Lake City, Utah) soaked in Aluminium chloride (ViscoStat Clear, Ultradent Products Inc). Definitive impressions of the prepared maxillary anterior teeth were obtained using vinyl polysiloxane impression material (Aquasil Putty and XLV, Dentsply, USA). Working casts were prepared using Type IV die stone (Ultrarock, Klabhai Dental, India). The all ceramic crown was subjected to a bisque trial to verify the colour and the contour. The final restoration was surface treated with hydrofluoric acid (Pululpdent, USA) and silane coupling agent, and cemented using dual cure resin cement (Wetbond Embrace, Pulpdent) ( Fig 8).



Fig 1: Pre- operative photograph



Fig 2: Pre -operative intra oral radiograph



Fig 3: Post- obturation radiograph



Fig 4: Luminex light transmitting plastic post



Fig 5: Light transmitting plastic post to of cure intra radicular composite resin



Fig 6: Reduced lumen of the canal with the help composite resin



**Fig 7: Core build up with composite**



**Fig 8: Post -operative photograph**

## DISCUSSION

The introduction of materials capable of bonding to dentinal structure has created potential for reconstitution and rehabilitation of lost dentinal tissues to salvage severely damaged teeth that would otherwise be extracted. To restore the lost dentin, in 1987, Lui *et al.* advocated the use of composite resin as a lining of the root canal surface to reinforce the weakened canal walls[5]. Saupe *et al.* have showed that the intra-radicular resin reinforcement method is 50% more resistant to fracture in compromised dentinal cases than conventional metal post & core[6]. Lui, demonstrated adequate depth of cure of a light-curing composite in the canal using a light transmitting plastic post[7]. In 2004, Anil Kishen *et al.* suggested that the structure of inner dentin, which surrounds the root canal is less mineralized and has more collagen, hence poses low modulus of elasticity. The conservation of the inner dentin is crucial to offer toughness or fracture resistance to the tooth structure. Undue loss or removal of inner dentin would compromise the toughness criteria in dentin structure, which in turn would predispose such a tooth to catastrophic fracture[8].

The modulus of elasticity of composite resin approaches that of dentin. The replacement and reinforcement of intra-radicular tooth structure with a material that is elastically compatible with dentin is far better than morphologic dowel, which has higher modulus of elasticity and hence higher potential to transfer and concentrate applied stresses to the surrounding compromised root structure[9].

For a weakened root, the use of cast post can concentrate the wedging forces at the weakened coronal portion of the root canal. The use of prefabricated post entails the obturation of large defects with the cementing medium, thus creating a weak link between the entire post-core-crown-tooth complex. Thus, for a flared canal, it is important that lost dentin is rebuilt with a strong substitute. Composite resin bonds well to the dentinal wall after the acid etching and the tooth bonding procedure, and serves to reinforce the weakened root[10]. The use of light transmitting post along with light curing composite resin facilitates complete polymerisation to the depths of the canal. The

placement of identical size fibre or metal post and composite core build up ensures optimum resistance and retention form. This technique has advantages like reinforced root strength, maximum shear load support, retention and safer than auto-cured composites that may prematurely harden[11,12].

Glass fibre post has modulus of elasticity and biomechanical behaviour which is nearly identical to that of dentine and is reported to cause less stress in the tooth and fewer root fractures, unlike metallic posts. The white colour of the post blends in readily with dentin eliminating the halo effect of metal or carbon fibre post underneath all ceramic restorations.

Aesthetic posts and cores contribute to the optical properties of the overlying restorations when metal-free crowns are used[13].

## CONCLUSION

Multidisciplinary management of a structurally weakened root through conservative approach by reinforcement with Flowable liner and Glass fibre post can be a simple and efficient procedure for the treatment of flared canal teeth with excellent esthetic & functional Results. Such teeth restored with this technique best serve the needs of the patients.

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