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CASE REPORT

Prosthodontic Rehabilitation of Weakened Root Canals: A Case Report

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ABSTRACT

This paper highlights the fact that many anterior teeth requiring restoration are severely weakened, having wide flared canal spaces and thin dentinal walls, and are at a high risk of getting fractured. Traditionally, such teeth would be restored using metal posts, but this procedure has often been unsuccessful, because of lack of retention or root fracture. The canal can be reinforced using a new post system involving intraradicular composite resin polymerization with light transmitting posts, rendering the defective endodontically treated root capable of supporting a post and core, and thereby ensuring continued function of the badly damaged tooth.

Key Words: intra-radicular rehabilitation, weakened root canals, post and core

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commonly accomplished using intra-radicular restorations or post and core, to retain the coronal portion of the tooth before the placement of a single or multi-unit fixed partial denture. Factors such as location and quantity of the remaining healthy dentinal structure and the internal configuration and morphology of the root, affect the choice of post system. Also, the principals for retention of the posts such as length, diameter and surface configuration should be considered [2],[3],[4].

Introduction

In clinical practice, endodontically treated teeth often have significant coronal and radicular compromise of the tooth structure. The factors responsible for this compromise include extensive carries, fracture, trauma to an immature tooth, iatrogenic and pulp pathology, as well as endodontic treatment [1]. In addition, loss of water content in dentin after endodontic therapy can reduce tooth resilience, and can subsequently increase the probability of fracture. The post-endodontic restoration of such teeth is

For many years, cast posts were most commonly used for the treatment of endodontically treated teeth with wide canals. Their disadvantages include catastrophic root fractures in teeth with reduced remaining dentinal thickness, shadowing and graying of the root and discolouration at the tooth's gingival margins.

In the past decade, other post systems including prefabricated aesthetic posts, have gained popularity. Endodontically treated teeth with weak canals i.e. remaining dentinal thickness <2mm,

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. An adhesive bonding system used with these resins is based on its ability to create micromechanical retention, which has an added advantage for a weakened root [3],[4].

In various clinical situations, when the post does not allow light transmission, it is only possible to light polymerise the resin within the intraradicular space to a maximum depth of 2-3 mm, due to the limited effect of trans-illumination within the composite resin. However, 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. Following is a case report, which describes the step by step procedure of post and core restoration of a maxillary central incisor with weakened root, with the above mentioned system.

Case Report

A 20 year old girl reported to the Department of Prosthetic Dentistry, GDC and H, Nagpur, with the complaint of an unaesthetic smile due to discoloured and fractured upper front teeth [Table/Fig 1].



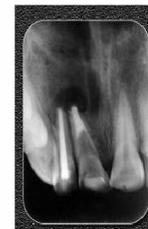
(Table/Fig 1) Fractured And Discolored Right Upper Central Incisor.

She gave a history of trauma on her front teeth 2 years back. She then visited a dentist who treated her conservatively, only with antibiotics and analgesics. On presentation,, an intraoral periapical radiograph was taken, which showed periapical radiolucency with a maxillary central incisor, along with a flared canal due to internal resorption [Table/Fig 2].



(Table/Fig 2) IOPA Radiograph Of Maxillary Right Central Incisor Showing Periapical Radiolucency And Decreased Dental Thickness Due To Internal Resorption.

The tooth tested negative on vitality testing. Root canal treatment of that tooth was carried out, and an apical seal was established using MTA. After 6 weeks, it was decided that the tooth could undergo post-endodontic restoration [Table/Fig 3].



(Table/Fig 3) IOPA Radiograph Of Root Canal Treated Maxillary Right Central Incisor.

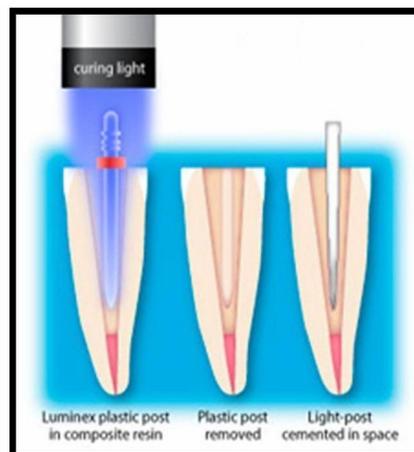
Since the remaining dental thickness was very less, it was decided that the root canal would require a reinforcement. Also, as the tooth was a central incisor, it was prudent to select an aesthetic post system. Luminex aesthetic post system (Dentatus, USA) [Table/Fig 4] was selected, since it combined both the

objectives. Gutta percha from the canal was removed carefully using pesos reamer, without disturbing the apical third of the filling.



(Table/Fig 4) Luminex Aesthetic Post System.

A radiograph was taken to ensure the adequacy of the canal preparation, and a matching diameter light transmitting plastic post was selected. 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. 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 [Table/Fig 5], [Table/Fig 6] Core build up was done using hybrid composite resin (Charisma, Heraeus Kulzer, Inc) in an incremental pattern, and this was light-cured every time for 20 sec.



(Table/Fig 5) Intraradicular Composite Resin Polymerisation With Light Transmitting Posts.



(Table/Fig 6) Glass Fibre Post In Position.

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) [Table/Fig 7].



(Table/Fig 7) Prepared Teeth For Taking Final Impression.

Definitive impressions of the prepared maxillary anterior teeth were obtained using vinyl polysiloxane impression material (Aquasil Putty and XLV, Dentsply, USA). Working casts were generated from Type IV die stone

(Ultrarock, Klabhai Dental, India). The restorations were subjected to a bisque trial to verify the colour and the contour. The final restorations were surface treated with hydrofluoric acid (Pulpdent USA) and silane coupling agent, and were then cemented using dual cure resin cement (Wetbond Embrace, Pulpdent) [Table/Fig 8]. Informed consent of patient was taken for the publication of the images.



(Table/Fig 8) Final Restoration.



(Table/Fig 9) Follow-Up IOPA Radiograph Showing Restored Teeth.

Conclusion

Failure in endodontically treated teeth is more likely due to restorative failure than the endodontic treatment itself. Thus, it is important to plan the treatment with respect to the endodontic technique and the feasibility of successful restoration as well. Also, post selection affects the stress patterns in the root canal. 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. 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/metal post and composite core build up ensures optimum resistance and retention form. This technique has advantages like reinforced root strength as light-cured composites internally reinforce the root structure, providing maximum shear load support and retention. There is also improved control since light-curing composites are easy to control, are more adaptive and safer than auto-cured composites that may prematurely harden.

Also, centered canal position, superior aesthetics and technique versatility are its additional advantages. Thus, even badly mutilated teeth need not necessarily be extracted.

They can be restored with this technique to best serve the needs of the patient.

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