TREATMENT OF ENDODONTIC TREATED MOLAR USING RICHMOND CROWN — A CASE REPORT

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ABSTRACT

A clinical case report is presented where a 20 years old patient having damaged posterior tooth with reduced occlusal clearance was treated by means of a single-unit post-core-crown restoration. Restoration was cemented by adhesive resin cement and evaluated clinically and radiographically for one year. The unification of the post, core, and crown in a single unit decreases the frequency of failure by creating a monoblock effect.

Key Words: Richmond crown, endodontic treated teeth, resin cement.

INTRODUCTION

Endodontically treated teeth are more prone to fractures than the vital teeth. Fracture occurrence is more in posterior teeth than anterior teeth as the masticatory forces are higher and teeth are weaker. In the late 19th century, the “Richmond crown,” a single-piece post-retained crown with porcelain facing, was introduced to function as a bridge retainer, it incorporated a threaded tube in the canal with a screw retained crown. Then, it was modified to eliminate the threaded tube and was redesigned as a 1-piece dowel and crown. During the 1930s, the custom cast post-and-core was developed to replace the Richmond crowns. This procedure required casting a post-and-core as a separate component from the crown; this 2-step technique improved marginal adaptation and allowed for a variation in the path of insertion of the crown. Several main causes of failure of post-retained restorations have been identified, including: recurrent caries, endodontic failure, periodontal disease, post dislodgement, cement failure, post-core separation, crown-core separation, loss of post retention, core fracture, loss of crown retention, post distortion, post fracture, tooth fracture, and root fracture. Also, corrosion of metallic posts has been proposed as a cause of root fracture.

Some researches advised that resin cements with dentin bonding agents can be used when the length of the post space is less than ideal or when the holes is not rounded and help to overcome retention problems and may fills in the spaces and eliminates the need for a cast post.

CASE REPORT

A 20 years old male patient reported to Fixed Prosthodontics Department, Faculty of Dentistry, Umm Al-Qura University, Saudi Arabia with a chief complaint of endodontic treated fractured left lower second molar (Fig 1). Patient had no medical history. Clinical examination revealed that tooth had short clinical crown with deep bite, radiographic examination of the obturation was found to be intact (Fig 2) and tooth was asymptomatic. Due to patient deep posterior bite, the tooth was planned for one piece post, core and crown. The coronal tooth structure was modified with rotary instruments to reduce undermined cusps. For post space preparation, gutta percha was removed from the pulp chamber using a thin straight fissure. Then using Peeso Reamers (sizes 1 to 4) removing 5mm of gutta percha was removed from distal canal (removing more than 5mm inside root canal may lead to problem in path of insertion of the crown). The prepared space was cleaned with normal saline, impression of the post space was taken with the tooth preparation using vinyl polysiloxane impression material (Virtual, Ivoclar-Vivadent co., Liechtenstein) where light body was injected inside the prepared post space and plastic post was inserted to support the material. Additional rubber base materials was then injected around the preparation and the tray loaded with putty body impression material and placed on the light body. Impression was poured in die material (CAM-Stone N, Siladent, Goslar, Germany) to obtain mater cast where wax pattern was made and was checked intra-orally to assure its margin accuracy. Subsequent investing and casting procedures were carried out to obtain metal try in. Casting was checked...
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for retention and accuracy followed by application of porcelain (VMK master, VITA Zahnfabric, Bad Sackingen, Germany). The finished restoration was evaluated for fit, and occlusion prior to cementation, finished restoration was cemented with dual cured adhesive resin cement (Multilink Automix, Ivoclar-Vivadent, Liechtenstein) (Fig 3). The cemented restoration was evaluated clinically and radiographically using bitewing (Fig 4) and computerized tomography radiograph (Fig 5) and appeared to have good functional results. The tooth was followed for a year-every three months- in which no recurrent caries, no dislodgment nor fracture of the restoration and no root fracture.

DISCUSSION

Restoration of teeth after endodontic therapy is becoming a useful part in modern restorative dentistry. It is well known that the successful treatment of a badly broken tooth with pulpal disease depends not only on good endodontic therapy, but also on good prosthetic reconstruction of the tooth. Appropriate patient selection is of paramount criterion for ensuring clinical success. One piece restoration is indicated for the management of mutilated tooth requiring post-core restorations where there is reduced occlusal clearance. A single-unit post-core-crown restoration has various advantages over two or three units components. When the post and core are two separate parts; different coefficients of thermal expansion of the various components of post crown restoration may have a harmful effect on the bonds between the tooth-post-core-cement-crown complex. In addition, flexion of the post under functional forces stresses the post-core interface, resulting in separation of the core due to permanent deformation of post. By decreasing the number of interfaces between components, the single unit restoration helps to achieve a monoblock effect. Microetching of the fitted surface of the restoration provides microscopic roughness of the surface and thus enhances bonding with the resin cement. Also acid etching of the dentin opens the dentinal tubules by removing the smear layer, and renders the intertubular dentin rough due to selective demineralization of the inorganic substance. This enhances the condition for infiltration of the etched surface with the primer resin leading to the formation of hybrid layer. The formed hybrid layer bond chemically with the resin cement. So this will lead to adhesive monoblock restoration. Failure to achieve this monoblock effect may lead to breakdown of the core, distortion or fracture of the core that may result in caries or dislodgement of restoration. This case was followed up every three months over a period of a year with no evidence of clinical or radiographic failures. Long-term follow-up and clinical studies will add to the credibility of this restorative strategy.
CONCLUSION

Resin cements with dentin bonding agents have led to the development of new alternative treatment modalities to restore endodontically treated teeth with deep bite, one piece post, core and crown can be considered as a treatment option for this badly broken endodontically treated tooth without the need to increase the length of post space, this treatment options could never be achieved with conventional cements.

REFERENCES


