Effect of restorative techniques on fracture resistance of endodontically treated premolars

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ABSTRACT

Purpose: This study was aimed to evaluate the effect of restorative materials and glass fiber post on the fracture resistance of endodontically treated premolars. Material and Methods: Fifty extracted single rooted lower premolars were used in this in vitro study and divided into 5 groups: sound teeth (control group); mesial-occlusal-distal (MOD) preparation + endodontic treatment + composite restoration; MOD preparation + endodontic treatment + glass fiber post + composite restoration; MOD preparation + endodontic treatment + glass fiber post + amalgam restoration. The specimens were loaded on a universal testing machine at the crosshead speed of 1 mm/min until fracture. The data were analyzed using two-way ANOVA test. Results: The mean loads at fracture were 860.11 N, 801.79 N, 761.39 N, 737.14 N and 707.85 N respectively. There were no statistically significant differences (P > 0.05) in the fracture resistance of teeth restored with composite and amalgam, as well as restored with or without glass fiber post. Conclusions: The type of restorative material and the usage of glass fiber post do not have visible influence on the fracture resistance of the endodontically treated mandibular premolars.

Keywords: Endodontic Treatment; Fiber Post; Fracture Resistance

1. INTRODUCTION

Endodontically treated (endo-treated) teeth are often compromised by structural destruction from dental caries, fractures, previous restorations and endodontic treatment [1-4]. The restoration of endo-treated teeth has always been a challenge to the clinician. Although the fracture potential of endo-treated teeth has been studied, yet to date, no definite relationship has been established between fracture and the type of restoration [5].

Root canal treatment should not be considered complete until the permanent restoration has been placed [6]. There are a few requirements for an adequate restoration of an endo-treated tooth. The restoration must provide a coronal seal, protect the remaining tooth structure, minimize the cuspal flexure and satisfy function and aesthetics [7].

Besides a crown, there are other restorative materials which are used to restore endo-treated tooth. These include silver amalgam alloy, composite resin, glass ionomer cement and resin modified glass ionomer materials [8]. Dental amalgam and composite resins are the most commonly used ones [9].

Dental amalgam has been characterized as technically easy to use and a clinically predictable material, with favorable mechanical properties [10]. The use and success rate of dental amalgams have been well documented and they are the most cost effective materials in posterior teeth restorations, but they are declining in use in dentistry mainly due to the unaesthetic appearance and concerns about the hazard of mercury [11-13]. The evidence suggests that complex amalgam restorations exhibit surprising durability and may have sufficient strength to protect the remaining tooth structure [14].

As alternatives to amalgam, direct adhesive restorative techniques with composite resin have been proposed, since these materials bond to tooth structure, and thus increase fracture resistance [15-17]. However, composite resin cores are not as dimensionally stable as amalgam.