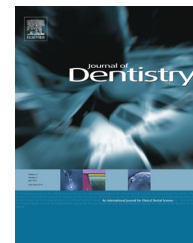


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# Cast metal vs. glass fibre posts: A randomized controlled trial with up to 3 years of follow up



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## ABSTRACT

**Objective:** This randomized controlled trial compared the survival of glass fibre and cast metal dental posts used to restore endodontically treated teeth with no remaining coronal wall.

**Methods:** Fifty-four participants (45 women) and 72 teeth were evaluated during a follow-up period of up to 3 years. Teeth were randomly allocated to the glass-fibre and cast-metal post groups. All teeth were restored with single metal-ceramic crowns. Survival probabilities were analyzed using Kaplan–Meier statistics ( $p \leq 0.05$ ).

**Results:** The 3-year recall rate was 92.3% and the survival rates of glass fibre and cast metal posts were similar (97.1% and 91.9%, respectively;  $p = 0.682$ ). Four failures were observed: two glass fibre posts in a premolar and anterior tooth debonded, one glass fibre post in a premolar debonded in association with root fracture, and one root fracture occurred in a molar with a cast metal post.

**Conclusions:** Glass fibre and cast metal posts showed similar clinical performance in teeth with no remaining coronal wall after 3 years.

**Clinical Significance:** Posts are used to restore most endodontically treated teeth with no remaining coronal wall. This randomized controlled trial, one of few to compare glass fibre and cast metal posts in such teeth, showed that post type did not significantly influence the survival of restorations. These results can help dentists respond to the important question of how best to rehabilitate endodontically treated teeth with no remaining coronal wall.

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## 1. Introduction

Endodontically treated teeth may exhibit pronounced coronal destruction,<sup>1</sup> and the amount of residual coronal dentine can influence the clinical survival of posts and restorations. The

preservation of at least one coronal wall is one of the most critical factors for the success of endodontically treated and restored teeth. Thus, the absence of coronal walls is a worst-case scenario for restoration, and the use of intraradicular posts is the main method for retaining coronal restorative

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material.<sup>2–4</sup> Cast metal posts were traditionally used for intraradicular retention and have shown high survival rates after 10 years.<sup>5</sup> As metal posts have been hypothesized to have high elastic moduli in comparison with that of dentine, which could increase the risks of root fracture and catastrophic failure,<sup>6</sup> glass fibre posts were introduced as an alternative. As the mechanical properties of these posts are similar to that of dentine, the risk of catastrophic failure is reduced<sup>2</sup> and most failures related to their use involve post debonding.<sup>7</sup> In addition to post failure *per se*, the failure of intraradicular posts can be related to tooth position; failures in post-retained crowns generally occur in the maxillary anterior region, where horizontal forces are greater than in other areas.<sup>8</sup> However, few studies have compared the use of glass fibre and cast metal posts to restore endodontically treated teeth with no remaining coronal wall.

Given this lack of clinical evidence regarding the best post to use for the restoration of teeth without coronal walls, the aim of this study was to evaluate the survival of glass fibre and cast metal posts in such teeth. The hypothesis tested was that the survival of endodontically treated teeth would not differ according to the type of post used.

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## 2. Materials and methods

### 2.1. Experimental design

This prospective, double-blinded (patient and evaluator), parallel-group randomized controlled trial (RCT) was registered at ClinicalTrials.gov (NCT01461239). The study was approved by the local research and ethics committee (protocol 122/2009) and followed the CONSORT recommendations. Participants' oral health was assessed, and they provided written informed consent before enrollment in the study. Inclusion criteria were: good oral health (no caries or periodontal disease), the presence of one or more endodontically treated anterior or posterior teeth with no coronal wall or the enamel portion of one wall with no dentinal support (ferrule height, 0–0.5 mm) requiring intraradicular retention and a single metal-ceramic crown, and bilateral posterior occlusal contact. Exclusion criteria were: presence of one or more endodontically treated teeth with periodontal or occlusal problems, and presence of a large prosthesis (Kennedy class I or II) in the antagonist(s) of the tooth or teeth to be restored. Participants were recalled for clinical and radiographic examinations over a 3-year follow-up period. The main outcome evaluated was post debonding.

### 2.2. Sample size calculation

Considering that some studies have shown no difference in survival between post types,<sup>1,9–11</sup> sample size calculation was performed based on the equivalence of treatments. Under the assumption of no difference between standard and experimental treatments, this calculation determined that 64 participants were required to be 90% sure that the limits of a two-sided 90% confidence interval would exclude a difference of more than 18% between the standard and experimental treatment groups.

### 2.3. Randomization

A randomization sequence was generated with a computerized random number generator. For treatment randomization, a person not involved in the study wrote post types (glass fibre and cast metal) on slips of paper and inserted them into plain brown envelopes. For participants randomly assigned to receive glass fibre posts, a second randomization was performed to determine whether regular or self-adhesive resin cement would be used. The randomization process took tooth group into account to minimize bias due to anatomical variation.

### 2.4. Clinical procedures

Between July 2009 and May 2012, 159 participants with endodontically treated teeth requiring crowns were screened in the Department of Operative Dentistry. Ninety-five participants were excluded because they did not meet the inclusion criteria or declined to participate.

All procedures were performed under rubber dam isolation and all materials were used according to the manufacturers' instructions. Initially, all teeth included in the study received endodontic treatment using the crown down technique and irrigation with 2.5% NaOCl solution. Teeth were filled using the lateral condensation technique and Grossman cement (Endo-Fill; Dentsply Maillefer, Petrópolis, Brazil) and gutta-percha cones (Dentsply Maillefer). Then, 2/3 of the filling was removed from the root canal with #5 Gates Glidden burs (Dentsply Maillefer). Before glass fibre post cementation, root canals were prepared with the reamer from the fibre post system. Glass fibre posts (White Post DC; FGM, Joinville, Brazil) were cleaned with ethanol and pretreated with silane (ProSil; FGM). Cast metal posts (CoCr) were previously done directly in acrylic resin (Duralay II Lab Pattern Resin; Polidental, Cotia, Brazil).

For glass fibre posts secured with regular resin cement (RelyX ARC; 3M ESPE, St. Paul, MN, USA), post spaces were etched with 37% phosphoric acid (Condac; FGM) and adhesive was applied (Single Bond or Scotchbond Multi-Purpose; 3M ESPE), which includes an activator, primer, and catalyst). The resin cement was applied to the root canal using a Centrix syringe (DFL Indústria e Comércio S.A., Rio de Janeiro, Brazil) and the post was seated. Digital pressure was applied for 5 min, excess cement was removed, and the preparation was light-polymerized for 40 s/surface. For glass fibre posts secured with self-adhesive resin cement (RelyX U100; 3M ESPE), all steps with the exception of adhesive application were performed as described for regular resin cement. For both resin cements, cores were made using adhesive and composite resin (Scotchbond Multi-Purpose primer and adhesive and Z250; 3M ESPE). Cast metal posts were luted with the self-adhesive resin cement following the same steps as for glass fibre posts. After post luting, radiographs were taken to check the success of the procedure.

All teeth received single metal-ceramic restorations. The teeth included had a ferrule height of 0–0.5 mm. Undergraduate and graduate students who had attended 12 h of lectures and training in restorative dentistry performed the procedures.

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