Research Article

An *In-Vitro* Study Comparing the Effects of Three Different Intracanal Medications on Push-Out Bond Strength into the Dentinal Tubules of Root Canal

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Abstract

This study compared and assessed the adaptability of a premixed bioceramic sealer and the formation of a physical barrier between the filling material and the dentinal tubule penetration. Bio-C Sealer (Angelus, Londrina, Brazil), a Bioceramic Endodontic Sealer with the combination of MTA (Meta BioMed) Ceraseal and Cold fowable, polydimethylsiloxane based root canal sealer with nano silver (Prevest Denpro) Nanoseal-S.

Materials and Methods: 45 wide roots, with single straight canals and formed apices, were endodontically prepared and divided into three groups (n = 15) according to the sealer used for the root canal lling: Group 1: Bio-C Sealer Group 2: Ceraseal MTA Group 3: Nanoseal-S.As controls, three samples were kept. After the canals were led, the samples were sliced and imaged under Scanning Electron Microscopy to analyse tubular penetration and sealer adaption. The Shapiro-Wilk, Levene, and Mann-Whitney tests were used to analyse the data (P0.05). Furthermore, in all three-thirds of the cases studied, Bio-C Sealer demonstrated better tubule penetration than Nanoseal-s and Ceraseal.

Keywords: Flexibility; Root Canal

Introduction

Root canal sealers play an important role in the prognosis of endodontic treatment. A three-dimensional root canal filling requires sealing imperfections and penetrating dentinal tubules. The flexibility of the materials enables sealers to reach areas of the root canal that tools cannot [1]. Root canal sealers enter dentinal tubules, creating a physical barrier between the filling material and dentine. This increases retention and isolates any remaining bacteria. Preventing reinfection [2]. The Bio-C Sealer (Angelus, Londrna, PR, Brazil)is a new, premixed bioceramic sealer designed for the permanent filling and sealing of root canals. The Bio-C Sealer comes in a single syringe and contains calcium silicates, calcium aluminate, calcium oxide, zirconium oxide, iron oxide, silicon dioxide, and dispersion agents. Ceraseal (CS) (Meta Biomed Co., Cheongju, Korea) is a calcium-silicate-based sealer used for pulpal regeneration and hard tissue repair, including pulp capping, pulpotomy, apexogenesis, apexification, perforation repair, and root-end filling [3]. Isolating potential remaining bacteria in the dentinal tubules, However, the literature contains relatively little information on its qualities and performance *in vitro* and *in vivo*. NanoSeal-S is a root canal sealant made from cold-flowable polydimethyl siloxane and nano silver [4]. It has excellent sealing properties as well as superior radio opacity. The chemical addition of silver acts as a preservative. Polydimethylsiloxane (PDMS) is a high-performance polymer with unique physical and chemical

properties such as flexibility, thermostability, oxidation resistance, ease of fabrication, tunable hardness, and other desirable properties [5]. This study compares the dentinal tubule penetration and adaptation of three bioceramic sealers: Angelus (premixed), CeraSeal (MTA and bioceramic), and Prevest (polydimethylsiloxane-based sealer with nano silver) [6].

Methods

Straight and wide roots, extracted for reasons unrelated to the current study and preserved in 0.1% thymol immediately after extraction, were used in the following experimental *in vitro* study. the roots of maxillary central incisors. A non-probabilistic sample was used to select 45 roots with single straight canals and a completely formed apex from. Preparation of the sample. The samples were cleaned using a P19 periodontal ultrasonic tip (Helse Ultrasonics, Santa Rosa de Viterbo, Brazil) and prophylaxis brushes to remove any hard or soft tissue. To standardise the samples, they were sliced 12 mm from the anatomical apex with a diamond disc. The root canals were prepared with the Protaper Next system (Dentsply Sirona, Ballaigues, Switzerland) and an AI-Moter (woodpeker) utilising the system's continuous rotation programme. After glide path creation with a K #10 file (Dentsply Sirona), the root canal shaping started with an X1 file (17/0.04), using progressive in and out movements with brushing motion on the withdrawal stroke, up to the working length (WL) was reached (11 mm). Patency