Comparison of the Cleaning Efficacy of Rotary ProFile and Lightspeed using Two Different Irrigant Regimens. A Scanning Electron Microscopic Study.

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Abstract

The cleaning effectiveness of rotary Profile and Lightspeed instrumentation techniques and irrigant regimes was investigated using a scanning electron microscope. Irrigants used were tap water as irrigant and final flush or 5.25% NaOCl as irrigant followed by 17% EDTA and 5.25% as final flush. Apical preparations were made to ISO size 40 in both techniques. After splitting the roots longitudinally, the remaining amounts of debris and smear layer were quantified using a 5-step scale. There were no significant differences in the amount of debris and smear layer between the two rotary techniques. Comparing 5.25% NaOCl as an irrigant followed by 17% EDTA and 5.25% NaOCl as final flush regime with water as irrigant and final flush, showed that 5.25% NaOCl and 17% EDTA regime yielded significantly less debris and smear layer scores ($P < 0.01$) than water regime. Complete cleanliness was not achieved by any of the two rotary techniques and irrigant regimes.

Introduction:

Thorough debridement of root canal system is considered a critical component of endodontic therapy[1]. Preparation techniques are classified as manual or engine-driven types. The latter frequently requires the use of modified hand pieces. During the late 1980s and early 1990s, significantly modified endodontic instruments were designed, tested and marketed.

Walia et al[2] introduced Nickel Titanium hand files that demonstrated properties of greater elastic flexibility when compared to stainless steel hand files. Currently, Nickel-Titanium endodontic instruments are marketed for engine driven types. Numerous investigations have shown that they can effectively create predetermined funnel form shape with minimal risk of transportation, in less time than it takes with hand instrumentation technique[3,4].New geometric designs were described for cutting heads and non-cutting shaft such as canal master[5]. More recently, Wildey and Senia have advanced the original design of the canal master by developing a new type of root canal instrument called *Lightspeed*. These instruments have long, thin, flexible shafts with short cutting heads, which vary in length from 0.25 mm to 1.75 mm. The short cutting heads have broad radial lands and non-cutting pilot tips, which help to keep the rotating instruments well centered during canal preparation[6]. Instruments have also designed for use with a slow handpiece. Other instruments with broad radial lands and non-cutting pilot tips but with long cutting blades, include the ProFile .04 instrument. The tapers of ProFile .04 and Lightspeed instruments do not conform to those stipulated by specification No. 28 and the corresponding instruments have larger and / or variable tapers. The ProFile, .04 are constructed from Nickel-Titanium alloy and offer a standard 29% increase between the tip diameters of each size instrument. More recently, the same manufacturer introduced a new system to be used with the ProFile 0.04 systems. This system is ProFile .04 and .06 taper with ISO-sized tip and orifice shaper[7]. ProFile orifice shapers are 5 to 8% taper and used to prepare the coronal third of the root canal while the middle and apical thirds will be prepared by the use of ProFile 0.04 and 0.06 taper system in a crown-down sequence. According to the manufacturer this system allow efficient preparation and cleaning of all sections of root canal. Thompson and Dummer[8] showed that canals shaped with 0.04 Profile instruments rarely terminated in apical stops. On the otherhand Thompson and Dummer[9] concluded that by following the manufacturers instructions, apical preparation produced by 0.04 ProFile instruments were smaller in diameter than those produced by Lightspeed instruments.

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