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بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

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التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Cleaning ability and Apically Extruded Debris of Three Single file Rotary Nickel Titanium systems (an in vitro study)

Thesis

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Introduction

The major aim of the endodontic treatment is to remove infected and necrotic tissues and debris, shape the root canals and provide an adequate seal of the root canals system. Cleaning and shaping of the root canal provide an efficient disinfection by creating reservoir for irrigants, medicaments and also provides space for root canal filling.

Root canal preparation using either manual or rotary instruments always causes the formation of pulpal debris, smear layer and smear plugs which cover the root canal surface. Debris is defined as dentin chips and residual vital or necrotic pulp tissue attached to the root canal wall. Such tissue remnants and debris prevent the penetration of irrigants and medicaments into the dentinal tubules and avoid the close adaptation of root canal filling onto canal walls. Thus, it is recommended to remove of debris and smear layer from the root canal system prior to obturation. As their presence may prevent antimicrobial agents from gaining access to the infected dentinal tubules and reduce the dentin permeability to irrigants and medical dressing, and compromise the fluid-tight seal of canals after root filling.

All root canal preparation techniques cause apical extrusion to some degree; however, the amount of extrusion may vary. The extrusion of debris, bacteria and irrigant beyond the apex may have undesired consequences such as induction of inflammation, postoperative pain and delay of periapical healing.

The first study to prove the phenomenon of apical extrusion from the root canal into the periapical area was done by Chapman in 1968. In the study, the apical regions of sterile teeth were bathed in a culture medium and endodontic instruments (infected with a known organism) were used to prepare the root canals. The results showed that 86% of the samples exhibited extrusion of infected material into the periapical area.[1]

McComb and Smith were the first to describe the smear layer on instrumented root canal walls. Smear layer is defined as an amorphous granular layer that consists chiefly of hydroxyapatite and altered collagen along with ground dentin, predentin, inorganic debris and organic components, such as pulp tissue remnants, odontoblastic processes, saliva, blood cells and bacteria. [2]

The smear layer is a surface film approximately 1 to 2 μm composed of inorganic and organic particles; including dentin, remnants of odontoblastic processes, pulp tissue, and bacteria that remain on the root canal wall after instrumentation. Smear layer is always formed as a result of dentin cutting, Packing of smear debris in the tubules may reach a depth of 40 μm. Also it can harbor bacteria and their products.

However, currently, no instrument is capable of complete cleaning of the entire root canal system. [3,4] Initially, the progress of nickel-titanium (NiTi) systems has been focused on variations in file design together with the simplification of the instrumentation sequences. [5,6]

There have been significant advancements in the development of Ni-Ti rotary instruments in recent years, aiming to produce more efficient

files, possessing features such as flexibility, efficiency, safety, and simplicity.

The ease of learning, decreased number of instruments, reduced potential for file separation and a dramatic reduction in preparation time have made single-file instrumentation techniques appealing to clinicians.

Among NiTi rotary instruments, The One-Shape New Generation file by MicroMega (Besancon Cedex, France) is single-file system, used in continuous clockwise rotation. The file comes in size 25 and 6.0% taper and 21- mm, 25-mm, and 29-mm lengths and should be used at a speed of 350– 450 rpm and torque of 4.5 N with a pecking motion. With three diverse cross-sectional areas above the entire length of the working part do not have a fixed pitch and a noncutting safety tip.

In 2017, One Curve (Micro Mega) single-file NiTi system was developed. It is based on one single instrument for shaping the root canal. The OneCurve instruments are manufactured from a C-Wire by using a proprietary heat treatment. The OneCurve instruments display a controlled memory of NiTi . The OneCurve instruments have variable cross section along the blade for better centering ability and cutting efficiency.

Fanta AF F One (Shanghai Fanta Dental Materials Co., LTD) Patent flat design, The manufacture claims that the vertical blades can sweeps the debris from flutes to the relieved area, having a unique cross section design with two active cutting points with a flat side-cut design. Providing more cutting efficiency, in which the debris can be swept from flutes to the safe- side relief area through vertical blades, and then outside

the canal, so more debris removal during instrumentation and less debris accumulation around the file, that promotes more efficient cutting and less stress subjected on the file, so decreasing the chance of file separation. The flat side-cut design also offers a more room for irrigation solutions during instrumentation; less surface area contact with canal walls, which offers less stress subjected on the file. AF F One file has non-cutting tip, which decreases the likelihood of iatrogenic complications like perforation, zipping, ledges, and canal transportation. It is used in continuous rotation (recommend 500RPM, 2.6N).

So the purpose of this study was to compare the three different NiTi rotary files regarding their cleaning ability and extrusion of debris.