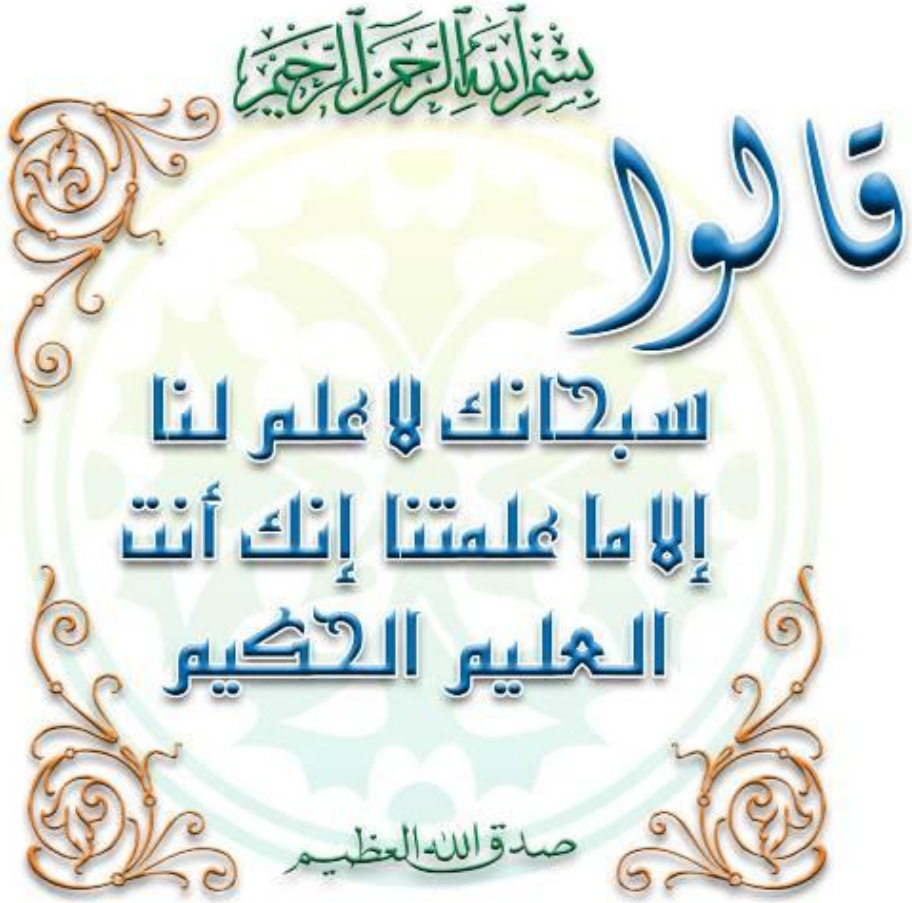

سورة البقرة الآية: ٣٢

EVALUATION OF TWO SINGLE FILE NITI ROTARY ENDODONTIC SYSTEMS

Thesis
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Dedication

To my precious and lovely family especially my Father, Mother, Brothers and sister for their sacrifices throughout life, endless love and continuous support and guidance in every step in my life

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Introduction

The primary goal of root canal treatment is to clean the entire root canal system of the organic pulpal remnants and inorganic debris. Shaping of the canals is done in order to adequately disinfect and subsequently obturate them to obtain a fluid tight seal with a biocompatible material. Every attempt should be done to conserve radicular dentin, and to avoid any iatrogenic events, such as fracture of the instrument, transportation of the root canal, formation of ledge or perforation of the tooth.

A number of studies on both extracted teeth and simulated canals were published, detailing successful endodontic treatment with the aid of rotary nickel-titanium (NiTi) instruments. A NiTi file has two or three times elastic flexibility in bending and torsion, as well as superior resistance to torsional fracture when compared with stainless steel files of the same size. These features led to better centering of the instrument within the canal, less straightening of the canal, fewer ledges, and less transportation.

Nickel titanium rotary shaping files fundamentally changed everything in endodontics; conceptually, procedurally and economically as well. The mechanical behavior of NiTi alloy is determined by the relative proportions and characteristics of the micro-structural phases. Changes to improve flexibility and resistance to fatigue fracture of endodontic instruments have been proposed, including different thermo-mechanical treatments, modified chemical composition of the NiTi alloy, different cross-sectional designs and changes in the manufacturing process.

The introduction of single file use was a breakthrough in endodontic treatment. The recommendation for single file has the added advantage of reducing instrument fatigue, prevent the cross contamination, and make the whole procedure more rapid and easy, as one file does the work traditionally performed by three or more NiTi files.

Recently, the WaveOne NiTi file system had been introduced. In this system a single NiTi file is made up of M-wire technology, and is used in a reciprocating handpiece to completely prepare the canal to an adequate size and taper, even in narrow and curved canals. The specially designed NiTi files work in a reverse "balanced force" action is using a pre-programmed motor to move the files in back and forth "reciprocal motion". The motor is programmed such that the counterclockwise movement is greater than the clockwise movement; three reciprocating cycles complete one reverse rotation.

The producers of One Shape rotary NiTi files with continuous rotation try to increase their flexibility and to reduce instrument screwing effects using a variable cross-section along the blade of the instrument. One Shape files have 3 different cross-section zones: the first zone presents a variable 3-cutting-edge design; the second, prior to the transition, has a cross section that progressively changes from 3 to 2 cutting edges and the last (coronal) is provided with 2 cutting edges. Anti- Breakage Control (ABC) Increases safety and avoid separation by unwinding of the instrument.

Review of Literature

- **Shaping ability of Rotary NiTi files**
- **Cleaning ability of Rotary NiTi files**
- **Bacterial load reduction of Rotary NiTi files**
- **Cyclic fatigue and torsional strength of Rotary NiTi files**
- **Recent advances of NiTi files**

  -Reciprocation.

  -Single file system.

- **Shaping ability of Rotary NiTi files:**

Assessing the behavior of the instruments, its effect on the tooth and the effect of the tooth on it was one of the main topics many researchers were concerned about it.

Iqbal *et al* [(1)]*:* compared the apical transportation between the ProFile and ProTaper instruments. 40 extracted mandibular molars were randomly divided into two groups according to the type of the instrument used. A specially constructed radiographic jig with a digital radiographic system was used in order to standardize the angle of radiographing the mesiobuccal canals pre and postoperatively. Superimposition of the radiographs was used to evaluate the central axis of the initial and the instrumented canal and also to evaluate changes in the working length. They showed that the ability of the file to remain centered may not entirely depending on the U-file design or the presence of radial lands. They showed that the variable taper design of Protaper dampens the screw-in effect. Thus, Protaper system was capable of performing equally well or slightly better than Profile with minimal transportation and better preservation of the working Length without significant difference.

The canal-centering ability of ProFile, Hero 642 and Stainless Steel (SS) K files was compared using the kuttler cube method in a study done by **Miglani et al** [2]. Both the Ni-Ti systems showed superior canal-centering ability compared to the SS hand instruments. They showed that the standard cutting tip can be too aggressive because the first flute makes the initial cut in canal transportation, whereas the rotary system has a modified noncutting tip. The noncutting tip that guides the blades of the instrument in the canal lumen could be the reason for Ni-Ti systems like the ProFile and Hero 642 remaining more centered than the standard K-files.

Song et al [3]**:** compared the centering ability for three instrumentation techniques using two NiTi systems namely; GT and Nitiflex files, and one SS K-type file in teeth with curvatures between 15 and 45°C. Results showed that both Ni-Ti instruments had a blunt transition angle in the tip which allowed the instrument to plane the canal walls rather than engaging and screwing into them. This may contribute to the even cutting of dentin along the canal wall and making these instruments self-centered in comparison to the SS K-type files.

Ayar et al [4]: compared the shaping ability of ProFile and K3 instruments with different curvatures and radii, using variable tip sequence. 40 simulated root canal were selected and prepared in crown down technique. The canals were divided into four groups of 10. Group 1; the canal was prepared with ProFile .06 taper instruments. A variable tip sequence was used from 40 to 35, 30 to 25 in a crown-down sequence until the canal was prepared to instrument size 40 at 0.06 taper 0.5 mm from the canal terminus. Group 2; the canal was prepared with K3 .06 taper files in the same manner as group 1 to a file size 40 at a .06 taper 0.5 mm from the canal terminus. Group 3; the canal was prepared as