# Comparison of root canal preparation using Two rotary Ni-Ti instruments

# (An In Vitro Study)

Thesis submitted to the Faculty of Dentistry,Ain Shams University

For
Partial Fulfillment of Requirements of the Master Degree in Endodontics

By


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# Acknowledgement

First and for most, thanks are due to ***ALLAH****, the most beneficent and mercifaul.*

I would to express my sincerest gratitude to ***Prof. Dr. Ehab El Sayed Hassanein****,* Professor of Endodontics *and* Head of the Endodontic department ,Faculty of Dentistry, Ain Shams University.The door office was always open whenever I ran into a trouble spot or had a question about my research or writing. He consistently allowed this paper to be my own work, but steered me in the right the direction whenever he thought I needed it.

I would also like to express my sincere gratitude and thanks to ***Dr. Shady Ali Hussein****,* Lecturer in Endodontic department Faculty of Dentistry, Ain Shams University. For his continuous supervision, guidance, encouragement and support .

Finally, I must express my very profound gratitude to my parents and to my husband for providing me with unfailing support and continuous encouragement throughout my years of study and through the process

of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

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# Introduction

The aim of root canal instrumentation is to create a tapered shape with adequate volume to allow effective irrigation and filling. Many instruments, devices and instrumentation techniques have been recommended but only few seem to be capable of consistently achieving these primary objectives of root canal preparation.

Root canal success is dependent upon two major factors: cleaning and shaping. Proper cleaning is essential in order to provide an adequate seal and to prevent failure. Among the chemical solutions currently used in endodontics, different concentrations of sodium hypochlorite (NaOCl) are the most common and accepted worldwide due to its properties that contribute to effective chemomechanical debridement of the root canal system. NaOCl acts as a lubricant for instrumentation and can flush loose debris from root canals. NaOCl promotes cleaning, dissolves both vital and non-vital tissue and has antibacterial action.

The removal of vital and/or necrotic pulp tissue, infected dentine and dentine debris to eliminate most of the micro-organisms from the root canal system is still one of the most important objectives during root canal instrumentation. It is believed that from a biologic point of view, the presence of a debris contribute to leakage and it is also a source of nutrients for microorganisms

In severely curved canals, traditional stainless steel instruments often fail to achieve the tapered root canal shapes needed for adequate cleaning and filling.

Recently, cone beam computed tomography (CBCT) was introduced to evaluate not only cross-sections of roots, but also three-dimensional shapes of canals. This innovation was achieved because new hardware and software were available to evaluate the metrical data created by CBCT, thus allowing geometrical changes in prepared canals to be determined in more detail.

Several investigations have shown the ability of some new rotary Ni–Ti systems to maintain the original root canal curvature well.

The goal of shaping the canal is to develop a continuously shaped three-dimensional conical form from

the apex of the root to the crown. During shaping, it is critical that the canal anatomy be maintained and tooth structure be conserved.

# Review of literature

## I. Shaping ability of the canal:

### A. Protaper Universal:

***Paqué et al***[1] Twenty-five extracted human mandibular first molars with two separate mesial root canals were selected. Canals were randomly assigned to one of the two experimental groups: Group 1: Rotary conventional preparation using ProTaper and Group 2: Reciprocate instrumentation with one single ProTaper F2 instrument. Specimens were scanned initially and after root canal preparation with an isotropic resolution of 20 μm using a micro-computed tomography system. The following parameters were assessed: changes in dentin volume, percentage of shaped canal walls and degree of canal transportation. In addition, the time required to reach working length with the F2 instrument was recorded.

They found that preoperatively, there were no differences regarding root canal curvature and volume between experimental groups. Overall, instrumentation led to enlarged canal shapes with no evidence of preparation

errors. There were no statistical differences between the two preparation techniques in the anatomical parameters assessed, except for a significantly higher canal transportation caused by the reciprocating file in the coronal canal third. On the other hand, preparation was faster using the single file technique. Shaping outcomes with the single-file F2 ProTaper technique and conventional ProTaper full-sequence rotary approach were similar. However, the singlefile F2 ProTaper technique was markedly faster in reaching working length

***McRay et al*** [(2)] compared ProTaper Universal rotary and WaveOne reciprocating files in their transportation and centering ability in mesial roots of mandibular molars using microCT imaging. Twenty seven extracted mandibular molars with mesial canals have separate foramina were used. Pre-instrumentation scans of all teeth were taken, canal curvatures were calculated, and the teeth were randomly divided into two groups. It has been found that WaveOne stayed slightly more centered at the 1, 3, and 5 mm levels and ProTaper showed less transportation at the 1 and 3 mm levels. Both file systems proved safe for endodontic instrumentation.