The Influence of Instrument Application Frequency on Apical Extrusion of Debris Using Rotary ProTaper, Hand ProTaper and Hybrid Technique

(An in vitro study)

A thesis Submitted to the Council in the College of Dentistry at the University of Baghdad

in Partial Fulfillment of the Requirements for the Degree of Master of Science in Conservative Dentistry

By

Zaid K. Al-Doory

B.D.S

Supervised by

Prof. Dr. Majida Al-Hashimi

B.D.S., M.Sc (USA)

Baghdad- Iraq

2012 1433

Abstract

Various kinds of hand-held or rotary instruments and techniques are used for mechanical preparation of the canal during root canal treatments. These instruments and techniques may produce and push debris out of the canals. This can induce inflammation within the periapical area; therefore, instrumentation technique that causes less extrusion of debris is more desirable.

The purpose of this in vitro study was to evaluate the effect of instrument application frequency on the amount of apical extrusion of debris within the same instrumentation technique, and also to compare the amounts of debris extruded apically using three instrumentation techniques (rotary ProTaper NiTi file, hand ProTaper NiTi file, and Hybrid technique).

One hundred and twenty freshly extracted human teeth were used in this study; all teeth were shortened to a length of 15 mm by cutting the crown with a diamond disc bur. Each experimented root was mounted on a centrifuge tube (Eppendorf tube) then this tube forced through a precut hole in a rubber stopper of a glass vial. The roots were divided randomly into 3 groups, each group contained 40 roots

- **Group R** was prepared by rotary ProTaper Ni-Ti files (Crown-Down technique).
- **Group H** was prepared by hand ProTaper Ni-Ti files (Crown-Down technique).
- **Group S** was prepared by Gates Glidden drill and stainless steel K-file using Step-back technique (Hybrid technique).

Each group was further subdivided in to five subgroups (A, B, C, D, and E) each subgroup contained 8 roots. The number of applications for each instrument used was according to the manufacturer recommendations. Debris extruded from apical foramen, were collected in a centrifuge tube containing 0.5 milliliter of distilled water. Each empty centrifuge tube was weighed before preparation by 0.0001g. sensitive weighing machine. Then at the end of canal preparation, these

centrifuge tubes were completely dried using an incubator at 68 C° for two days and weighed again. The difference between the weights of tubes in two stages represented the weight of debris extruded from apical foramen during instrumentation.

The data were analyzed using Statistical Package for Social Sciences (SPSS) statistical software, the inferential statistics showed that there was no significant difference recorded for the mean weight of apically extruded debris regarding the instrument application frequency within the same instrumentation technique; also the results showed that there was a high significant difference for subgroup (A, B, C, and D) and a significant difference for subgroup E, regarding the effect of instrumentation techniques on amount of apical extrusion of debris among tested groups.

Based on the results of this in vitro study, the following was concluded: all instrumentation techniques that were used in this study produced measurable amounts of apically extruded debris with different values. No significant differences recorded for the number of instrument application frequency in the amount of apically extruded debris within the subgroups of the same instrumentation technique. The hand ProTaper NiTi files extruded smaller amounts of apical debris than the rotary ProTaper NiTi files; also hand ProTaper NiTi files extruded larger amounts of apical debris than Hybrid technique.