

**A Study to Compare the Efficiency of Different
Instrumentation Systems for Cleaning Oval-
shaped Root Canals
(An In Vitro Study)**

A Thesis
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Abstract

Successful endodontic treatment depends on the effectiveness of the cleaning and shaping of the root canal system. Any remaining tissue, bacteria, or debris can contribute to endodontic failure. Proper cleaning and shaping of the whole root canal space have been recognized as a real challenge, particularly in oval-shaped canals.

This in vitro study was conducted to evaluate and compare the efficiency of different instrumentation systems in removing of dentin debris at three thirds of oval-shaped root canals and to compare the percentage of remaining dentin debris among the three thirds for each instrumentation system.

Fifty freshly extracted human mandibular molars with single straight oval-shaped distal root canals were randomly divided into five groups of ten teeth each. Group One: instrumentation with ProTaper Universal hand instruments, Group Two: instrumentation with ProTaper Universal rotary instruments, Group Three: instrumentation with Revo-S rotary instruments, Group Four: instrumentation with Twisted rotary files and Group Five: instrumentation with Self-Adjusting Files (SAF). Sodium hypochlorite (3%) was used as an irrigant for all groups. After canals preparation, the roots were split longitudinally and photographed with a professional digital camera. The images of root sections were then magnified to 100x and the percentage of remaining dentin debris calculated for the apical, middle and coronal thirds by dividing the pixels occupied by debris at each third by the total pixels representing the entire area of the canal using Adobe Photoshop CS6. Data were analyzed statistically by ANOVA and LSD at 1% and 5% significant levels.

Both ProTaper hand and ProTaper rotary files resulted in significantly cleaner canals than Revo-S and Twisted rotary files at the middle and coronal thirds. The Self-Adjusting Files produced significantly cleaner canals at the three thirds than all the other groups. The coronal and middle thirds showed a greater amount of

remaining dentin debris than the apical third for all groups except a non-significant difference found between the apical and middle thirds in SAF group. The Self-Adjusting Files allowed more efficient cleaning of oval-shaped root canals than hand and rotary instruments.