

Comparison of Autoclaving Effects on Torsional Deformation and Fracture Resistance of Three Innovative Endodontic File Systems

Rhett B. Casper, DDS, Howard W. Roberts, DMD, MS, Mark D. Roberts, DMD, Van T. Himel, DDS, and Brian E. Bergeron, DMD

Abstract

Introduction: Recent innovative manufacturing techniques have produced nickel-titanium (NiTi) rotary instruments with reports of superior properties compared to standard NiTi files. These include: Profile® Vortex™ made from M-Wire™ (PV), Twisted Files™ (TF) and 10 Series™ files made from CM Wire™ (CM). Sterilization is recommended prior to use and is repeated if files are reused and/or carried forward between cases. The purpose for this study was to compare the effects of multiple autoclaving cycles on the torsional load resistance of these three new rotary endodontic files. **Methods:** PV, TF, and CM files (n=100; size 25/.04) were divided into five groups (n=20). Files were autoclaved for 1, 2, 3, and 7 sterilization cycles. A control group was not subjected to autoclaving. Files were tested in a torsionometer in general accordance with ISO 3630-1 standards. Torsional load and degrees of rotation to failure were recorded. Mean data were analyzed using Kruskal-Wallis/Dunn post hoc (P=0.05). **Results:** Autoclave cycles had no significant overall effect on file performance for any of the instrument systems tested. PV and CM displayed significantly greater resistance to torsional load than TF (P<0.001), but were not different from each other (P>0.05). Angular deflection for TF and CM was significantly higher than PV (P<0.001), with TF demonstrating greater deformation than CM (P<0.05). **Conclusions:** Under the conditions of this study, repeated autoclaving did not affect torsional resistance for unused files of the systems evaluated. Additionally, CM Wire™ files may have a combined advantage of greater torsional strength and high deformation prior to failure.