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[\[Image PDF \(1487K\)\]](#) [\[References\]](#)**Application of Nondestructive Testing in Cyclic Fatigue Evaluation of Endodontic Ni-Ti Rotary Instruments**[Uei-Ming LI](#)¹⁾³⁾, [Chow-Shing SHIN](#)²⁾, [Wan-Hong LAN](#)¹⁾ and [Chun-Pin LIN](#)¹⁾

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Abstract:

The purpose of this study was to investigate the application of nondestructive testing in cyclic fatigue evaluation of endodontic ProFile[®] nickel-titanium (NiTi) rotary instruments. As-received ProFile[®] instruments were made to rotate freely in sloped metal blocks by a contra-angle handpiece mounted on a testing machine. Rotation was interrupted periodically, and the instrument removed and engaged onto a device to monitor its stiffness by using two strain gauges in four different directions. This monitoring method has the potential to be developed into a convenient, nondestructive turnkey system that allows *in situ* assessment of the integrity of NiTi instruments in the clinic. Upon fracture, which was indicated by a change in instrument stiffness, the fractured surface would be examined under a scanning electron microscope. Microscopic evaluation indicated a small area of fatigue fracture with a large area of final ductile fracture, whereby the latter was the major cyclic failure mode. Based on the results of this study, we concluded that a potential nondestructive integrity assessment method for NiTi rotary instruments was developed.

Key words:[Nondestructive testing](#), [Nickel-titanium](#), [Cyclic fatigue](#)

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