Nickel-Titanium Rotary Instrument Separation during Root Canal Preparation by Dental Students: A Comparison between a Strict Crown-Down Technique and a Modified Crown-Down/ Step Back Technique

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ABSTRACT

The objective of this study was to compare the incidence of instrument separation and distortion, and canal preparation times between a crown-down technique and a modified crown-down/step back technique in human extracted molar teeth. The operators in this study consisted of 104 undergraduate dental students with no practical experience in the use of rotary-powered root canal instrumentation. Three-hundred-and-fourteen root canals of extracted maxillary and mandibular molar teeth were used and the canals were instrumented randomly with either the crown-down or the modified crown-down/step back technique, according to the recommended sequence for each technique. The results showed the percentage of separated and distorted files in the crown-down technique group to be 26.9% and 23.1%, respectively. In the modified technique group, no files were separated or distorted. However, there was no statistical significance for separated instruments (p=0.052) and distorted instruments (p=0.083) for either technique. The modified technique took significantly less preparation time than the crown-down technique (P=0.048). It was concluded that the new hybrid technique, when used by undergraduate dental students, could be useful for preparing root canals without instrument separation or distortion and the time of canal preparation was decreased. The technique is reliable and can be used by inexperienced dental students to prepare root canals safely.

Key words: NiTi rotary instruments, Root canal preparation techniques, Crown down technique, Step back technique, Hybrid technique, Instrument separation

INTRODUCTION

The ideal shape of a root canal preparation is a taper with the smallest diameter at the apex and the widest diameter at the orifice (Schilder, 1974). This shape can be achieved either by traditional hand or contemporary mechanical preparation. Hand preparation techniques can be time-consuming, especially in narrow and curved canals, where aberrations, such as ledging and zipping, can occur because larger,