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Ni-Ti ROTARY INSTRUMENT FRACTURE ANALYSIS AFTER CLINICAL USE. STRUCTURE CHANGES IN USED INSTRUMENTS

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Abstract

Over the past three decades, nickel–titanium engine-driven files have become instruments “sine qua non” for root canal treatment. They are increasingly used by dentists to facilitate the cleaning and shaping of root canals, during the mechanical treatment phase in endodontic therapy, increasing not only the speed of the treatment but also assuring a proper shape of the canal preparation. During the repeated use of these instruments, separation of the file occurs. It has been demonstrated that the failure of the instruments can appear due to the torsional stress or cyclic loading, or a combination of both. Our study was meant to explore the surface and the non-organic structure of the fractured instruments, using SEM analysis. Extracted teeth' roots were prepared with Bio-RaCe (FKG, Le Chaux-of-Fonds, Switzerland) until the instrument fracture occurred. In order to reduce friction between the root canal wall and the instrument, the root canal was rinsed both with NaOCl and EDTA. The corrosive environment of both rinsing agents may be noticed on SEM images, scoring as a severe surface defect with 10 points, out of the maximum 11. Both are corrosive agents, used to eliminate the debris, bacterial agents and to soften the hard tissue. The moment the first instrument separated (BR3 25/.06.) we scored all the files, noticing on SEM analysis all the changes that occurred. Opposed to the current trend of using as less files as possible, we consider it a dangerous simplification of the preparation procedure. A step by step taper increasing is less dangerous, providing thus, a predictable outcome of the treatment. For a safer treatment and a positive outcome, a full kit of files (from 10 to 50) with a taper of 4 is recommended before using the same size files with a greater taper.

Key words: instrument fracture, Ni-Ti, rotary instruments

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