

Ni-Ti separation: prevention and effective retrieval methods

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The fracture of endodontic instruments is a procedural problem creating a major obstacle to normal endodontic therapy and its incidence ranges from 2%~6%. The separated instruments lead to metallic obstruction in the root canal and impedes efficient cleaning and shaping. These instruments can include Gates-Glidden, lentulo spiral, ultrasonic tips, thermomechanical gutta-percha compactors, or the tips of hand instruments, such as gutta-percha spreaders. There are many associated factors affecting instrument retrieval, including retrieval protocols, tooth type, location, visibility, size, length, type of fractured instrument, canal curvature, curvature radius, and operator experience and fatigue.

Instrument retrieval protocols can be divided into three categories: mechanical (bypass), chemical and surgical methods. Surgical methods should be performed as a last resort since they are invasive and require a significant amount of dentin sacrifice involving root-end resection when the fractured instrument is in the apical terminus or beyond the apical terminus. Chemical methods using solvents, including iodine trichloride, nitric acid, hydrochloric acid, sulphuric acid, iodine crystals and iron chloride solution, to corrode the fractured metallic instrument, as well as electrolysed sodium fluoride and sodium chloride solutions for instrument dissolution as an electrochemical process, are inefficient for instrument retrieval. Moreover, they may cause damage to the surrounding soft and hard tissue. Therefore, mechanical retrieval methods are more reliable and practical, accordingly, they are frequently used in clinical setting.

All mechanical protocols for instrument retrieval comprise two steps. The first step is preparing the root canal using rotary or ultrasonic instruments to loosen the fractured instrument. The next step is making retrieval attempts using special devices or ultrasonics to remove the fractured instrument. Mechanical devices involving trephine burs include the Masserann Kit (Micro- mega), Cancellier Extractor Kit (SybronEndo), Endo Extractor (Brasseler Inc.) and iRS (Dentsply Tulsa Dental). Systems involving trephine burs can be used to remove fractured instruments only in the coronal third of the canal mainly in anterior teeth.

Systems involving ultrasonics or special files include the Canal Finder System (FaSociete Endo Technique), small-diameter ultrasonic tips, including a CPR-7 titanium alloy ultra-sonic tip (Obtura-Spartan Corp.), ET25 (Satelec Corp) and TFRK-S (DELabs). The systems comprise a special handpiece and special files, which generate a vertical movement to bypass the fractured instrument. However, great caution is required when bypassing the fractured instrument around a curve given the risk of perforating the root canal, pushing the fractured instrument in a further apical direction, or even extruding the fractured instrument beyond the apical foramen.

This lecture will discuss the present status on removal of fractured instruments based on clinical case presentation to identify factors and variables that could affect the success of fractured instrument retrieval based on both the preparation techniques and the instrument retrieval techniques.

Profile

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