The Effect of Canal Preparation with Four Different Rotary Systems on Formation of Dentinal Cracks: An *In Vitro* Evaluation

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Abstract

Statement of Problem: Several factors such as rotary systems, which are used during root canal preparation, may paly role in formation of dentinal cracks in root canal walls and subsequently development of Vertical Root Fracture that significantly compromises the outcome of endodontic treatment. Features of rotary systems affect root dentin. Due to variability in types of rotary systems, this study aimed to compare dentinal crack formation in root canal preparation following instrumentation with 4 different rotary systems.

Methodology and Theoretical Orientation: This in vitro study was conducted on 110 extracted human single-rooted teeth. The teeth were randomly divided into four experimental groups (n=25) for root canal preparation with Neolix, Reciproc, Mtwo and ProTaper systems and two control groups (n=5). The first control group underwent root canal instrumentation with hand files while the second control group received no preparation and was only irrigated. After instrumentation, root canals were horizontally sectioned at 3, 6 and 9 mm from the apex and inspected under a stereomicroscope under 12× magnification for detection of cracks. The data were analyzed using

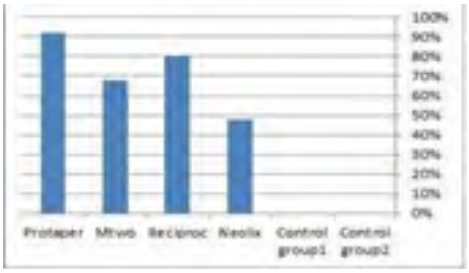
Chi-square, GEE test and Bonferroni tests ($P<0.05$).

Conclusion and Significance: All rotary systems cause dentinal cracks and it is significantly different in apical, middle and coronal third of the root. ProTaper caused significantly more cracks than Neolix and Mtwo. No significant differences were noted between Neolix and Mtwo. Neolix appears to be a suitable alternative to other rotary systems since use of this single-file system saves time and cost and minimizes trauma to dentinal walls.

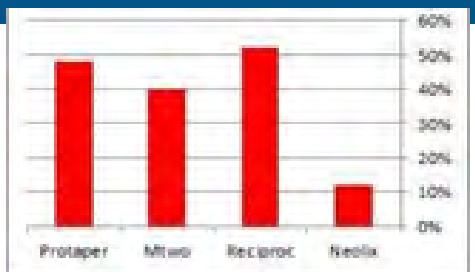
Figures



Samples instrumented with rotary systems under a stereomicroscope under 12× magnification; A) Presence of a complete crack; B) Presence of several cracks; C) Absence of crack



Percentage of dentinal cracks formation found in study groups



Percentage of dentinal cracks formation found in experimental groups, in level 2

Importance of Research

The maxillary sinus is a fundamental anatomical structure which is often involved in many oral and maxillofacial surgical procedures in the posterior maxilla, and whose integrity is important to preserve. Maxillary sinusitis is common due to the close anatomic relation of the frontal sinus, anterior ethmoidal sinus and the maxillary teeth, allowing for easy spread of infection.

The main features of odontogenic sinusitis The clinical presentation of odontogenic sinusitis varies, but most commonly includes symptoms of facial pain or pressure, postnasal drip, nasal congestion, purulent anterior rhinorrhea that may be unilateral, foul smell or taste, and fatigue.

Odontogenic sinusitis is an inflammatory condition of the paranasal sinuses that is the result of dental pathology, most often resulting from prior dentoalveolar procedures, infections of maxillary dentition, or maxillary dental trauma and Odontogenic maxillary sinusitis may originate from a variety of causes such as apical periodontitis, oroantral fistulas and infection due to foreign bodies. The increasing use of dental implants and sinus lift procedures performed by dentist in recent years may explain the higher incidence of sinusitis caused by iatrogenic origin. In light of this, the collaboration between rhinologists and dentists became essential for the diagnosis, management and treatment of dental-related sinus diseases thus enabling dental rehabilitation of complex cases suffering from sinus diseases. Sciences.



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Speaker Biography

Erfan Abbasi Atibeh is a Periodontist. He has completed his General Dentistry from Tabriz University of Medical Sciences and postgraduate studies in Periodontics from Hamedan University of Medical. Experienced in Heat-treatment, Thermomechanical Processing, Microstructural/mechanical Characterisation and Wear/Failure analysis of Advanced/Ultra High Strength Steels and High Entropy Alloys (HEA). Industrial research experience in the most of alloys and products (e.g. stainless steels, cast irons, aluminium alloys, copper alloys, magnesium alloys, titanium alloys, superalloys, powder metallurgy products, W carbides, hardfacing and weldings), alloy design and Abaqus FEM. I have completed my MDS (Masters in Dental Surgery) in Oral Medicine and Radiology from Hamedan University of Medical in Iran. I am now working as Lecturer in Department of Oral Medicine and Radiology, Hamedan University School of Medical Sciences Iran. Here I am involved in academics, research and clinical patient care. I have 12 publications in the field, published in national and international peer reviewed and indexed journals. I have been serving as a reviewer for five national and international journals and editor for one national journal of dentistry. I have attended multiple national and international trainings, workshops and conferences and have been guest speaker to many of them.

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