

A CONTEMPORARY VIEW ON CHALLENGING ISSUES IN ENDODONTICS

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Summary

Recommendations for superior endodontic dental therapy are offered. Issues in endodontics are emphasized. A contemporary viewpoint on the concepts and phases of endodontic coronal and root preparation is provided. Recommendations are provided for mistake avoidance and the attainment of high-quality endodontic therapy.

Keywords: endodontic preparation (coronal and root), preventive, advice, issues, mistakes.

Introduction A significant and contemporary issue in modern dentistry is the management of complex caries—pulpitis and periodontitis. Diseases of the apical periodontium are, regrettably, a primary cause of tooth extraction. Moreover, teeth affected by apical periodontitis often initiate odontogenic inflammatory responses in the body owing to damaging processes occurring at the root apex.

The Function of Biofilm In recent years, there has been a heightened focus on the quality of endodontic therapy. The mouth cavity is a distinctive region of the body that consistently harbors many bacterial strains, both helpful and pathogenic. From the standpoint of evidence-based dentistry, bacterial plaque on teeth (biofilm) is seen as a consortium of diverse bacterial strains adapted for collective survival, including both non-cariogenic and cariogenic bacteria. Scientifically validated evidence of the harmful function of biofilm underpins the elucidation of the processes behind oral

disease progression, including caries and associated consequences.

Simultaneously, insufficient patient knowledge of oral hygiene protocols, delayed disease identification, gingivitis, and initial stages of caries facilitate the progression to irreversible types of pulpitis or apical periodontitis. From this viewpoint, the primary objective of endodontic therapy is to modify the biofilm to diminish and eradicate pathogenic bacteria inside the afflicted tooth and adjacent tissues, while also preventing reinfection of the root canal system.

Obstacles in Endodontics Endodontic therapy requires a comprehensive grasp of the protocols for executing coronal and root preparation for each tooth, ensuring proper disinfection, and achieving high-quality obturation of root canals under radiographic supervision.

Numerous scientific findings suggest that about 60% of endodontic treatment failures are directly attributable to inadequate obturation of the root canal system inside the radicular region. This may ultimately result in several inflammatory illnesses of the craniofacial area and the development of localized infection sites in systemic organs.

The intricacy of endodontic therapy arises from the need of performing significant procedures inside a confined area, mostly lacking ocular accessibility. In addition to objective challenges, it is essential to understand the potential mistakes and issues that may occur during examination, diagnosis, and the execution of coronal and root preparation, as well as strategies to mitigate them in order to maintain dental function and the patient's general health.

Determinants of Success Recently, the incorporation of novel technology, equipment, and materials into endodontic therapy has resulted in favorable trends in enhancing treatment efficiency. Nonetheless, this does not imply that the incidence of

unsatisfactory outcomes has diminished in practical practice. Addressing issues in endodontics is fundamentally linked to essential knowledge and abilities.

The assurance of successful endodontic therapy and its prognosis depends on three elements:

An adequate standard of oral hygiene.

Meticulous mechanical preparation followed by obturation of the root canal system.

Reconstruction of the tooth's anatomical form.

Anatomy and Preparation Errors arise from many causes, although they primarily stem from breaches of the protocol for preparing the coronal section of the tooth and the root canals. Radiographic evidence indicates that root canals are adequately filled in just 13.4% of instances. Teeth with inadequately filled canals are causes of persistent odontogenic infection. This results from pathogenic bacteria and their toxins inside the dentinal tubules, as well as the infiltration of tissue fluid from the apical foramen. Micro-leakage of breakdown products via the apical foramen and lateral canals results in irritation of the adjacent periodontal tissues (periradicular inflammation).

The phrase "pulp space" encompasses the pulp chamber of the crown and the root canal together with its many branches. The morphology of the pulp chamber may alter owing to the accumulation of secondary and tertiary dentin, denticles, and calcifications. It is crucial to recognize that the linkage between the pulp and the periodontium transpires not just via the primary canals but also via supplementary (lateral) canals, which may serve as a reservoir for infection if antiseptic treatment is inadequate or sealers are not used. In the apical third, a delta-like branching (apical delta) is often seen, which must be acknowledged to avoid inaccuracies.

Coronal Preparation In practical endodontics, practitioners often encounter challenges while operating in the coronal region of the tooth. Understanding the dental characteristics defining the "first projection" (ascertained radiographically) and evaluating anatomical-topographical factors assist in eliminating inaccuracies. The objectives of coronal preparation encompass:

Facilitating access to the ceiling of the pulp chamber for its whole extraction.

Contouring the walls and floor of the pulp chamber, taking into account the topography to provide a straight route to the root canal orifices (e.g., in a triangular or rhomboidal configuration in upper and lower molars).

Errors in root preparation often arise during the root preparation phase owing to insufficient understanding of the features of the "second projection," which are not delineated radiographically. Consequently, these indicators must be taken into account during a comprehensive assessment of all root canal levels using a pulp extractor (or extirpation if warranted) with obligatory irrigation. The critical phase involves the expansion and contouring of root canal walls using suitable endodontic instruments, along by essential antimicrobial irrigation and quality obturation (sealers and gutta-percha) under radiographic supervision to the root apex.

Prevention of Perforations and Mistakes Perforation often occurs in the bifurcation region of lower molars when coronal preparation protocols are disregarded. Accurate diagnosis of perforation requires the use of an apex locator and radiographic imaging. The most favorable prognosis is seen when the hole is promptly sealed.

Primary criteria for avoiding perforations:

Adherence to preparation guidelines taking into account dental characteristics in three dimensions.

Accurate performance of coronal preparation to provide optimal access to orifices.

Examination of dental inclination, displacement, and morphology.

Extraction of artificial crowns before to therapy.

Prevention of Root Perforation in Curvilinear Canals:

Compulsory first radiographic evaluation of canal morphology.

Pre-bending manual instruments to conform to the root curvature.

Employing the anti-curvature method with Safety Hedstrom files (Kerr) — H-files with a polished surface on one side.

Utilizing flexible Nickel-Titanium (NiTi) devices (files, profiles) for constricted, calcified canals.

Continuous radiographic monitoring or use of an apex locator.

Refrain from using rotating instruments on a stiff shaft equipped with a sharp tip.

Prevalent Issues in Practice:

Discoloration: Resulting from inadequate excision of the pulp chamber ceiling.

Instrument Fracture: Resulting from insufficient access or breach of coronal-apical method.

Inadequate Obturation: Resulting from neglecting canal curvature or bifurcation in the cervical, middle, or apical third.

Post-operative discomfort: Resulting from insufficient antiseptic and instrumental intervention (reinfection).

Adverse Prognosis: Attributable to breaches in preparation and obturation processes, as well as a misjudgment of the oral ecology.

Operational Directives

Obtain a pre-operative radiograph.

Monitor the maximum rotational angles of instruments: K-reamers – 180°, K-files – 90°; in constricted curved canals, limit to 20–30°. Refrain from rotating H-files.

Utilize EDTA gels for canal expansion when appropriate.

Promptly dispose of unsuitable devices.

Utilize measurement instruments (DentaPORT, Raypex5) and get confirmation radiographs while using rotary files (ProFile, FlexMaster, ProTaper).

Conclusion: Criteria for Achievement

Professional Oral Hygiene: Effects on pathogenic microorganisms (biofilm).

Comprehensive Diagnosis: Evaluation of the tooth and adjacent tissues; application of a rubber dam.

Accurate Preparation Method: Taking into account anatomical characteristics and age-related alterations.

Instrumentation and Irrigation: Root preparation at all stages using suitable equipment (e.g., NiTi files for curved canals) and extensive irrigation with antiseptics (Calcium hydroxide, Sodium hypochlorite 0.5–5%, Chlorhexidine 0.2%).

Complete Obturation: Sealing all tiers of the root canal with sealers and lateral condensation of gutta-percha, confirmed by apex locator and radiographic imaging.

Subsequent assessment: Dynamic monitoring of the oral ecology and radiographic evaluation (after 1–3 years)

Success Criteria:

Lack of symptoms.

Patient compliance with oral hygiene practices.

Revised oral hygiene indices (OHI-S, etc.).

Radiographically, root canals are filled to the apex in cases of periodontitis or to the physiological foramen in cases of pulpitis.

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