RUDDLE ON

The Radar

Identifying root canals

Endodontic strategies

There are a few critical procedural steps that comprise start-to-finish clinical endodontics. One of the initial steps of endodontic treatment is preparing the access cavity. The Holy Grail of the access preparation is to create a minimally invasive preparation that enables the identification of any given orifice and underlying root canal system.

There are concepts, strategies, and armamentaria that drive clinical techniques. In turn, these techniques may be utilized for finding root canal orifices. Locating orifices facilitates negotiating and shaping canals, 3D cleaning, and filling root canal systems. The following represents, in no particular order, the more important strategies for identifying any orifice.

- ***Anatomical familiarity:*** Any dentist can become a serious student of endodontic anatomy by reviewing the historic work of Walter Hess or visualizing state-of-the-art microCT images (www.ehumanlearning.com). Knowledge, understanding, and appreciation for root canal system anatomy influence predictably successful endodontic treatment outcomes.
- ***Radiographs:*** Even the best angulated film is a two-dimensional representation of a three-dimensional object. As such, well-angulated periapical images should be taken in three horizontal planes: straight-on, mesioblique, and distoblique. For example, another canal is suspected when a file or obturation material is radiographically positioned asymmetrically within the long axis of any given root. Certainly, CBCT technology represents a major advancement in radiographic diagnostics and facilitates identifying aberrant, mineralized, or previously missed canals.
- ***Vision:*** Magnification plus lighting equals vision. Traditionally, magnification glasses, headlamps, and transilluminating devices have been used to enhance vision. Today, the dental operating microscope provides unsurpassed vision for identifying orifices.
- ***Surgical length burs:*** Surgical long-length round burs move the visually-obstructive head of the handpiece further away from the occlusal table. Long-length round burs improve the line of sight along the shaft of the bur, promoting safety when searching for canals.
- ***Access cavities:*** The access preparation should be prepared so that the operator can look in the mouth-mirror of a furcated tooth and visualize all of the orifices without moving the mirror. Importantly, axial walls should be flared, flattened, and finished to provide straightline access to the orifice(s).
- ***Piezoelectric ultrasonics:*** The ultrasonic handpiece eliminates the bulky head of the conventional handpiece, which notoriously obstructs vision. Certain ultrasonic insert tips have abrasive surfaces for sanding away dentin and uncovering hidden orifices.
- ***Micro-openers:*** Micro-Openers are flexible, stainless-steel hand files attached to an ergonomically designed off-set handle. Micro-Openers provide unobstructed vision for initially penetrating and enlarging an offshoot that divides deep within a canal.
- ***Dyes:*** Methylene blue is a water-soluble dye that can be irrigated into a dry pulp chamber. The dye is absorbed into orifices, fins, and isthmus areas. This technique serves to visually "map" hard-to-find orifices or certain coronal fractures.
- ***Bubble test:*** When NaOCl is flooded into the access cavity, it dissociates into Na+ and Cl- ions and liberates free oxygen. A positive "bubble," or "champagne" test signifies that NaOCl is reacting with pulpal tissue or residual viscous chelator, if used.
- ***Transillumination:*** A fiber optic wand may be positioned cervically so that light is directed perpendicular to the long axis of a tooth. Identifying an orifice is, at times, improved by turning off any overhead light source.
- ***Explorer pressure:*** The endodontic hand-held explorer should be strong, thin, and have a durable pointed tip. Firm explorer pressure provides a safe way to punch through a thin layer of secondary dentin and expose a hidden, receded, and more mineralized canal.
- ***White line test:*** In necrotic teeth, dentinal dust frequently moves into any anatomical space, such as an orifice, fin, or isthmus, when performing ultrasonic procedures without water. This dust can form a white dot or line that provides a visible roadmap to, for example, an MB2 orifice/canal.
- ***Red line test:*** In vital teeth, blood frequently emanates from an orifice, fin, or an isthmus area. Like a dye, blood serves to map and visually aid in the identification of the underlying anatomy below the pulpal floor.
- ***Restorative disassembly:*** Removing a full-coverage dental restoration provides direct visualization of the underlying tooth preparation. Coronal disassembly improves the predictability of safely entering the pulp chamber and identifying any given orifice.
- ***Perio-probing:*** Circumferentially probing the sulcus around a tooth is another important strategy for locating canals. Intersulcular probing can provide important information as to the emergence profile of the clinical crown and the orientational alignment of the underlying root.
- ***Symmetry:*** In a furcated tooth, the orifices on the pulpal floor should be symmetrically positioned in relationship to each other and the external root surfaces. Appreciating the rules of symmetry will help to confirm that all the orifices and underlying canals have been identified.
- ***Color:*** A dark, narrow line on the pulpal floor of a multi-rooted tooth provides a visual trail of color that leads to a canal orifice. Visually, an orifice or fin will generally appear darker in color compared to the surrounding dentin.

Whether you're endodontically accessing a maxillary versus a mandibular tooth, an anterior versus a posterior tooth, through a single-unit restorative versus a bridge abutment, or performing initial treatment versus endodontic retreatment, *if you can see it, you can do it.* The strategies outlined all serve to enhance vision and promote more predictable success… Keep these strategies for identifying canals on your radar. EP

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