



# Endodontic misadventure

## Dental malpractice or unfortunate result – Do I have a case?

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If you get a call from a potential client with an endodontic (root canal) claim, how do you know if it's actually a case? As a plaintiff's attorney, knowing when to either accept the case or when to decline can be challenging. Most attorneys are not trained medical specialists, and poor clinical results, do not, in and of themselves, rise to the level of negligence. This said, increased endodontic knowledge for the trial attorney can be extremely helpful in jumpstarting your discussion with the retained expert. This article was written to aid decision making and improve communication between the attorney and their endodontic experts.

Two dental clinician groups perform endodontic therapy in the United States: general dentists (GPs) and specialists (endodontists). GPs have gone to a dental school where endodontic procedures form part of the larger curriculum. Endodontists, by contrast, have completed dental school and then gone on to a two-year residency, and, in some cases, also received a Master's Degree. GPs are licensed by state dental boards to perform the same procedures as specialists. Because a referral relationship typically exists from the GP to endodontist, the responsibility of either initially treating or referring the patient lies primarily with the GP.

GPs are held to the same standard of care as specialists. In the U.S., the standard of care is national and not regional. To the authors' knowledge, no comprehensive specific written standard of care exists. This notwithstanding, the American Association of Endodontists twice a year publishes an excellent and widely distributed newsletter ("Colleagues for Excellence"), defining clinical best practices on a wide range of topics

and the emerging state of the art from a literature-derived evidence base. Similar to other medical fields, the endodontic standard of care is not static. It changes and the bar is raised as technology, literature, and new techniques evolve.

The best available data estimates that at least 75% of the root canals done in the U.S. are performed by GPs. In fact, the number is probably much higher. The majority of claims, whether allegations of negligence or accusations of poor outcomes, are brought against GPs. This fact is, in part, related to the much higher number of GPs performing endodontic treatment relative to endodontists.

### Defining the endodontic standard of care

In broad scope, endodontic procedures fall into two categories, non-surgical and surgical. Uncomplicated non-surgical endodontic treatment involves, among other procedures, the cleansing, shaping and filling of the canal space within the roots of the tooth (Figure 1). Endodontic treatment is an option to retain the tooth when the pulp (nerve tissue) within the tooth becomes diseased from decay, multiple restorations, fractures, trauma, developmental reasons, and/or a combination of these factors, among other causes. Fortunately, the clinical success of endodontic treatment is very high (greater than 90% when performed by endodontists). When primary endodontic treatment fails (for whatever reason), most often the tooth can be treated again (non-surgical retreatment) or managed surgically.

Surgical endodontic treatment involves correction of non-surgical treatment challenges, where non-surgical retreatment is not feasible, and/or due to anatomical reasons that cannot be managed non-surgically, among many other reasons. While the vast majority of primary non-surgical first-time root canal

treatment is performed by GPs, endodontists perform significantly more non-surgical retreatment and surgery than their GP colleagues. In clinical practice, endodontists manage the most complex cases and patients.

Almost without exception, in the U.S., endodontists perform only endodontic treatment on a daily basis. GPs, depending on their patient population and preferences, may perform one root canal a week or potentially several a day, but relatively rarely do they exclusively practice endodontics as a non-specialist.

The equipment and technology ubiquitously used by endodontists represent the state of the art. This technology includes Cone Beam Computed Tomography (CBCT) which provides a three-dimensional (3D) scan of the tooth and surrounding bone. 3D in this context



Figure 1: Root canal therapy has been performed in this molar tooth. The white lines are the pulp (nerve) space of the tooth cleaned, shaped and filled (with gutta percha). Case treated with GentleWave™ irrigant technique. Courtesy of Dr. Paula Elmi.



Figure 2: A cone beam computed tomography (CBCT) scan showing multiple viewpoints of the same area of the upper left maxilla. Courtesy of Dr. David McCarty.



Figure 3A: A surgical microscope. Courtesy of Gary Vincent, Global Surgical Corp.

means the tooth can be sliced and imaged from top to bottom, side to side and front to back. (Figure 2.) Another primary instrument utilized ubiquitously among specialists is the dental microscope. The improved lighting, visualization, magnification and tactile and diagnostic capabilities provided by the dental microscope cannot be overstated (Figure 3A-B).

Additional important devices and equipment used routinely by specialists include: apex locators (measures tooth length), ultrasonics (allows selective removal of tooth structure relative to the alternatives), digital X-rays (less radiation, no developing chemicals, faster images), nickel titanium root canal shaping drills (used to mechanically debride the canal space), mechanisms to improve the canal space disinfection (irrigant activation systems – sonic, ultrasonic, GentleWave™, laser systems, etc.), specialized obturating systems (devices used to fill root canal systems after cleaning and disinfection), among many other important materials and technologies.

While a comprehensive list of all the equipment and technology used by endodontic specialists is beyond the scope of this article, it is clear that the further away from the highest level of care provided by the endodontist using state of the art techniques, equipment and technologies mentioned above, the closer the clinician without these is to practicing below the standard of care, especially in complex cases.

Complex in this context refers primarily to patient anxiety, detailed medical histories, previous treatment issues and anatomical challenges, among other issues. Not addressing patient anxiety through appropriate use of oral and/or potentially IV medications is the harbinger of an uncooperative patient accentuating the possibility of a malpractice claim. In other words, if the patient has experienced pain and leaves the treatment dissatisfied with the experience, they are much more likely to find fault in the work. The converse is true. Not utilizing the technology above where indicated also portends poor and avoidable clinical outcomes, as detailed below.

For practical purposes, the key question is not what equipment the clinician does or does not use, but rather, without causing harm, does the clinician provide a clinical result and make treatment decisions comparable to other skilled clinicians at a national level?

### Record keeping

One almost universal factor that, while not in and of itself negligent, is clearly correlated with indicia of malpractice is deficient record keeping. While a comprehensive discussion of dental charting is beyond this article's scope, for the GP, the chart should include, at a bare minimum, a frequently updated and reviewed medical history (ideally at



NOVEMBER 2019

every visit), general and specific written informed consents, periodontal probings and periodontal diagnosis (the health of the gum and bone tissues), an initial treatment plan, a record of all medications prescribed, as well as the written record of each visit. Because the endodontist treats patients on a referral and generally one-off basis, their chart will tend to be more focused on one tooth and issue at a time rather than focused on comprehensive treatment.

In either event, when a patient has an endodontic issue (most often but not always pain, swelling, sensitivity), the record should include the patient's chief complaint in their own words. Recording the chief complaint is important because the clinician should be attempting to duplicate the patient's chief complaint for the purpose of determining a pulpal and periapical diagnosis for the given issue, and hence, a basis upon which to perform treatment.

A pulpal diagnosis denotes the status of the pulp (nerve) of the tooth, and is classified as either normal, vital with possibly mild symptoms (reversible pulpitis),

vital inflamed (irreversible pulpitis, can be symptomatic or asymptomatic), non-vital (dead pulp), previously treated, or previously initiated treatment (a root canal has already been started).

A periapical diagnosis must be provided to determine the status of the bone and tissues surrounding the tooth. Periapical diagnosis can be defined as within normal limits (normal), apical periodontitis (can be symptomatic or asymptomatic, denotes inflammation in the bone surrounding the tooth), chronic apical abscess (bone destruction from an abscessed tooth which drains through gum boil), acute apical abscess (rapid onset of pain and swelling from an infected tooth), among others. The expert in your malpractice case should be looking to see if pulpal and periapical diagnoses are recorded in the chart. If not, the clinician has not provided a biologic basis upon which to begin an endodontic procedure, which could be an indication of malpractice.

The above pulpal and periapical diagnoses are made by a comprehensive examination. The examination should include, at a minimum, a determination of

the restorability of the tooth (how much tooth structure remains and whether the tooth can be retained), the periodontal condition of the tooth (the remaining bone support for the tooth and the health of the gum tissues), clinical signs and symptoms (pain, swelling, frequency, duration, intensity, causes, etc), radiographic interpretation (changes visible on the X-ray especially in comparison to previous films), thermal and electrical pulp testing (testing the tooth to hot and cold and electrical stimulation as appropriate to determine the vitality of the tooth). Also, the clinician should always record percussion (tapping to determine the degree of inflammation present at the root end), gum palpation, mobility (if the tooth has excessive bone loss and/or is mobile due to severe inflammation or swelling) and the aforementioned periodontal probings of the tooth in question to reach a pulpal and periapical diagnosis.

While the endodontic chart can and should include a great deal more than what is detailed above, this information is critical to determine the pulpal and periapical status of any given tooth and make an appropriate treatment decision.

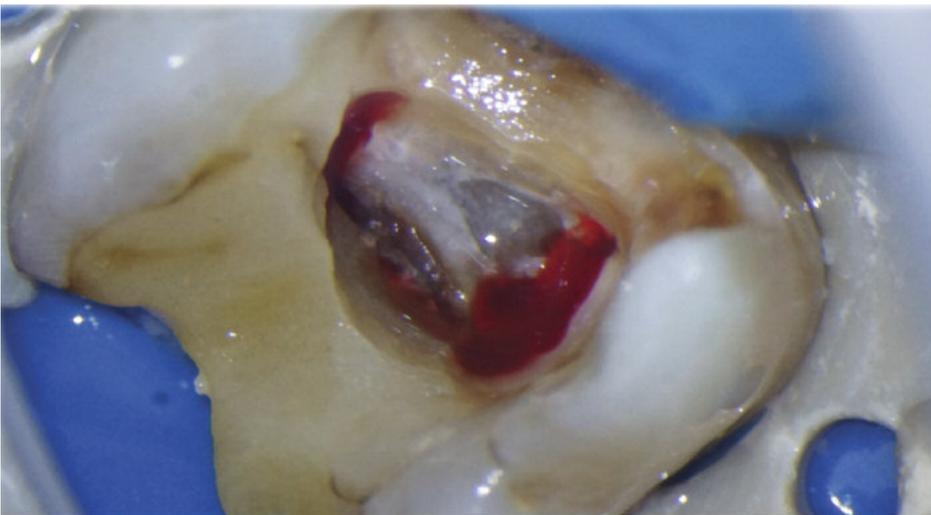


Figure 3B: Clinical view through the surgical microscope into the pulp chamber of the tooth. Courtesy of Dr. Sergio Rosler.



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Figure 4A: A rubber dam clamp. Courtesy of DenMat Hartzell.



When the chart does not show these basic examination, diagnostic and treatment findings, be those chart notes handwritten or typed in an electronic health record, it is our empirical observation the likelihood is increased that a malpractice event may have occurred.

Interestingly, we also observe an empirical correlation between handwritten notes and negligence claims. Handwritten notes generally do not contain any or very little of the above needed information. Frequently, handwritten notes are marginally legible, and sometimes use uncommon abbreviations known only to the writer. Handwritten notes are commonly written by the assistant without a dentist's countersignature. In practical terms, obtaining dental records and seeing a handwritten entry that reads "Caries, #13, root canal, GP and sealer. Working length 21 mm." is grossly inadequate and a strong clue that if there is a reported injury, further investigation by the expert is necessary.

In addition to the above examination and diagnostic findings, at a minimum, any and all of the following should be included at every visit where endodontic treatment is performed: informed consent should be obtained in writing, how much and via what techniques all local anesthetics were provided, whether a rubber dam (Figure 4A-B) was used, what endodontic instruments, equipment, technologies, and materials were used, how the tooth was sealed at the

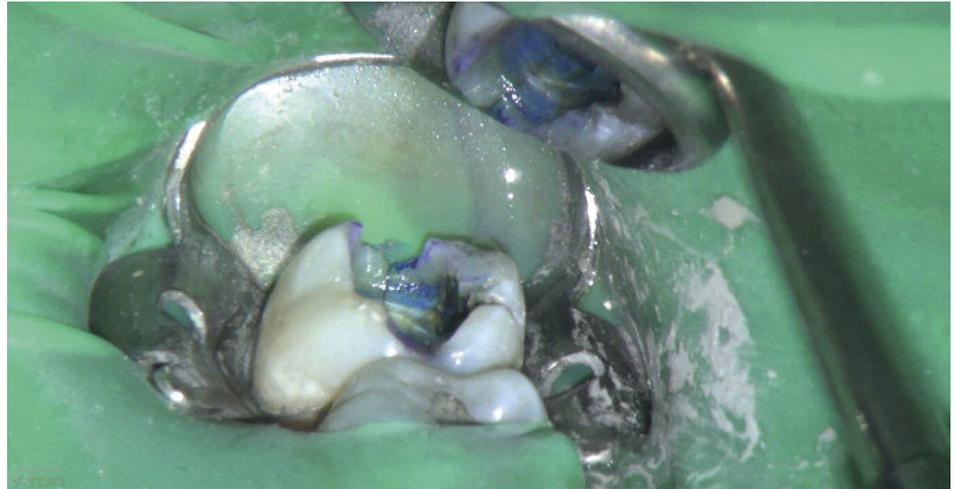


Figure 4B: A rubber dam placed over the rubber dam clamp isolating the tooth. Courtesy of Dr. David McCarty.

conclusion of treatment, any medications given, that post-operative instructions were given, and what follow up treatment is required (for example, if the patient needs a crown (cap) after the root canal treatment.

**Common endodontic negligence claims**

While there are an infinite number of potential negligent scenarios, what follows is a list of common claims sources:

**Lack of informed consent.**

To the knowledge of the authors, there is not a universally accepted



Figure 5: Ideal endodontic treatment of the tooth on the left-hand side of each thumbnail image. Perforation of the tooth on the right-hand side. Note the white material extruding between the roots of the tooth on the right in each of the three panels. This perforation resulted from the clinical complexity of the case and not negligence.



Figure 6A: Note the large horizontal white area below the tooth (calcium hydroxide which was extruded into the mandibular canal which houses the inferior alveolar nerve (IAN)). The IAN supplies sensation to the lower teeth on the same side among other structures; damage was permanent.



Figure 6B: Lesion on the palate, approximately 4 months after extrusion of sodium hypochlorite (bleach) beyond the root end of an upper tooth.

endodontic consent form. This said, a written consent form should, at a minimum, state that the procedural outcome cannot be guaranteed, detail the procedure, provide a prognosis, expected post-treatment outcomes, detail needed follow-up treatment, the risks of treatment, and the risks of non-treatment of the condition. Even so, from a legal perspective, the mere absence of a formally signed consent form is not enough to anchor an entire malpractice claim. Much like a contracts claim, the defense can be that consent and instructions were given verbally and the severity of the claim loses some merit.

#### **Inferior alveolar nerve (IAN) injuries (secondary to extrusion and surgical treatment).**

The inferior alveolar nerve provides sensation to the mandibular (lower) teeth among other areas. Injury to the IAN can occur from endodontic surgery, third molar extraction, orthognathic surgery (surgical modification of the

position of the mandible and maxilla), dental implants, and possibly routine injections of the IAN (extremely rare). Aside from trauma to the IAN detailed above, extrusion of endodontic sealers, calcium hydroxide (antimicrobial paste) and other cytotoxic materials into the IAN can cause significant injury (temporary and possibly permanent numbness) for the patient.

#### **Lack of a rubber dam and/or swallowing the rubber dam clamp.**

A stainless steel rubber dam clamp fits over a tooth and secures a piece of latex or nitrile that isolates the tooth from the rest of the mouth and prevents aspiration or unwanted swallowing of dental materials. Performing an endodontic procedure without a rubber dam is below the standard of care. With some exceptions, the clinical record should show at least one X-ray with the rubber dam clamp in place. Radiographs showing files in place without rubber dam clamps is prima facie evidence that a rubber dam was not used.

#### **Broken files without informing the patient.**

Endodontic canal cleaning and shaping instruments come in a wide variety of sizes, shapes, and materials. Endodontic files are used manually or are engine driven. Fracturing an instrument in a canal, while unfortunate, is not negligence. However, once an instrument has fractured in the tooth, it is essential the clinician inform the patient and take an appropriate action (most often referral to a specialist for evaluation and treatment).

#### **Working on the wrong tooth and/or not informing the patient a root canal has been initiated or performed.**

Self-explanatory.

#### **Perforations.**

Endodontic perforations occur when an opening is made into the tooth with the intention of locating the canal and/or to place a reinforcing post. Instead of finding the canal, the clinician creates an unwanted opening out the side of the tooth. (Figure 5.) It is the opinion of one

of the authors (RM) that some (relatively rare) perforations are understandable given case complexity. This said, the vast majority of perforations can be avoided by taking a pre- or intraoperative CBCT and using sound clinical judgment. Creating a perforation as described in 9c and 9d below and not informing the patient is a deviation of the standard of care and therefore indicia of negligence.

#### **Extrusion of obturation material, irrigants, and medicaments.**

By definition, the goal of endodontic treatment is the removal and disinfection of the contents of the canal system. Ideally, gutta percha filling materials, sealers, medicaments (calcium hydroxide, a highly basic antibacterial), and irrigants (sodium hypochlorite, bleach) should be contained within the tooth. This said, minute and easily tolerated amounts of irrigating solutions, and sealer for example, routinely extrude beyond the tooth in treatment without clinical consequences. This stated, excessive and uncontrolled amounts of calcium hydroxide, sodium hypochlorite, and sealers, among other materials placed beyond the tooth into or next to vital anatomical structures such as the mandibular canal can cause significant morbidity. (Figure 6A-B.)

#### **Performing procedures outside the normal scope of accepted treatment practices:**

In a sample of recent cases evaluated by author RM, the dentist:

- filled the root canal space of a tooth in the presence of a large and acute fluctuant swelling (severe infection), sending the patient to the hospital with a potentially life-threatening airway obstruction.
- removed decay and placed temporary fillings on numerous abscessed and diseased teeth without initiating endodontic therapy first, resulting in significant pain, swelling and ultimately tooth loss.
- perforated the root with a root canal filling and did not take a final X-ray and/or inform the patient. Severe complications occurred for the pregnant patient.



NOVEMBER 2019

- finished the root canal locating only half of the canals present and perforated the root while placing a reinforcing post, all without informing the patient. The tooth was lost.

**Miscellaneous:**

Among many medical conditions that require special care and consideration, patients with a history of oral (Alendronate, Fosomax™ among others) and IV bisphosphonate use (Zoledronate, Reclast™, among others) are at varying degrees of risk to develop osteonecrosis of the jaws (ONJ) from several dental sources. While oral bisphosphonate use is associated with lower ONJ risk than IV administration, these patients must be managed with caution and sound clinical judgment. Dental surgical procedures (endodontic surgery, tooth extraction and dental implants) if at all possible, should/might be avoided in these patients, especially with a history of IV bisphosphonate care.

The above notwithstanding, it is important to discuss briefly clinical results and events that, while not optimal, do not rise to the level of a deviation of the standard of care or legal negligence. Case complexity (primarily challenging canal anatomy and previous failed endodontic treatment), and patient cooperation will impact the clinical prognosis. For example, some root fractures, despite taking

all reasonable precautions and appropriate clinical steps, may manifest after treatment and ultimately require extraction. In short, some cases simply do not heal despite optimal treatment, are infinitely more complex than others, and at times, even after all the most appropriate measures are taken, the given procedure may require additional treatment or removal of the tooth.

This said, fortunately, the vast majority of endodontic procedures are successful and tooth retention is both predictable and preferable to the alternatives. Your expert will be able to inform you if the procedure created an unwanted result but was not a deviation from the standard of care.

Hopefully, when you receive a call from a potential client with a difficult root canal story, this article has helped to distinguish malpractice from an unfortunate result. With the aforementioned information, the attorney should be able to determine if the story does not sound right and inform the discussion between counsel and the specialist expert. We welcome your feedback and questions.

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