

Possible Complications of Endodontic Treatments

Gabriele Miccoli¹, Marco Seracchiani², Alessio Zanza³, Andrea Del Giudice⁴, Luca Testarelli⁵

The Journal of Contemporary Dental Practice (2020): 10.5005/jp-journals-10024-2811

Endodontic treatments tend to have very high successful rates in spite of the fact that they are quite an invasive, difficult procedure, especially in complex anatomies. Some complications can arise during or after a root canal procedure due to poor understanding of the anatomy and iatrogenic errors mainly during instrumentation. While some of these problems can be anticipated, many can never really be predicted.¹⁻³ As a consequence, retreatment has become a well-defined field of knowledge and expertise in endodontics, since most complications can be solved with proper surgical or nonsurgical retreatments.⁴ Reinfection or persistent infections: Root canal treatment can fail due to a persistent bacterial infections or reinfections. These include inadequate shaping, cleaning, and obturation procedures, poor restorations, and exposure through a fracture. The remedies are dependent on the primary cause of the reinfection and the affected parts. Persistent infection is the major cause of short-term endodontic failures.⁵

Missed root canals: Canal anatomy can be complex and variable. Clinicians can sometimes miss a canal in a complex tooth structure. The increasing use of more advanced 3D radiographic images (CBCT) is very helpful to reduce these errors.⁶ **Fractured root or crown:** The carious lesions and the endodontic procedure (access cavity and canal enlargement) leaves make it brittle and fragile. Fractures on the crown or root can be detected before, during, or after the root canal. Crown fracture is the major cause of long-term endodontic failures.⁷ Depending on the extent and severity of the fracture, the dentist will advise on whether extraction (and placement of an implant) or a filling is the correct option. **Fractured instruments:** This happens especially if the canal is complex and curved, and instrumentation stresses become greater than the mechanical resistance of the instruments. Being a quite frequent complication in common practice, many studies have been published to understand the mechanisms of these iatrogenic errors and instruments' resistance (cyclic fatigue and torsional tests). A fractured instrument is a potential factor for failure when it negatively affects the correct shaping and cleaning procedure. Clinicians should be very careful in avoiding oversteering, mainly the rotating nickel-titanium instruments of greater tapers.^{8,9}

Postoperative pain and discomfort: These are common symptoms immediately after a root canal procedure, but should resolve within a few weeks.¹⁰ If a tooth stays or becomes symptomatic after months/years, this is a sign of treatment failure. Symptoms related to discomfort or pain on chewing, aching, and so forth are generally an indication of periradicular inflammation or infection. It must be remembered that bony healing takes time and that a tooth that feels "different" on biting may be en route to healing; this should be confirmed clinically and radiographically. Pain on release may indicate a cracked tooth. A bad taste may indicate a draining abscess. Occasionally, a patient reports sensitivity to cold or heat; this is most likely related to an adjacent

¹⁻⁵Department of Oral and Maxillo-Facial Sciences, Sapienza University of Rome, Roma, Italy

Corresponding Author: Luca Testarelli, Department of Oral and Maxillo-Facial Sciences, Sapienza University of Rome, Rome, Italy, Phone: +39 338 1504134, e-mail: luca.testarelli@uniroma1.it

How to cite this article: Miccoli G, Seracchiani M, Zanza A, *et al.* Possible Complications of Endodontic Treatments. *J Contemp Dent Pract* 2020;21(5):473-474.

Source of support: Nil

Conflict of interest: None

untreated tooth but could be an indication of a missed vital canal in a treated tooth.¹

Post-treatment: As with all dental procedures, complications may occur after root canal treatment. However, the incidence of long-term postoperative complications appears to be lower than for the alternatives, single tooth implants, and fixed dental prostheses.¹¹

In conclusion, the patient history, clinical findings, and radiographic examinations are fundamental metrics of root canal treatment outcomes assessment and data they provide should never be underestimated.

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