

# Endodontic Autopsy: A Learning Tool

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## INTRODUCTION:

Clinical success rates in endodontics can be improved if the causes of failures can be determined, prevented, or corrected. The endodontic autopsy is recommended as a method for determining preoperative, operative, and postoperative causes of failures in endodontics. Endodontic autopsies are not really new because dentists have been performing them for many years.

The Random House Dictionary of the English Language defines autopsy as follows:

1. Inspection and dissection of a body after death. As for determination of the cause of death: postmortem examination.
2. An analysis of something after it has been done or made (Greek. Autopsia - a seeing with one's own eyes). This definition can be easily applied to the concept of examining an endodontically treated tooth that has been extracted to determine the cause of failure. An example of the endodontic autopsy is illustrated in Figs. 1 to 10.

There are numerous examples of endodontic autopsies in the endodontic textbooks.<sup>1</sup> These procedures have been performed when the cause of failure was not known or when verification of the cause of failure

## ABSTRACT:

Clinical success rates in endodontics can be improved if the causes of failures can be determined, prevented, or corrected. The endodontic autopsy is recommended as a method for determining preoperative, operative, and postoperative causes of failures in endodontics. The endodontic autopsy should be performed on as many extracted endodontically treated teeth as possible. The information gained from this procedure can be very helpful in improving the quality of endodontic treatment that we provide our patients. Hopefully, we can learn from our failures and use this knowledge to improve our future success rates.

**Key words:** endodontic autopsy, endodontic failures, extracted teeth.

was desired. Unfortunately the extractions are usually performed by the general dentist or an oral surgeon and the endodontist must make a special effort to obtain the extracted tooth for autopsy. Therefore, numerous endodontic failures have been extracted without an attempt to determine the cause of failure.

To improve success rate in endodontics, it is imperative to determine the causes of endodontic failures. If we can determine, prevent, eliminate, or treat these causes of failure. Success rate will improve accordingly.

The endodontic autopsy is recommended as a method for determining the causes of endodontic failures that are not apparent on clinical and/or radiographic examination or from case records. The autopsy can be performed on extracted teeth that have failed after initial endodontic treatment, retreatment or surgical treatment.

The autopsy procedure may be performed as follows:<sup>2</sup>

1. Wash and clean the extracted tooth.
2. Inspect tooth visually for possible causes of failure. Magnification enhances the inspection process.
3. Radiographs should be taken from the buccal-lingual and mesio-distal directions.
4. Lower molars should be hemisected. And mesial and distal roots radiographed from proximal directions.
5. The mesio-buccal root of upper molars should be amputated and radiographed from the proximal.
6. Transillumination of the root (s) should be examined histologically at different levels as deemed necessary.
7. Cross-sections of the root (s) should be examined histologically at different levels as deemed necessary.
8. Staining for a cracked tooth. Split tooth. Or vertical root fracture using methylene blue or other detecting agents may be performed.
9. Endodontic microscopes could also be used to examine the tooth or sections thereof if necessary.

Possible causes of failure that may be determined in the autopsy process can be classified into three categories: Preoperative, operative and postoperative. Many of these causes of failure may

be observed radiographically or clinically. But the autopsy process can confirm these observations and reveal additional information.

#### **Preparative causes of failure**

1. Lingual radicular groove<sup>3, 4</sup>
2. Pulp stone(s) in canal or apical foramen
3. Unusual canal anatomy
4. Unusual root canal system
5. Anomalies of pulp cavities
6. Incomplete apical closure
7. Calcific metamorphosis of pulp chamber and/or canal(s)
8. Internal or external resorption<sup>5</sup>

#### **Operative causes of failure**

1. Inadequate access
2. Poor debridement
3. Inadequate cleaning and shaping
4. Instrument breakage<sup>6, 7</sup>
5. Overextended access cavity
6. Perforations
7. Failure to maintain curvature<sup>8</sup>
8. Strips, Zips, and ledges
9. Quality of obturation
10. Composition of obturation material
11. Missed canal(s)
12. Over instrumentation
13. Overextended filling<sup>9</sup>

#### **Postoperative causes of failure**

1. Trauma
2. Fracture
3. Absent or poorly designed final restoration
4. Post perforation
5. Post fracture
6. Vertical root fracture<sup>10, 11, 12</sup>
7. Apical or lateral root resorption.

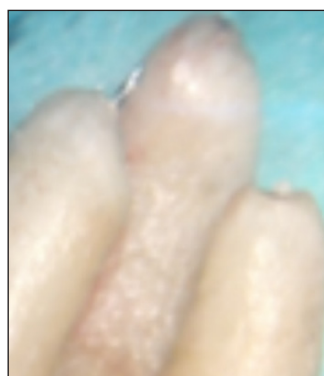
#### **CONCLUSION:**

The endodontic autopsy should be performed on as many extracted endodontically treated teeth as possible. The information gained from this procedure can be very helpful in improving the quality of endodontic treatment that we provide our patients. Hopefully, we can learn from our failures and use this knowledge to improve our future success rates.

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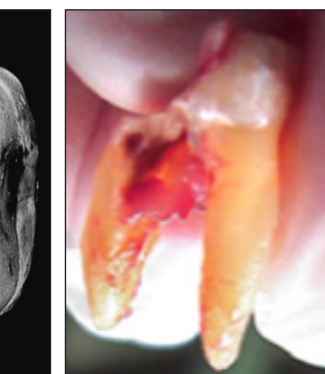
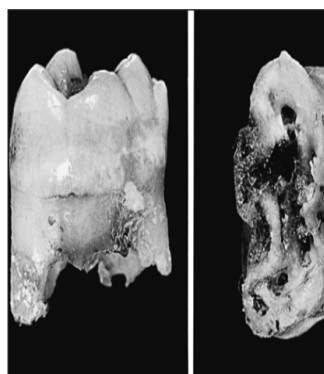
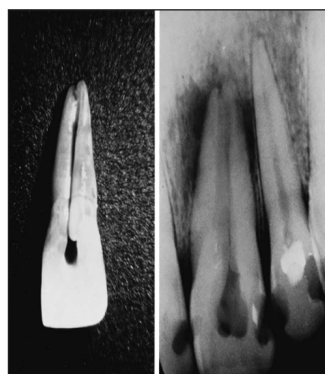


**Figure 1:** Radiograph showing broken instrument crossing apex

**Figure 2:** Microscopic picture showing broken instrument

**Figure 3:** Magnified view of apex with broken instrument

**Figure 4:** Radiograph showing extensive cervical perforation

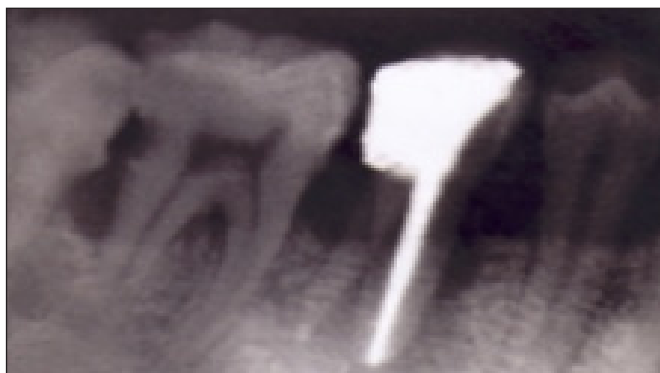


**Figure 5:** Microscopic view of cervical perforation

**Figure 6:** Palato radicular groove

**Figure 7:** External root resorption

**Figure 8:** Internal resorption



**Figure 9:** Endodontically treated tooth with vertical fracture

**Figure 10:** After extraction showing vertical