

ENDODONTIC DIAGNOSIS

A Professional Courtesy of
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Practice Limited to Endodontics

The primary goal of dentistry is to improve the quality of life for people. The 3 most important aspects of achieving this goal include eliminating discomfort, preventing disease, and maintaining natural teeth. In order to promote people's confidence in dentistry, the treatment that his or her dentist provides should address these issues.

Proper diagnosis is the key to ensuring that the most conservative and necessary treatment is always rendered.

The premise of diagnosing can be paralleled to the concept of cause and effect. Only after determining the etiology (cause) of a patient's symptom (effect) can a proper treatment be recommended.

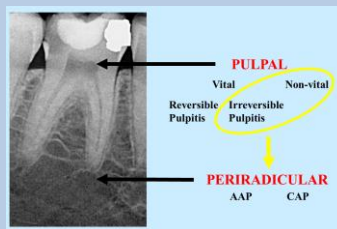
The two symptoms occurring most frequently in dentistry are discomfort and radiographic bone loss. The common etiologies of these symptoms often fall under one of the following categories: endodontic, periodontal, occlusion, fractures, and non-odontogenic.

ENDODONTIC Etiology

There are two diagnoses necessary for a proper endodontic evaluation: pulpal and periradicular.

The pulp tissue inside the canal spaces of a tooth can be categorized as either vital or nonvital. When vital pulp tissue is symptomatic, it may be characterized as reversibly or irreversibly inflamed. The former condition may be detected by a hypersensitivity to temperature that does not linger. An irreversible pulpitis can be defined as a tooth that has spontaneous symptoms or symptoms that linger for a period of time after the tooth is exposed to a stimulus such as temperature.

When a tooth does not respond to vitality testing (ie. cold temperature), the pulp status is considered to be necrotic. A tooth with a necrotic pulp, or non-vital, is susceptible to an intracanal infection.



When the pulp of a tooth is determined to be irreversibly inflamed or necrotic, root canal treatment is indicated. These two diseased states of the pulp may lead to inflammation or destruction of the periradicular tissues.

The two significant diagnoses of periradicular bone that has become symptomatic include acute apical periodontitis (AAP) and chronic apical periodontitis (CAP). The diagnosis of AAP refers to apical bone that is symptomatic (usually confirmed with percussion testing) without the presence of a radiolucency. Examination of the adjacent bone to the root reveals an intact lamina dura and consistent PDL space. The diagnosis of CAP involves bone loss adjacent to a tooth root. Proper clinical testing, most importantly vitality testing, is critical in order to determine whether the etiology of these two conditions is endodontic and would therefore improve as a result of root canal treatment.

The following case demonstrates the progression of the endodontic disease process. A 30 year old female was initially referred with a chief concern of spontaneous and lingering sensitivity to cold temperature and tenderness upon biting from tooth



#30. Root canal treatment was recommended at that time and she elected not to have the treatment. She returned one year later with no symptoms other than a sinus tract on the buccal gingiva of tooth #30. At her initial visit, her biting sensitivity was the result of inflamed apical bone affected by an irreversibly inflamed pulp. There was no apical bone loss at that time because an intracanal infection was not present.

A vital pulp is unlikely to be the cause of bone loss.

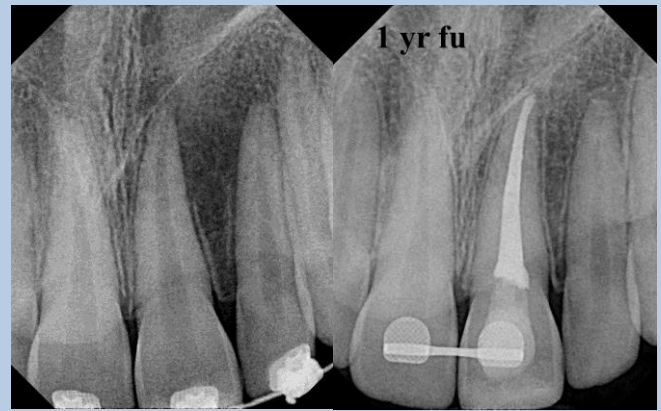
Therefore, the complete initial endodontic diagnosis was irreversible pulpitis (IP) with acute apical periodontitis (AAP). Root canal treatment

at that time would have eliminated the source of irritation (inflamed pulp) to the surrounding bone and would have

prevented pulp necrosis and an eventual intracanal infection, leading to future bone loss. One year later periapical bone loss was evident and was the result of a necrotic and infected pulp. The diagnosis at that time was necrotic with chronic apical periodontitis (CAP). Because the etiology of the bone loss was determined to be an intracanal infection, root canal treatment was the proper treatment and the bone revealed healing at a one year follow up visit.

Determining the proper treatment to address bone loss using the pulp status of a tooth is demonstrated by this next case. A 15 yo female presented with facial swelling of her upper left lip. Radiographic examination revealed periapical bone loss associated with both teeth #9 and #10. The PDL spaces of both teeth were widened and the lamina dura obliterated. Based upon the radiograph alone, the etiology of the radiolucency could not be determined.

Vitality testing of the adjacent teeth concluded that tooth #9 was necrotic, while tooth #10 responded within normal limits to thermal testing. Because the pulp tissue must be nonvital in order for an intracanal infection to be present and therefore cause bone loss, it was determined that tooth #9 was the primary cause of the bone loss. Repair of the lamina dura of both teeth #9 and #10 one year after the endodontic therapy confirmed that this diagnosis was accurate.



The case below reveals a tooth #30 with apical and furcation radiolucencies. The prognosis for teeth with furcation radiolucencies is often guarded due to the unpredictability of bone regeneration in this area. In this instance, this tooth did not respond to vitality testing. Determining that the pulp was necrotic and that an intracanal infection was present indicates a higher probability that the etiology of bone loss is endodontic and therefore betters the prognosis for osseous healing with root canal therapy. Fortunately, ideal healing was observed at a one year follow-up visit. This case not only demonstrates that addressing the cause of symptoms will help achieve predictable results but also emphasizes the importance of thorough irrigation in order to treat accessory (ie. furcation and lateral) canals.

PERIODONTAL Etiology

The previous cases illustrate situations in which inflamed or infected pulp tissue are the etiologies of symptoms. Often times, symptoms originate from outside the tooth. The intraoral photo below reveals a buccal swelling of the marginal gingiva of tooth #30. The periapical radiograph on the right reveals a radiolucency in the furcation area of this tooth. It was determined that the etiology of bone loss was not endodontic in origin due to the normal response of this tooth to vitality testing. A periodontal evaluation was therefore recommended in order to discuss treatment options.



OCCUSION Etiology

This patient had biting and temperature sensitivity from tooth #4, present since a restoration had been placed 3 weeks prior. Clinical testing revealed that this tooth was hyperresponsive to thermal testing, however this symptom did not linger. The diagnosis of reversible pulpitis is not an indication for endodontic therapy and therefore the occlusion was adjusted. Both biting and temperature sensitivity resolved within 1 day.

FRACTURE Etiology

The following patient presented with severe biting sensitivity reproduced upon bite-stick testing of tooth #13. This tooth responded within normal limits to thermal testing and therefore he was informed that the vertical bone loss along the mesial aspect of this tooth was not caused by an unhealthy pulp. Endodontic treatment was initiated in this instance in order to confirm the presence of a root fracture and the need for tooth replacement.

NON-ODONTOGENIC Etiology

The periapical radiographs below represent two different patients with apical osseous changes with no pulpal etiology. In both cases, all lower anterior teeth responded normal to vitality testing. While the apical bone associated with the teeth in the PA on the right appears to represent a normal process, the apical radiolucency in the PA on the left should be biopsied for further diagnosis.

