



# PERIODONTAL DISEASE OF THE MANDIBLE

Brook A. Niemiec, DVM, FAVD, Diplomate AVDC

## QUESTIONS

**Figure 1** shows the right mandible of a small breed dog with significant periodontal disease. Notable findings on examination of the patient include:

- Heavy calculus
- Gingival recession and purulent exudate from gingiva
- Stage 3 mobility of the mandibular first molar (409)
- Stage 3 furcation involvement.

1. What do the levels of mobility and furcation involvement indicate?
2. What are your treatment recommendations based on this information?

Turn to **page 60** for the answers to the questions and further information about the case.

**Furcation** is the anatomical area where the roots divide on a multirouted tooth. A furcation defect, or furcation involvement, is bone loss, usually resulting from periodontal disease, associated with this area of the tooth.



Reprinted with permission from *The Importance of Dental Radiology* (client educational poster), available at [vetdentalrad.com](http://vetdentalrad.com).

**Periodontal disease** is the most commonly diagnosed problem in veterinary medicine.<sup>1,2</sup>

Bacteria attach to teeth through a substance called *plaque*. Initial plaque formation on the surface of teeth is called *supragingival* plaque. Minerals in saliva eventually calcify plaque, creating *calculus*. It is critical to note that supragingival plaque and calculus are almost completely nonpathogenic.

Over time, bacteria infiltrate the gingival margin, forming *subgingival* plaque. Once plaque is beneath the gumline, its bacterial population changes from aerobic to anaerobic. Bacteria and their byproducts cause inflammation, which in combination with the patient's immune defenses, leads to bony destruction. This destruction proceeds apically down the tooth.

Chronic periodontal bone loss weakens the tooth's support, causing tooth mobility and, potentially, exfoliation of the tooth.

Continued from page 59.

## ANSWERS

1. Stage 3 mobility (**Table 1**) is defined as tooth movement of more than 1 mm. Stage 3 furcation involvement (**Table 2**) indicates that the root is exposed to a level that is “through and through” (ie, a probe can be passed in between the roots from the buccal to the lingual side). In more advanced cases, this level of furcation involvement can be visualized.
2. Extraction is the treatment of choice for teeth with either Stage 3 mobility or Stage 3 furcation involvement.

Regardless of the oral examination findings, it is crucially important to take dental radiographs prior to commencing with surgery. **Figure 2** is a dental radiograph from the same patient in **Figure 1**.

TABLE 1. MOBILITY STAGES

Stage	Defined By:
<b>Stage 0 (M0)</b>	Physiologic mobility up to 0.2 mm
<b>Stage 1 (M1)</b>	Mobility is increased in any direction other than axial over a distance of more than 0.2 mm and up to 0.5 mm
<b>Stage 2 (M2)</b>	Mobility is increased in any direction other than axial over a distance of more than 0.5 mm and up to 1 mm
<b>Stage 3 (M3)</b>	Mobility is increased in any direction other than axial over a distance exceeding 1 mm or any axial movement

TABLE 2. FURCATION INVOLVEMENT STAGES

Stage	Defined By:
<b>Stage 1 (F1)</b>	Less than halfway under the crown in any direction of a multirooted tooth with attachment loss
<b>Stage 2 (F2)</b>	Greater than half way under the crown of a multirooted tooth with attachment loss but not through and through
<b>Stage 3 (F3)</b>	Under the crown of a multirooted tooth, through and through from one side of the furcation out the other

Tables 1 and 2 adapted from [avdc.org/nomenclature.pdf](http://avdc.org/nomenclature.pdf).

## QUESTIONS

1. What is your interpretation of the dental radiograph?
2. Does this change your treatment recommendations?

Turn to **page 61** for the answers to the questions and case discussion.



Reprinted with permission from *The Importance of Dental Radiology* (client educational poster), available at [vetdentalrad.com](http://vetdentalrad.com).



**Brook A. Niemiec, DVM, FAVD, Diplomate AVDC**, is chief of staff of Southern California Veterinary Dental Specialties. He is the author of *Small Animal Dental, Oral and Maxillofacial Disease: A Colour Handbook* (Manson Publishing) and *Veterinary Periodontology* (Wiley Blackwell). He founded the veterinary dental telemedicine website [vetdentalrad.com](http://vetdentalrad.com), lectures at national and international conferences, and is the coordinator and instructor of the San Diego Veterinary Dental Training Center ([vetdentaltraining.com](http://vetdentaltraining.com)). He received his DVM from University of California–Davis.

Continued from page 60.

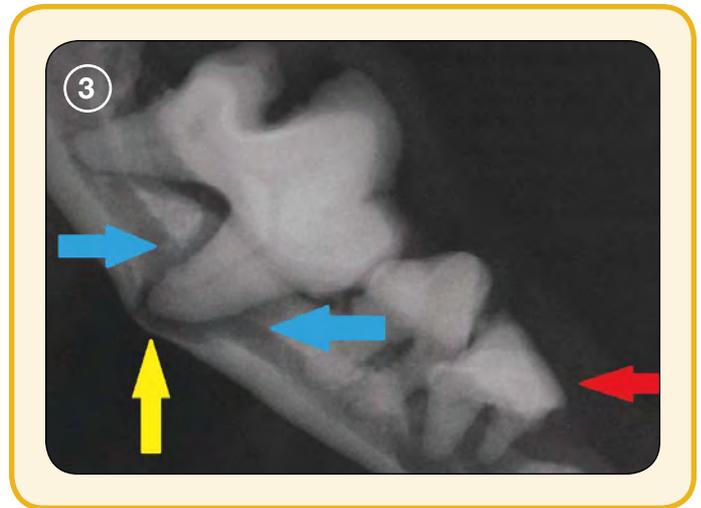
## ANSWERS

1. This dental radiograph reveals severe alveolar bone loss throughout the arcade, leaving minimal bone surrounding the tooth roots.

Significant vertical bone loss exists in the area of the mandibular first molar, especially in the area of the mesial root (**blue arrows**). In addition, there only is 0.3 mm of bone remaining at the ventral cortex (**yellow arrow**). Note that the roots run through the mandibular canal, where the mandibular nerve artery and vein are located. These can be compromised during an extraction, leading to significant hemorrhage and loss of sensation.

The **red arrow** denotes the third premolar, which has lost all attachment and is merely being held in the mandible by a “calculus bridge.”

2. The extent of bone loss and resultant weakening of the mandible are critical to consider prior to treatment in order to avoid an iatrogenic jaw fracture during extraction.



### CASE DISCUSSION

Extraction or periodontal flap surgery (+/- guided tissue regeneration) is indicated for teeth with grade 2 and 3 furcation involvement or mobility, or greater than 50% alveolar bone loss. In this case, extraction is obviously indicated. However, in cases, such as the one presented, the extraction must be performed *very* carefully. The normal force used during elevation is excessive for a weakened mandible, explaining why iatrogenic jaw fractures are relatively common during dental procedures in small dogs.

Pre-operative dental radiographs provide the critical knowledge required to:

- Plan extractions appropriately
- Educate owners about the increased risk for jaw fractures due to advanced periodontal disease and extensive bone loss.

Ideally, this patient should be referred to a boarded specialist in order to lower the risks for surgical complications and mandibular fracture.

#### In the Case of Small Dogs...

Typically, alveolar bone loss and tooth exfoliation occurs before severe bone weakening. In some situations, however, the size of the tooth's roots in relation to the mandible can cause significant bone destabilization *prior* to tooth loss.

This scenario most commonly occurs in small breed dogs for several reasons:

- Small dogs generally have more severe periodontal disease than medium to large breed dogs.<sup>3</sup>
- Small dogs tend to live longer.
- Most important, small and toy breed dogs have proportionally larger mandibular first molar roots than those of larger breeds. Consequently, the root apex of the mandibular first molar (especially the mesial root) lies within millimeters of the mandible's ventral cortex.

### SURGICAL TECHNIQUE

In order to skillfully and carefully complete this procedure, practitioners planning to perform this type of extraction should allow a minimum time frame of 30 minutes.

The tooth should be sectioned with a high-speed bur; then carefully elevated with a small, sharp elevator. For this patient, I utilized a 22-gauge needle for meticulous elevation and removed the tooth without complication.

Additional risks associated with these extractions include damage to the mandibular vessels and nerves.

### BONE GRAFTS

Bone grafting can be considered in these cases, but grafting infected extraction sites should be avoided due to the:

- Inherent ability of the jaw to heal once the diseased tooth has been extracted
- Risk of xenobiotic (nonanimal) material being infected since most current bone augmentation products are xenobiotic.

However, due to the severity of bone loss in this patient, a demineralized cancellous freeze-dried bone was used for grafting.

### IN SUMMARY

- Prior to extraction, all teeth should be radiographed. These radiographic images not only identify areas of weakened bone, but also elucidate any root abnormalities, ankylosis, and/or other pathologic areas.
- Regardless of the severity of periodontal disease, extractions of mandibular first molar (and canine) teeth in small and toy breed dogs are always a challenge, requiring caution, patience, and skill for successful outcomes. ■

### References

1. University of Minnesota Center for Companion Animal Health. National companion animal study. *Uplinks*, 1996, p 3.
2. Lund EM, Armstrong PJ, Kirk CA. Health status and population characteristics of dogs and cats examined at private veterinary practices in the United States. *JAVMA* 1999; 214:1336-1341.
3. Hamp SE, Hamp M, Olsson SE, et al. Radiography of spontaneous periodontitis in dogs. *J Periodontal Res* 1997; 32(7):589-597.