

Diagnostic Imaging in Veterinary Dental Practice

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Figure 1—Gross appearance of the right mandibular first molar in a dog examined because of gingival recession involving this tooth. Notice the enamel defects on the mesial aspect of the mesial cusp and the distal aspect of the central cusp of this tooth (white arrows).



Figure 2—Intraoral radiographic projections of the caudal portions of the right (A) and left (B) mandibles of the dog in Figure 1.

History and Physical Examination Findings

A 14-month-old 28.9-kg (63.6-lb) castrated male German Shepherd Dog was evaluated because of an area of gingival recession involving the right mandibular first molar. The dog was reportedly otherwise healthy and had been treated with amoxicillin-clavulanic acid (375 mg, PO, q 12 h) and twice-daily oral rinses with 0.12% chlorhexidine gluconate for the previous 7 days. The owner reported having seen the dog chewing on a wooden deck in the past.

Results of a general physical examination were unremarkable. Oral examination revealed only minimal plaque, calculus, and gingivitis, except that moderate gingivitis and gingival recession were evident in the area of the right mandibular first molar. Small enamel defects were evident at the mesiobuccal aspect of the mesial cusp and at the distal aspect of the central cusp of this tooth (Figure 1).

Fourteen days later, the dog was returned for intraoral radiography, dental scaling and polishing, and possible periodontal surgery or extraction of the right mandibular first molar. Following induction of general anesthesia, intraoral radiographs of the caudal portions of the right and left mandibles were obtained by means of the parallel technique with size 4 dental film (Figure 2).

Determine whether additional images are required, or make your diagnosis from Figures 1 and 2—then turn the page →

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Diagnostic Imaging Findings and Interpretation

Pulp cavities in both roots of the right mandibular first molar are wider than cavities in roots of the left mandibular first molar (Figure 3). In addition, there are large radiolucencies surrounding the apices of both roots of the right mandibular first molar and extending coronally. Findings are consistent with cessation of secondary dentin deposition by odontoblasts and severe periapical inflammation, both as a consequence of pulp necrosis.

In addition, there is moderate horizontal bone loss at the mesial root of the right mandibular first molar, an absence of bone in the furcation region of this tooth, and mild vertical bone loss at the distal aspect of the distal root of this tooth. The periodontal bone loss in the furcation region appears to be directly connected to the coronal extension of the periapical radiolucencies.

Treatment and Outcome

Clinically, the right mandibular first molar had grade 1 mobility and grade 3 (through-and-through) furcation exposure. Periodontal probing revealed a 12-mm pocket on the buccal aspect of the tooth. The owner was contacted and informed that preserving the tooth would require endodontic treatment and periodontal surgery, with a guarded prognosis. The client elected extraction.

Following ultrasonic scaling and air polishing of all teeth, a triangle mucogingival-periosteal flap was created at the right mandibular first molar. The tooth was sectioned with a taper diamond bur on a high-speed dental handpiece with continuous irrigation and extracted with a combination of a 3-mm luxator and 4-mm winged elevator. Alveoplasty was performed with a round diamond bur on a high-speed dental handpiece with continuous irrigation. The mucogingi-

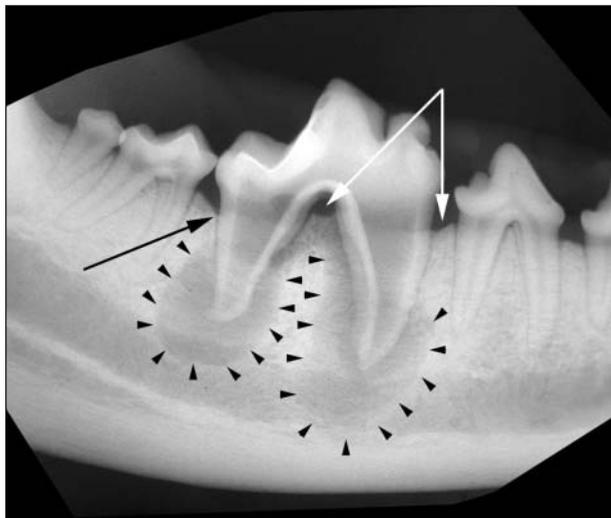


Figure 3—Same radiographic view as in Figure 2A. Notice the large radiolucencies surrounding the apices of both roots of the right mandibular first molar (black arrowheads). In addition, there is moderate horizontal bone loss at the mesial root and an absence of bone in the furcation region (white arrows) and mild vertical bone loss at the distal aspect of the distal root (black arrow).

val flap was sutured with 5-0 poliglecaprone 25 in a simple interrupted pattern. A postoperative radiograph was obtained. Reexamination 14 days later confirmed that the extraction site had healed and the dog had returned to normal activity levels.

Comments

The 2 enamel defects on the right mandibular first molar of the dog described in the present report appeared clinically to be areas of hypoplasia, rather than enamel fractures. The edges of the defects were rounded, rather than jagged as would be expected with enamel fractures, and the lesions were located at sites unusual for enamel fractures. Enamel hypoplasia results from disruption of ameloblasts during development of the permanent tooth germ. When generalized, it is most often caused by epitheliotropic viruses, such as canine distemper virus,^{1,2} or a high fever.^{2,3} Focal hypoplasia of the enamel of a permanent tooth, especially if accompanied by malformation, may result from trauma to the developing tooth germ or the deciduous predecessor.^{2,4-6} Because of the close proximity of the apices of the deciduous teeth to the developing permanent tooth germs, traumatic forces may be transmitted from the deciduous teeth to the developing crowns of the permanent teeth.^{5,6} In addition, pulp exposure in a fractured deciduous tooth leads to periapical inflammation, which can result in crown malformation and enamel hypoplasia in the successor permanent tooth germ.⁴

Given the history of wood chewing reported for the dog described in the present report, it seems likely that the enamel defects on the right mandibular first molar were caused by trauma to the bone surrounding the developing first molar tooth germ. Another possibility is trauma to the deciduous fourth premolar because the distal root of this tooth is in close proximity to the mesial aspect of the developing first molar. Timely treatment of fractured deciduous teeth is recommended to minimize the risk of developmental disorders in the underlying permanent teeth.⁵ In dogs, the recommended treatment for fractured deciduous teeth is extraction, which, when performed carefully, is unlikely to cause iatrogenic trauma to the developing permanent tooth.⁷

The combination of a primary endodontic lesion with secondary periodontal involvement is referred to as a type 1 perio-endo lesion.⁸ The pulp necrosis of the right mandibular first molar in the dog described in the present report resulted in substantial periapical inflammation and secondary periodontal bone loss. It is possible that concussive trauma from aggressive chewing activity was the underlying cause of pulp necrosis in this case. However, bacterial migration through dentinal tubules⁹ in the regions of enamel hypoplasia on the crown must be considered as a potential cause of irreversible pulpitis and subsequent pulp necrosis. Because placement of an adhesive dental sealer and a composite restoration decreases dentin permeability¹⁰ and may stimulate production of reactionary dentin,¹¹ composite restoration of the enamel defects on this tooth shortly after eruption may have reduced the risk of pulp necrosis secondary to bacterial ingress.

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