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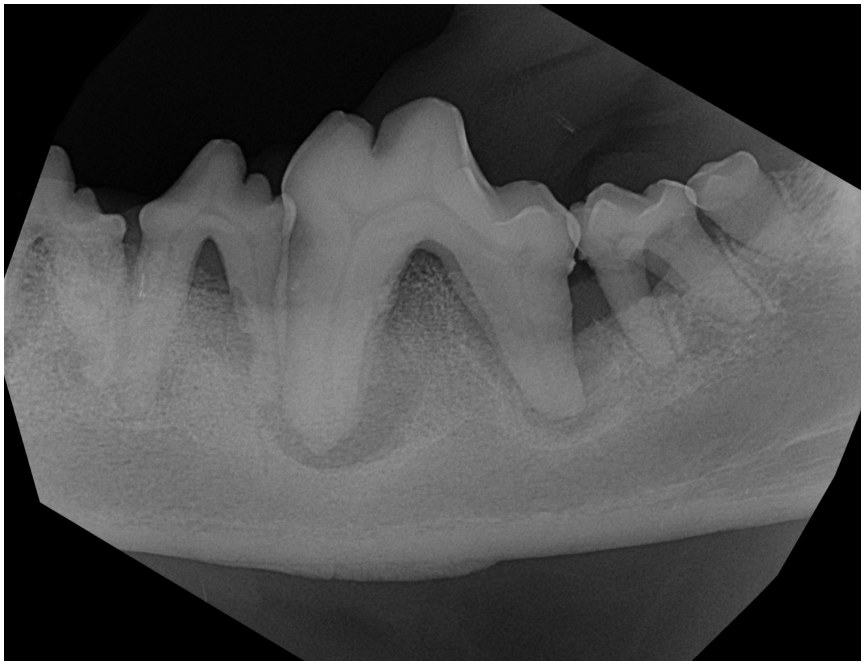

Figure 1—Lateral radiographic view of the caudal left mandibular cheek teeth of a 14-year-old Border Collie–cross dog that was evaluated because of halitosis, repetitive lower jaw motions, and drooling. The image was obtained with a parallel technique.

History and Physical Examination Findings

A 14-year-old 27.6-kg (60.7-lb) castrated male Border Collie–cross dog was evaluated for halitosis, repetitive lower jaw motions, and drooling, which had worsened during the 2 months prior to the visit. The dog had a history of bilateral otitis externa and osteoarthritis in the pelvic region, for which it was being treated with deracoxib (1.3 mg/kg [0.59 mg/lb], PO, q 24 h).

On physical examination, the patient had bilateral mandibular lymph node enlargement, generalized gingivitis, plaque and calculus accumulation, gingival recession at the incisors and canine teeth, and contact ulcers in the buccal mucosa. A more detailed examination of the oral cavity in the awake patient was not possible because of signs of pain on manipulation of the mouth. The remainder of the physical examination findings were unremarkable. Results of a CBC and serum biochemical analysis performed by the referring veterinarian 1 week prior to the referral visit were within the respective reference ranges.

The patient was anesthetized to allow for complete oral examination. A palpable thickening of the left mandible and gingival recession of 4 mm with a probing depth of 12 mm at the left mandibular fourth premolar tooth were observed. The buccal aspect of the mesial root of the left mandibular first molar tooth had gingival recession of 10 mm, and probing of the distal aspect of the distal root of the same tooth revealed a probing depth of 10 mm. Enamel fractures were seen on the crowns of the left mandibular fourth premolar and first and second molar teeth, but no pulp exposure or discoloration of the teeth was evident. An intraoral dental radiograph of the affected area was obtained with a parallel technique **(Figure 1)**.

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Diagnostic Imaging Findings and Interpretation

The intraoral dental radiography revealed enamel defects in the left mandibular fourth premolar and first and second molar teeth **(Figure 2)**. Horizontal and vertical bone loss affected the caudal left mandibular cheek teeth, involving the furcation of the fourth premolar and second molar teeth (stage 3 furcation involvement) and resulting in a deep periodontal defect between the first and second molar teeth. Bone loss between the fourth premolar and first molar teeth was less obvious, owing to a slight overlap of these teeth. The periodontal ligament space was inapparent or very narrow around the distal root of the third premolar tooth and in some areas of the fourth premolar tooth and was abnormally wide around the mesial and distal roots of the first molar tooth. Loss of approximately 50% of the periodontal attachment was evident at the distal aspect of the first molar tooth and mesial aspect of the second molar tooth. These findings were consistent with advanced periodontitis (stage 4 periodontal disease). External replacement resorption was evident at the roots of the third premolar tooth and at the mesial root of the fourth premolar tooth. Circumscribed loss of tooth structure along the mesial surface of the distal root of the fourth premolar tooth, possibly indicative of an area of external inflammatory resorption, was noted.

Periapical lucencies with sclerosis of surrounding bone were associated with the apices of the mesial and distal roots of the left mandibular first molar tooth. Sclerosis of the bone and loss of definition of the mandibular canal were observed ventral to the left fourth premolar and first molar teeth; the pulp cavity of the third premolar tooth was not visible. The pulp cavities of the other affected teeth appeared narrow, becoming less obvious apically, but these were not compared radiographically with pulp cavities of the contralateral mandibular cheek teeth. A thin and smoothly surfaced, homogeneously solid, single-layered periosteal reaction was evident on the ventral margin of the left mandible at the level of the first molar tooth. These features were suggestive of periodontal and endodontic disease with secondary osteomyelitis.

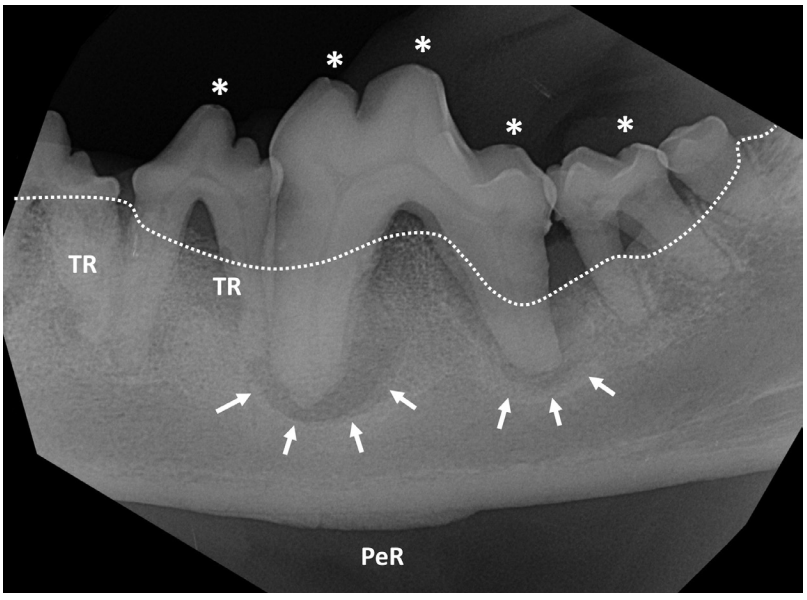

Figure 2—Same radiographic view as in Figure 1. The crowns of the left mandibular fourth premolar tooth and first and second molar teeth have enamel defects (asterisks). Horizontal and vertical alveolar bone loss is evident along the roots of several teeth. The dotted line indicates the approximate height of the buccal alveolar margin. The left mandibular third and fourth premolar teeth have signs of resorption (TR). The mesial and distal roots of the left mandibular first molar tooth have periapical lucencies with sclerosis of the surrounding bone (arrows). A homogeneously solid periosteal reaction (PeR) with a smooth surface is present along the ventral margin of the mandible.

Treatment and Outcome

Multiple extractions were performed during the same anesthetic episode as for the dental examination. An envelope flap was created for extraction of the left mandibular fourth premolar and first and second molar teeth. The teeth were sectioned with a cross-cut, tapered fissure bur[a] and extracted by use of winged dental elevators,[b] followed by alveolar bone curettage and debridement of granulation tissue. The area was rinsed with 0.12% chlorhexidine solution, and the buccal and lingual gingiva were apposed with 4-0 absorbable synthetic monofilament suture[c] in a simple interrupted pattern. Histologic analysis of the gingiva, bone, and teeth revealed severe chronic plasmacytic gingivitis and osteomyelitis with no evidence of neoplasia. The patient was discharged from the hospital on the day after surgery, with client instructions to feed only soft food and to avoid hard treats and toys for 2 weeks. Treatment with tramadol hydrochloride[d] (4 mg/kg [1.8 mg/lb], PO, q 12 h) and deracoxib[e] (1.3 mg/kg [0.59 mg/lb], PO, q 24 h) was prescribed for 10 days for pain control, and antimicrobial treatment with clindamycin hydrochloride[f] (5.4 mg/kg [2.5 mg/lb], PO, q 12 h) was prescribed for 15 days.

One week later, the owner reported that the dog was not eating well and not taking the medication; its body temperature was 39.4°C (103.0°F). Treatment with injectable antimicrobial and analgesic medications was recommended. Cefovecin sodium[g] (8 mg/kg [3.6 mg/lb], SC, once) and buprenorphine hydrochloride[h] (0.01 mg/kg [0.005 mg/lb], SC, once]) were administered by the referring veterinarian. The patient's normal activity level and appetite had returned 2 days later. At a 3-week recheck examination, the extraction sites had healed and there

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was no clinical evidence of inflammation or pain. The owners were instructed to start brushing the patient's teeth on a regular basis and to return the dog for annual reevaluations.

Comments

Radiographic patterns can aid in determining whether a bony lesion is aggressive or nonaggressive. Poorly demarcated margins; the presence of a wide, indistinct zone of transition; moth-eaten or permeative osteolysis; interrupted and irregular periosteal reactions; and absence of sclerosis of the bone are usually seen in association with aggressive lesions. In contrast, well-demarcated lesions with a narrow or distinct zone of transition and no lysis or lysis of bone resulting from pressure atrophy are characteristics of nonaggressive lesions such as cysts or benign odontogenic tumors.[1] Periosteal reactions develop in association with aggressive and nonaggressive lesions. A spicular periosteal reaction and sunburst effect are characteristic of aggressive lesions, whereas a more uniform opacity or lamellar onion-skin pattern is typical of nonaggressive lesions.[2,3]

Radiographic findings in patients with periodontal disease include horizontal and vertical bone loss.[4,5] The severity of the changes determines the type of treatment. Endodontic involvement is characterized radiographically by the presence of periapical lucencies, apical resorption, loss of the lamina dura, changes in the width of the pulp cavity, and increased width of the periodontal ligament space in the periapical region.[5,6] Concurrent endodontic and periodontal lesions are classified as periodontal disease with secondary endodontic disease, endodontic disease with secondary periodontal disease, and true combined periodontal and endodontic lesions.[6] True combined periodontal and endodontic lesions have evidence of periodontal disease and endodontic disease originating independently and progressing concurrently. Enamel defects in the left mandibular first molar tooth may have led to exposure of dentinal tubules and inflammation or infection of the pulp, even when the pulp was not directly exposed.[7] The generalized horizontal and vertical bone loss seen in the dog of this report suggested that endodontic disease of the left mandibular first molar tooth might have been caused by extension of periodontal inflammation or infection through lateral and furcation canals or apical foramina.[8] Areas of increased radiopacity surrounding the periapical lucencies (referred to as sclerosing osteitis) indicate the likelihood of chronic lesions.[9] External inflammatory resorption of teeth can be associated with either periodontal disease or endodontic disease.[4,10] Osteomyelitis in the jaws commonly occurs secondary to dental infections and jaw fractures, or it can be associated with idiopathic conditions such as osteonecrosis.[9,11,12] Radiographic characteristics of osteomyelitis include a decrease or increase in bone radiopacity and a periosteal reaction at the periphery of the lesion without displacement of teeth, as would be seen with other lesions such as oral tumors.[3,10]

The clinical appearance of the lesions in the dog of this report was suggestive of severe periodontal disease, but the palpable swelling of the left mandible warranted further evaluation by means of dental radiography to rule out a more aggressive condition. The radiographic appearance revealed concurrent abnormalities suggestive of a nonneoplastic bone lesion, which was confirmed by histologic analysis of biopsy samples.

Footnotes

a. No. 701 Carbide bur, Henry Schein Animal Health, Fort Worth, Tex.
b. Winged elevators, iM3 Inc, Vancouver, Wash.
c. Monocryl, Ethicon, Sommerville, NJ.
d. Tramadol hydrochloride tablets USP, Sun Pharmaceutical Industries Inc, Cranbury, NJ.
e. Deramaxx, Novartis Animal Health Inc, Greensboro, NC.
f. Clindamycin hydrochloride capsules USP, Ranbaxy Pharmaceuticals Inc, Jacksonville, Fla.
g. Convenia, Zoetis, Kalamazoo, Mich.
h. Buprenorphine hydrochloride, Hospira Inc, Lake Forrest, Ill.

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