

Diagnostic Imaging in Veterinary Dental Practice

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Figure 1—Intraoral radiographic view of the incisive bones and maxillary incisor teeth of a 3-year-old 11-kg (24.2 lb) neutered male Boston Terrier that was evaluated because of an oral mass.

History and Physical Examination Findings

A 3-year-old 11-kg (24.2-lb) neutered male Boston Terrier was examined because of an oral mass that the owners noticed 4 months prior to evaluation. Examination of the oral cavity in the awake dog revealed a 10 × 15-mm raised, irregular, slightly ulcerated gingival mass at the left maxillary first and second incisor teeth extending onto the palate and buccally to the mucogingival junction. Results of physical examination, including palpation of peripheral lymph nodes, were unremarkable.

Full-mouth digital intraoral radiographs were obtained under general anesthesia to screen for abnormalities not evident on oral examination. An incisional biopsy was performed, and a sample was submitted for histologic analysis. An intraoral radiograph of the incisive bones is provided (Figure 1).

Determine whether additional imaging studies are required, or make your diagnosis, then turn the page →

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Figure 2—Same radiographic view as in Figure 1. There is an expansile bony mass with an overlying soft tissue component extending from the mesial aspect of the left maxillary first incisor tooth to the mesial aspect of the left maxillary third incisor tooth (dotted line) with associated incisor tooth displacement. The alveolar bone supporting the incisor teeth otherwise appears radiographically normal. There is evidence of external inflammatory root resorption at the mesial aspect of the left maxillary second incisor tooth (black arrow).

Diagnostic Imaging Findings and Interpretation

Examination of an intraoral radiograph of the incisive bones (Figure 2) revealed an expansile bony mass with an overlying soft tissue component extending from the mesial aspect of the left maxillary first incisor tooth to the mesial aspect of the left maxillary third incisor tooth, with associated incisor tooth displacement. No other abnormalities of the alveolar bone supporting the incisor teeth were detected radiographically. Evidence of external inflammatory root resorption was seen at the mesial aspect of the left maxillary second incisor tooth.

The presence of normal bone adjacent to the lesion suggested that the growth was not malignant.¹ The most likely differential diagnoses for this lesion were focal fibrous hyperplasia (FFH), peripheral odontogenic fibroma (POF), or an early canine acanthomatous ameloblastoma. However, malignant lesions could not be ruled out on the basis of radiographic appearance alone.

Treatment and Outcome

Following the biopsy procedure, the owner was instructed to administer tramadol hydrochloride

(2.25 mg/kg [1.0 mg/lb], PO, q 6 to 8 h) for 3 to 4 days for postoperative analgesia and to provide only softened food for the next 2 weeks. Histologic analysis of the biopsy sample revealed proliferative periodontal tissue with pseudoepitheliomatous hyperplasia, which was most consistent with a diagnosis of POF. En bloc resection of the mass with 10-mm margins was recommended to the client.

The dog was returned for surgery, and the mass was resected under general anesthesia. The same postoperative care regimen was prescribed. The excised specimen was submitted for histologic analysis. The analysis revealed a thick bed of periodontal ligament tissue surrounding the left maxillary second incisor tooth and reactive crestal bone with periosteal proliferation. A definitive diagnosis of POF was made. Results indicated that the excision was complete. The patient was returned for a recheck examination 2 weeks after surgery, and the surgical site was healed. The owner reported that the dog was more energetic than prior to the surgery.

Comments

Although radiographic analysis can be useful as an adjunct in assessment of oral masses, these lesions cannot be identified without histologic analysis.² A study³ of the radiographic appearance of oral masses in dogs found that bone involvement was evident in most (87%) malignant tumors and that irregular or aggressive bone loss was common in these, but that the absence of radiographic changes did not rule out the presence of malignancy. That study³ also found that displacement of teeth was common in dogs with malignant oral tumors. However, this finding is not limited to malignant tumors as evidenced by the dog of this report and radiographic examples of POFs in other publications.⁴ Bone production or calcification was the most common change detected radiographically in dogs with benign tumors, including POF.³ Radiography, MRI, or CT scans are not suitable for classifying oral tumors, but these imaging modalities can be useful for assessing the extent of such lesions.¹

Patients with early POF lesions often have no radiographic changes,^{1,4} but as the tumor progresses, the adjacent bone can enlarge and the surrounding teeth can become displaced. The tumor often has a soft-tissue radiodensity with focal mineralization.⁴

The nomenclature of POF, and of oral masses in dogs in general, has been complex and confusing. The term epulis is widely used in the veterinary literature and clinical practice to indicate a mass originating from the periodontal ligament. However, the correct definition of epulis is a gingival mass of any type.^{2,5-7} The confusion regarding this term partially arises from a classification scheme by Dubielzig et al,⁸ in which benign oral masses were divided into 3 categories: fibromatous epulis, ossifying epulis, and acanthomatous epulis. The categories fibromatous epulis and ossifying epulis were also used in the World Health Organization classification of veterinary oral tumors.⁹ Other authors later identified fibromatous and ossifying epulides as variations of the same lesion and as being similar to a benign oral tumor in humans termed POF.⁵⁻⁷ These authors grouped canine fibromatous and ossifying epulides into a single classification under the term POF and

removed FFH from the POF classification.⁵⁻⁷ This distinction is important, because whereas FFH is a reactive lesion resulting from plaque and calculus, POF is a true neoplasm, and each has a distinct clinical manifestation.² Although the nomenclature is still changing, at this time, POF is considered the correct nomenclature for the neoplastic lesion, while FFH is the correct term for the reactive lesion.²

Studies vary regarding the frequency of occurrence of POF. Investigators in 1 study⁶ found that POF was the third most common gingival tumor of dogs (26/154 [17%]), with FFH being the most common (67 [44%]) and peripheral ameloblastoma the second most common (27 [18%]). In another a study² in dogs, POF was the second most common oral tumor found, comprising 47 of 152 (31%) of the tumors, and canine acanthomatous ameloblastoma was the most commonly identified tumor (68 [45%]). Results of another study¹⁰ also revealed that POF was the second most common oral tumor (58/194 [30%]), with reactive gingival hyperplasia being the most common.

In 1 study,² POF developed most frequently in the rostral aspect of the maxillae (22/47 [47%]) in dogs, followed by the caudal aspect of the mandibles (10 [21%]). The mean age of dogs with POF was 8.5 years, and castrated males were overrepresented. Golden Retrievers were affected more frequently than expected, but no significant association with breed was found.²

Treatment for POF is by excision, although the extent of excision required has not been clearly established. A study¹¹ of POF in dogs found a recurrence rate of 7 of 42 (17%) following excision, although no analysis of the tumor margins was reported. In 1 clinical report,¹² a dog with a mass diagnosed histologically as an ossifying epulis with incomplete margins had tumor recurrence detected 4 months after excision; a second surgery was performed with en bloc excision including 10-mm margins. No gross signs of tumor recurrence were found 1 year after the en bloc excision. An investigation¹³ of gingival masses in dogs found a recurrence rate of 6 of 104 (6%) for lesions diagnosed as fibromatous epulides and removed via marginal excision. The width of the margins was not specified in the study. Four of 44 (10%) lesions diagnosed as ossifying epulides and removed by means of simple excision recurred after 1 year; however, simple excision was not defined in the study.

In the dog of this report, 1 tooth adjacent to the POF had radiographically detectable signs of external inflammatory root resorption. A study¹⁴ of tooth resorption in dogs indicated that oral tumors may cause external inflammatory resorption of teeth at tumor sites and at sites distant from masses. Among dogs in that study that had POF, 6 of 22 (27.3%) had some type of tooth resorption at tumor sites and 2 of 22 (9.1%) had external inflammatory resorption. Only 1 of 128 (0.8%) control dogs in the study had external inflammatory resorption somewhere in the mouth.

In radiographic images, POF typically has a soft tissue density and may also have an expansile bony component. Definitive diagnosis requires histologic analysis. The biological behavior of this lesion has not been completely determined, and thus, the width of surgical margin necessary to prevent recurrence has not been established.

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