History and Physical Examination Findings

A 6.5-year-old 5.65-kg (12.43-lb) castrated male Himalayan cat was referred for evaluation of a ventrally expanding hard palate. A few weeks prior to referral, the owners noted that the cat had developed a tendency to tilt its head slightly while it was eating. They also felt that the cat had difficulty prehending normally because food was accumulating on the fur around its mouth. A preliminary extraoral examination, including palpation of the skull and mandibular lymph nodes, cranial nerve assessment, ocular retropulsion, evaluation of temporomandibular range of motion, and testing of the nares for air movement of cotton fibers, revealed no clinically important findings. In addition to the ventral deviation of the hard palate, abundant calculus accumulation (calculus index of 3) was observed on many teeth. Remaining results of the physical examination were considered normal, and results of a CBC, serum biochemical analysis (including total thyroxine concentration), and urinalysis were within the respective reference ranges.

General anesthesia was induced, and a more thorough inspection of the oral cavity was performed. No dental mobility or evidence of severe periodontal disease was detected with a periodontal probe and dental explorer, although slight bleeding from the gingival sulcus was noted (gingivitis index of 1). The palatal deviation extended symmetrically across the entire expanse of the hard palate, protruding ventrally almost 1 cm in the center and tapering to the dental arch. The palatal mucosa appeared normal except for a focal, 5-mm-diameter ulcer at its caudal extent. Size 2 digital dental radiographs (dorsoventral and right lateral views) of the hard palate were obtained (Figure 2).

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On the dorsoventral view, a poorly defined region of increased radiopacity was observed, extending from the level of the canine teeth to the fourth premolar teeth and centered on the midline. Loss of turbinate detail was detected bilaterally, consistent with a mineralized mass. Several radiolucent foci were present in the central region of the palate, and the nasal septal width appeared irregular. The right lateral dental radiograph revealed a heterogeneous radiopacity with irregular margins, extending 4 to 7 mm ventrally from the normal level of the hard palate, approximately the demarcation of dental crown and root (cementoenamel junction). No radiographic evidence of mass-associated tooth displacement was found on the acquired images.

Differential diagnosis for the mineralized mass at the hard palate included osteosarcoma, chondrosarcoma with endochondral ossification, osteoma, odontogenic neoplasms, and multilobular tumor of bone. Nonneoplastic lesions, such as exostosis, foreign body granuloma, abscess, bacterial or fungal osteomyelitis, and eosinophilic granuloma, were also considered. In this patient, an invasive neoplasm such as osteosarcoma or chondrosarcoma was considered most likely, given the indistinct radiographic margins, signs of osteolysis, and evidence of mineralization. However, other benign bone lesions (eg, osteoma or exostosis) could not be ruled out by radiographic imaging alone.

Treatment and Outcome

The mass was too firm to permit fine-needle penetration for an aspirate sample, so an incisional biopsy was performed. A 25-mm midline palatal incision was made, and the mucosa was elevated to allow access to the abnormal calcified tissues. Rongeurs were used to collect several samples of the underlying calcified mass, which had a crumbly texture. The palatal mucosal incision was sutured closed with 5-0 poliglecaprone 25. Histologic evaluation of the tissue revealed a proliferative response.

Figure 4—Photograph of the hemisectioned skull of the cat in Figure 1 at necropsy. The hard palate is effaced by a 2.9 X 1.8 X 1.4-cm, gritty, expansile mass that bulges into the nasal and oral cavities.

Figure 3—Same dorsoventral (A) and right lateral (B) radiographic views as in Figure 2. In the dorsoventral view, loss of detail of the nasal turbinates and an overall increased radiopacity can be seen in the affected region, with areas of radiolucency (asterisks). In the right lateral view, the affected region has a heterogeneous radiopacity with irregular margins (arrow) extending 4 to 7 mm ventrally from the normal level of the hard palate, approximately the demarcation of dental crown and root (cementoenamel junction).
tion of neoplastic cells forming multiple contiguous lobules of bone rimmed by plump fusiform cells and separated by variably thick fibrous septa, with multilobular tumor of bone (MLTB).

Given the location and extent of the lesion, obtaining clean surgical margins and reconstruction of the ensuing palatal defect was deemed unrealistic. At a 2-week recheck, the palatal mucosal incision had healed. After 6 weeks of palliative treatment with buprenorphine as needed for pain management, the patient was euthanized owing to progressive inappetence. At necropsy, the hard palate was effaced by a 2.9 x 1.8 x 1.4-cm, white, gritty, well-demarcated, expansile mass that bulged dorsally into the nasal cavity and ventrally into the oral cavity (Figure 4). The oral mucosa overlying the mass was locally ulcerated. There was no gross or histologic evidence of metastasis.

Comments

Multilobular tumor of bone is an uncommon neoplasm in dogs and has been rarely reported in other domestic species, including cats, a ferret, and a horse. The neoplasm has historically been referred to by a variety of names, including multilobular chondroma or osteoma, multilobular osteochondromas, and chondroma rodens, and shares some features with juvenile aponeurotic fibroma (also known as calcifying aponeurotic fibroma or cartilage analog of fibromatosis) in humans. In dogs, MLTB develops most commonly in bones of the skull, where it is proposed to arise from altered periosteal elements, and older, medium- to large-breed dogs are most commonly affected. These tumors are typically slow growing and locally aggressive, with compression of adjacent structures. Treatment of MLTB depends on the location and size of the lesion, with wide surgical excision as the preferred treatment when possible.

Four cases of MLTB in cats have been reported in the literature. Similar to findings in dogs, these tumors most commonly involved bones of the skull: 2 developed in the frontal bone and 1 in the parietal-occipital region. In the remaining cat, the MLTB was located on the thoracic wall and involved the 7th to 10th ribs. An additional case, in which the MLTB developed on the mandible, was identified through our facility’s pathology service. Age at diagnosis in these cats ranged from 9 months to 12 years. In 2 of the cats with skull involvement, malignant transformation to chondrosarcoma was reported. Surgical resection was performed in 1 cat, with local recurrence within 2 months after excision.

Radiographically, MLTBs range from well-demarcated, multinodular or granular lesions with a “popcorn ball” appearance to poorly demarcated, largely radiolucent lesions with variably mineralized foci, cortical disruption, and radiating spicules, similar to the radiographic findings for the cat of this report. Previous radiographic descriptions of MLTB in cats are sparse and include a mass of fluid density with foci of mineralization near the external ear canal and a compact tumor mass in the frontal bone region of the skull. Dental radiography often provides important information regarding the character of an oral mass. Features that can be used to help distinguish malignant versus benign oral lesions include the presence of osteolysis; tooth displacement, resorption, or both; extent and type of periosteal bone reaction; and characteristics of the transition zone. In a study evaluating the radiographic features of incisive bone or maxillary neoplasms in dogs (including 1 MLTB), bone destruction was more commonly associated with malignant neoplasms, whereas bone production predominated in benign neoplasms. However, because nonneoplastic lesions, such as osteomyelitis, can also result in bone proliferation and destruction, radiographic features alone should be interpreted with caution. Additionally, benign lesions often have well-defined margins, whereas aggressive lesions tend to have ill-defined transition zones. In the patient of this report, the lack of distinct radiographic margins and presence of osteolysis were suggestive of an aggressive, malignant neoplasm. Ultimately, histologic evaluation is often required for definitive diagnosis of oral lesions.

In addition to traditional intraoral radiographic views, other intraoral and extraoral views (such as dorsoventral, lateral, and oblique views) should be considered when evaluating oral masses. For example, in this patient, the lateral projection revealed the mineralization extending ventrally from the palate, which would have been missed on a conventional dental quadrant bisecting angle view. Interestingly, the radiographs did not accurately represent the expansile rather than invasive nature of this neoplasm. Computed tomography is the ideal imaging modality for many lesions involving the skull, particularly for lesions involving the palate. Computed tomography eliminates superimposition and allows 3-D reconstruction of a lesion, thereby providing more detailed information on the anatomic location and extent of the lesion that is essential for surgical planning. The neoplasm in this cat was not considered amenable to complete surgical excision because of its size and location, and advanced imaging was not recommended.

In the few reported cases of MLTB in cats, the predilection sites, gross and histologic appearances, and potential for malignant transformation seem similar to those described in dogs. Although rare in cats, MLTB should be considered as a differential diagnosis for an expansile mineralized mass associated with the skull. Notable findings in this case that may have clinical implications for the treatment of smaller MLTB in cats include the presence of a compressive, well-demarcated mass (although radiographic margins of the lesion were indistinct for this patient) and lack of evidence of regional or distant metastasis (even with a large tumor burden). A better understanding of the biological behavior of these neoplasms in cats will emerge as more cases are described.

References


Monocryl, Ethicon Endo-Surgery Inc, Blue Ash, Ohio

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