Case Report

Feline inductive odontogenic tumor in a young cat

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Abstract

A 6-month-old, 4.45 kg, intact, male domestic shorthair cat was presented with a gingival mass located on the left rostral maxilla and second left upper premolar tooth. Intraoral x-ray of the left rostral maxilla revealed left maxilla bone lysis with a unilocular cystic lesion. The cytology result revealed an epithelial cell tumor .A left rostral maxillectomy was performed and the tumor was submitted for histological assessment .Histopathological diagnosis of the tissue revealed a feline inductive odontogenic tumor .There was no evidence of tumor recurrence 24 months after surgery.

Keywords: inductive, odontogenic, cat

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Introduction

The feline inductive odontogenic tumor is a benign gingival proliferation arising from the odontogenic tissue (Liptak and Withrow, 2013). It is an epithelium-derived odontogenic tumor that superficially resembles ameloblastic fibroma described in humans and cattle .This tumor is characterized by aggressive local behavior and frequently invades bone of the underlying mandible or maxilla .It usually manifests as a gross swelling with a distortion of bone; however, the presenting complaint may be notable tooth displacement or malocclusion (Thomas and Milinda, 2012). Radiographically, the feline inductive odontogenic tumor most often appears as an osteolytic, unilocular cystic lesion around tooth roots, with well-defined, sclerotic margins (Sakai H, 2008). Wide surgical excision is the treatment of choice (Walsh *et al*., 1987). The feline inductive odontogenic tumor is a rare neoplasm in a cat (Gardner DG, 1995; Beatty J, 2000; Sakai H, 2008) .The report revealed that tumors have occurred in cats in the range of 7 to 18 months, affected both sexes, both jaws and various breeds. This study aimed to report a young case (6 -month -old) in a domestic shorthair cat with oral feline inductive odontogenic tumor and discuss this in terms of clinical signs, radiographic and histological findings, as well as the surgical treatment and postoperative care.

Case Description

A 6-month-old intact male domestic shorthair cat weighing 4.45 kg was referred to the Dentistry and Maxillofacial Surgery Unit of Kasetsart University Veterinary Teaching Hospital for evaluation of a gingival mass discovered by the owner 3 weeks before presentation. No obvious signs of oral discomfort were reported .Cytology performed prior to presentation showed no evidence of malignancy .An epithelial cell tumor was suggested at the time. The physical examination finding was a gross swelling of the left facial with painlessness on palpation (Fig.1). The bilateral mandibular lymph nodes were normal .The complete blood count and serum biochemistry profile disclosed no abnormalities. Serological screening tests for feline leukemia virus and feline immunodeficiency virus were negative. The oral examination found an approximately 3 cm in diameter, raised, firm, smooth gingival mass on the buccal aspect of the left rostral maxilla and the second left upper premolar extending into the left nasal cavity (Fig.2). The left maxillary canine tooth was missing. Gingiva were slightly inflamed and plaque accumulation was more evident on premolar and molar teeth when compared with the incisor and canine teeth .Intraoral dental radiograph of the left maxilla revealed left maxilla bone lysis, unilocular cystic lesion, with well-defined, sclerotic margin. The missing left maxillary canine tooth was found from the radiograph to have been displaced to the palatal site and suspended in the mass (Fig.4).

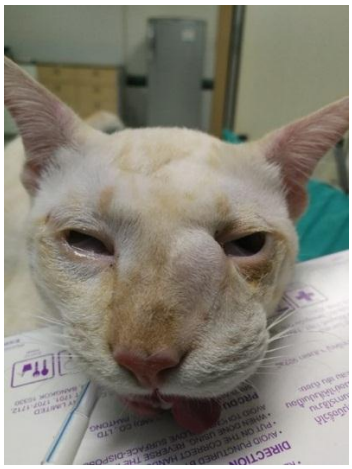

Figure 1 Photograph of a painless swollen mass of the left facial.

Figure 2 Photograph of a gingival mass on the buccal aspect of the left rostral maxilla and the second left upper premolar approximately 3 cm in diameter, with a raised, firm, smooth surface.

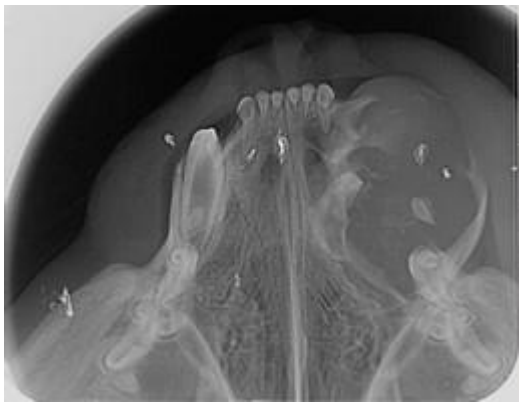

Figure 3 Photograph of intraoral dental radiograph of left maxilla .The left maxilla bone lysis, unilocular cystic lesion, with well-defined, sclerotic margin and the left maxillary canine tooth displaced to the palatal site and suspended in the mass.

Figure 4 Photograph of left unilateral rostral maxillectomy .The maxilla was section rostral to the left upper third premolar and caudal to the left upper third incisor.

The cat underwent general anesthesia for the excision of the gingival mass. Anesthetic induction with 4 mg/kg of propofol was intravenously administered to the cat .General anesthesia was maintained with 2-3 %isoflurane. Prior to surgery, morphine sulfate (0.3 mg/kg) was intramuscularly administered and a left maxillary nerve block was performed for augmented pain control, using 0.5% bupivacaine. Amoxicillin-clavulanic acid (8.5 mg/kg, subcutaneous) was used for prophylaxis antibiotic and tolfenamic acid (4 mg/kg, subcutaneous) was administered postoperatively .The oral cavity was rinsed with chlorhexidine gluconate 0.12% solution followed by supragingival and subgingival scaling and polishing was performed before the mass removal. Then, a left unilateral rostral maxillectomy was performed, including 5 mm of normal tissue away from the visible tumor margins. A full-thickness incision was performed with a #15 blade on a round scalpel handle No 3 .Alveolar and buccal mucosa was elevated with a molt periosteal elevator to expose the underlying bone. Osteotomy of the left rostral maxilla was performed with a long #701 taper fissure bur on a sterile water-cooled highspeed dental handpiece .The maxilla was section rostral to the left upper third premolar and caudal to the left upper third incisor (Fig.5). A 3 cm mass was removed and submitted for histopathological examination .A buccal mucosal flap was repositioned in place and sutured with 5-0 monofilament absorbable suture material (Monosyn Quick; B. Braun surgical S.A) using a simple interrupted suture pattern (Fig.6). The cat recovered from the anesthesia normally and was hospitalized with intravenous fluid for the first 24 h after the surgery .A portion of soft food and water was offered 24 h after surgery and the cat ate and drank normally . The cat was given an oral amoxicillin-clavulanic acid (12.5 mg/kg, q12 h) for 7 days, tolfenamic acid (4 mg/kg q 24 h) for 3 days. The owner was instructed to feed it a softened diet and to clean the oral cavity with antiseptic (0.12% chlorhexidine solution) twice daily for 14 days .The assessment of mucoperiosteal flap healing was performed at 2 weeks postoperatively.

The specimen was immersed in 10 %neutral buffered formalin and dehydrated in graded ethanol series .After paraffin embedding, serial sections of 4µm thickness were cut and stained in hematoxylin and

eosin .Histopathological examination showed a gingival mass covered by gingival mucosa and poorly defined, non-encapsulated submucosa mass (Fig.6). The mass was composed of islands of basaloid epithelial cells among dense sheets of stellate cells and loose fibrous tissue. The mitotic index of both cell types was low (Fig.7). The histopathological diagnosis was feline inductive odontogenic tumor. Histopathology confirmed complete removal of the mass .No recurrence of the tumor was noted by the owner 24 months after surgery.

Figure 5 A buccal mucosal flap at surgical defect using 5-0 monofilament absorbable suture material with a simple interrupted suture pattern.

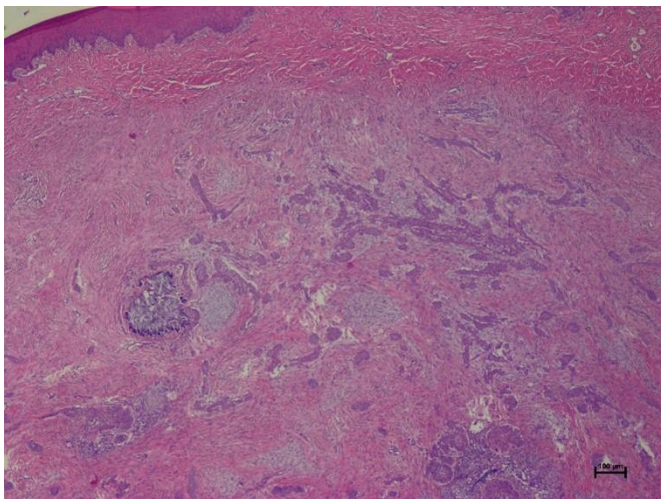

Figure 6 Photomicrograph)4x magnification (of a gingival mass stained with hematoxylin and eosin stain) H&E (revealed a non-encapsulated, poorly demarcated, submucosal mass covered by gingival mucosal epithelium.

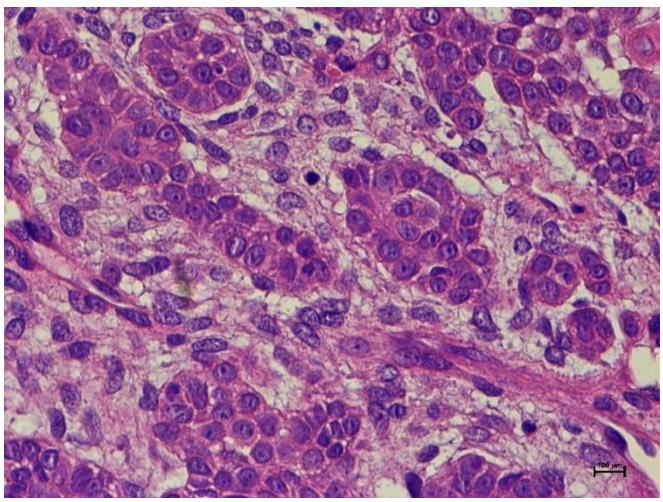

Figure 7 Photomicrograph of the gingival neoplasm, H & E, 60x showing islands of basaloid epithelial cells among dense sheets of stellate cells and loose fibrous tissue.

Discussion

Oral neoplasia has been reported to account for 3% of all feline cancers (M Cray *et al*., 2020). In a recent study, the majority of feline oral tumors were classified as malignant (58.1%) and only a few benign (2.5%). Squamous cell carcinoma is the most common oral malignancy in cats and odontogenic tumors are the majority of feline oral benign tumors (Regezi JA *et al*., 2012). Odontogenic tumors originate from the remnants of odontogenic epithelium, odontogenic mesenchyme or a combination of the cellular elements that comprise the tooth forming apparatus (Regezi *et al*., 2008; Verstraete, 2003; Gardner DG, 1992). There are ameloblastoma, ameloblastic fibroma, peripheral odontogenic fibroma, feline inductive odontogenic tumor and amyloid- producing odontogenic tumors found in cats (Boehm and Breuer, 2011; Poulet *et al*., 1992; Gardner DG, 1998). The feline inductive odontogenic tumor is an epithelial tumor that originates from remnants of the dental organs, dental lamina, cells of epithelial origin lining odontogenic cysts or possibly from basal epithelial cells of the oral mucosa and occurs in the tooth-bearing areas of the mandible and maxilla bone (Thomas and Milinda, 2012). The terms adamationma and inductive fibroameloblastoma have been used diversely to describe this tumor. Presently, feline inductive odontogenic tumor is suggested as being a more appropriate designation than previous terms.

This study is described a case of feline inductive odontogenic tumor in a young cat. Clinical features typically are a locally invasive, slowly growing neoplasm that does not metastasize. It usually presents as a gross swelling with distortion of the bone; however, the presenting complaint may be remarkable tooth displacement or malocclusion. Intraoral radiographs allowed initial access to the mass in this case, however, a computed tomography scan may provide better anatomical detail and structural resolution in the maxillary area. The radiographic finding of neoplasm appears as an osteolytic, unilocular cystic lesion with well-defined, sclerotic margins. Even though the feline inductive odontogenic tumor is a benign tumor, complete excision is considered the treatment of choice, including the affected teeth and peripheral osteotomy to prevent tumor recurrence (Murray *et al*., 2010; Verstraete, 2005). Surgical resection is recommended to a gross surgical margin of 10 mm (Brain *et al*., 2020) however the surgical margin of 5 mm, in our case, was enough for a complete margin without cosmetic defects. Adjuvant therapy for odontogenic tumors in the cat is radiation therapy. The previous report used radiation therapy for treatment in cases of feline inductive odontogenic tumors where the tumor was incompletely excised (Moore *et al*., 2000). The cat received orthovoltage radiation with a half-value layer of 2.9 mm Cu using a single portal, in 12 fractions of 4.0 Gy to the skin surface, given three times a week. Histopathological examination of tumors is necessary to differentiate feline inductive odontogenic tumor from other focal oral masses with similar gross lesions. The feline inductive odontogenic tumor is a mixed tumor consisting of different odontogenic tissue elements – neoplastic odontogenic epithelium, induced ectomesenchyme of the dental papilla and supportive fibrous stroma reminiscent of the dental follicle (Moore *et al*., 2000). The histological characteristic of the tumor, in this case, was composed of islands of basaloid epithelial cells among dense sheets of stellate cells and fibrous tissue. The feline inductive odontogenic tumor has been confused in the part with two other feline odontogenic tumors: ameloblastoma and the amyloid-producing odontogenic tumor. The histopathological features and clinical features of feline inductive odontogenic tumor differ from the other two tumors. Ameloblastoma occurring in cats over the age of 6 years, affects both sexes, both jaws and various breeds. Two microscopic variants have so far been reported, namely, the follicular pattern and the keratinizing pattern, which is similar to the keratinizing ameloblastoma in dogs (Gardner DG, 1998). Ameloblastic fibroma, the amyloid-producing odontogenic tumor is a cellular epithelial tumor. The epithelium in some areas shows palisading of the basal cells, reverse polarization of nuclei, stellate reticulum and collagenous matrix are variable focal findings. This tumor exhibits amyloid which tends to calcify present in some parts of the tumor (Gardner DG, 1996).

In conclusion, feline inductive odontogenic tumor should be considered in a juvenile cat. Histopathological findings are necessary for final diagnosis and surgical treatment is required. The wide marginal excision combined with partial ostectomy is considered a curative method. Rapid identification and treatment are necessary to achieve remarkable success.

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