J. Comp. Path. 2017, Vol. 157, 11–14

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NEOPLASTIC DISEASE

Lingual Chondrolipoma in a Dog

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Summary

A 13-year-old female Yorkshire terrier was presented with difficulty swallowing because of a lingual mass, which had grown to a size of 0.8 × 0.8 × 0.8 cm in 1 month. Grossly, the mass was located in the lingual frenulum and the cut surface was grey-white in colour. Microscopically, the mass was unencapsulated and composed of lobules of mature adipose tissue and cartilaginous tissue with abundant basophilic myxoid matrix separated by fibrous connective tissue. Immunohistochemically, almost all of these cells were positive for vimentin and S100. Chondroid cells and their adjacent spindle cells were also positive for SOX9. Based on these findings, a diagnosis of chondrolipoma was made. To the best of our knowledge, this is the first report of a chondrolipoma originating as a primary tumour in the lingual frenulum of a dog.

Keywords: chondrolipoma; dog; lingual frenulum

Lingual tumours are rare in dogs, accounting for approximately 2–4% of all oropharyngeal tumours (Dennis *et al.*, 2006). Malignant tumours including melanoma and squamous cell carcinoma account for 64.1% of all lingual tumours. The most common benign tumours are squamous papilloma, plasma cell tumour and granular cell tumour, and the incidence of lipoma is approximately 2.8% of all lingual neoplasms (Dennis *et al.*, 2006). According to the World Health Organization (WHO) histological classification of human mesenchymal tumours of soft tissue and bone, adipocytic tumours may be of 11 different types: lipoma, lipomatosis, lipomatosis of nerve, lipoblastoma, angiolipoma, myolipoma of soft tissue, chondroid lipoma, spindle cell/lipomatous tumour, dedifferentiated liposarcoma, myxoid liposarcoma and pleomorphic liposarcoma (Nielsen and Mandahl, 2013). Human chondrolipomas, a subtype of benign adipocytic tumours, often affect the head and neck, in particular the tongue (Pitman and Bell, 2013). In dogs, variants of lipomas include fibrolipoma, angiolipoma, angiofibrolipoma and chondrolipoma (Liggett *et al.*, 2002; Mutinelli *et al.*, 2007; Ramírez *et al.*, 2010; Asproni *et al.*, 2012). However, to our knowledge, lingual chondrolipomas have not been reported in dogs.

A 13-year-old female Yorkshire terrier was admitted to an animal hospital with difficulty swallowing because of a lingual mass, which had grown to a size of 0.8 × 0.8 × 0.8 cm in 1 month. Apart from the lingual mass, no other abnormalities were observed on physical examination, complete blood count or routine serum biochemical profile. Detailed radiographical and ultrasonographical examinations detected no masses in the thoracic or abdominal cavities. The mass was excised surgically and submitted to the Department of Veterinary Pathology, Nippon Veterinary and Life Science University, Tokyo, for examination. No additional chemotherapy was performed after the surgical excision.

The mass was fixed in 10% neutral buffered formalin, processed routinely and embedded in paraffin wax. Sections (4 μm) were stained with haematoxylin and eosin (HE), periodic acid–Schiff (PAS), toluidine blue and alcian blue at pH 2.5 (AB). Serial sections were subjected to

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0021-9975/$ - see front matter
http://dx.doi.org/10.1016/j.jcpa.2017.04.001

immunohistochemistry (IHC) using the labelled streptavidin–biotin (LsAB) method with primary antibodies specific for vimentin (mouse monoclonal, Dako, Glostrup, Denmark; 1 in 100 dilution), S100 (rabbit polyclonal, Dako; 1 in 1,500 dilution) and Sry-type HMG box 9 (SOX9) (rabbit polyclonal, Santa Cruz Biochemistry, Santa Cruz, California, USA; 1 in 100 dilution). For antigen retrieval, the sections were pretreated at 121°C for 10 min in citrate buffer (pH 6.0) for vimentin and S100 and at 65°C for 60 min in citrate buffer (pH 6.0) for SOX9. The antibodies used were validated by a positive reaction with brain for vimentin and S100 and embryonic cartilage for SOX9 and a negative reaction on replacement of antibody with normal mouse or rabbit immunoglobulin.

Grossly, the mass was located in the lingual frenulum and the cut surface was grey-white (Fig. 1). Microscopically, the mass was non-encapsulated and composed of lobules of mature adipose and cartilaginous tissues with an abundant basophilic myxoid matrix (Fig. 2). Adipocytes contained uniform and hyperchromatic nuclei and large clear vacuoles in the cytoplasm (Fig. 3). Contiguous areas of chondroblasts and chondrocytes showing hyperchromatic small round nuclei and abundant eosinophilic cytoplasm surrounded the spindle cells, which had hyperchromatic oval nuclei and scant cytoplasm (Fig. 3). In addition, myxoid and cartilage matrices were stained with PAS, AB and toluidine blue. No mitotic figures were observed and there were no areas of mineralization or ossification. Immunohistochemically, almost all of these cells were positive for vimentin and S100. Chondroid cells and their adjacent spindle cells were also positive for SOX9 (Fig. 4).

On the basis of the morphological and immunohistochemical findings, the tumour was diagnosed as a chondrolipoma originating in the tongue. Chondrolipoma is not yet included in the WHO histological classification of mesenchymal tumours of domestic animals (Hendrick *et al.*, 1998). In dogs, chondrolipomas are rare tumours that occur in the mammary gland, intrapelvic cavity and skin (Mutinelli *et al.*, 2007; Ramírez *et al.*, 2010; Asproni *et al.*, 2012). This case should be distinguished from chondroid lipoma. Chondroid lipoma is composed of mature adipocytes and a myxoid–chondroid matrix without hyaline cartilage, while chondrolipoma is a rare form of benign mesenchymoma containing mature cartilage and adipose tissue (Jones *et al.*, 2003; Nielsen and Mandahl, 2013; Pitman and Bell, 2013).

Several hypotheses have been proposed for the origin of cartilage in this tumour. The cartilage may arise from cartilaginous metaplasia in the adipocytes, which may be triggered by various factors, such as

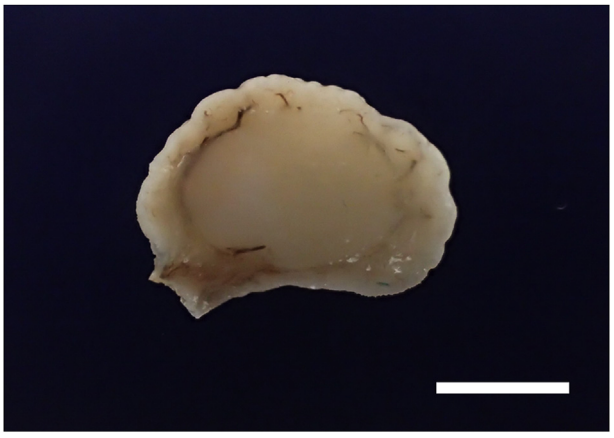

Fig. 1. Gross appearance of lingual chondrolipoma in a dog. The cut surface is grey–white. Bar, 5 mm.

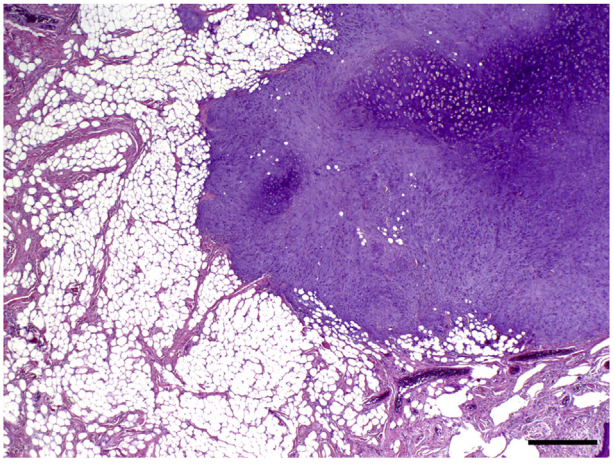

Fig. 2. Lingual chondrolipoma in a dog exhibiting mature adipose and chondroid tissues. HE. Bar, 500 µm.

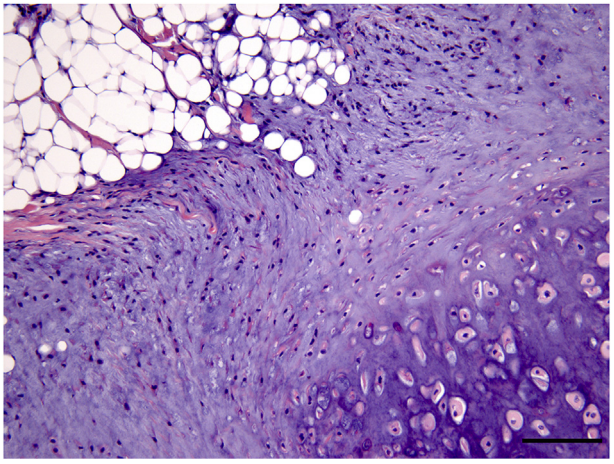

Fig. 3. Lingual chondrolipoma in a dog exhibiting mature adipose tissue and chondroid tissues accompanied by a myxoid matrix. HE. Bar, 100 µm.