J. Comp. Path. 2012, Vol. 147, 199–203

Available online at www.sciencedirect.com

SciVerse ScienceDirect

ELSEVIER

www.elsevier.com/locate/jcpa

NEOPLASTIC DISEASE

Intrathoracic Myxosarcoma in a Dog

C.-C. Sommerey*, K. A. Borgeat†, U. Hetzel‡, J. Archer* and A. G. Torrance§

** Central Diagnostic Services, Department of Veterinary Medicine, University of Cambridge , † Queen Mother Hospital for Animals Royal Veterinary College, London, UK, ‡ Veterinary Pathology, Faculty of Veterinary Medicine, University of Helsinki, Finland and § Torrance Diamond Diagnostic Services, Innovation Centre, University of Exeter, UK*

Summary

A 3-year-old Labrador retriever dog was presented with pyrexia, dyspnoea and tachycardia. A pleural effusion was detected radiographically and ultrasonography showed pleural fluid with floating material. The fluid was drained, revealing a soft tissue mass adjacent to the left ventricle. The aspirated fluid had a proteinaceous and gelatinous appearance. Cytological examination revealed atypical mesenchymal cells in a dense eosinophilic background, interpreted as consistent with the presence of a matrix-secreting tumour, probably a myxosarcoma. Thoracoscopy confirmed the presence of the mass adjacent to the left ventricle, but showed additional smaller pleural masses. Microscopical and immunohistochemical evaluation of a biopsy sample from the mass supported the diagnosis of a myxosarcoma, which was further confirmed by transmission electron microscopy.

Keywords: dog; myxosarcoma; pleural effusion; thorax

Myxoid soft tissue tumours are rare in domestic animals (Pulley and Stannard, 1978). According to the classification of the World Health Organization (WHO), the main variants in dogs are benign myxoma and its malignant counterpart, myxosarcoma, as well as the myxoid liposarcoma (Hendrick *et al.*, 1998). The chief distinguishing feature is the presence of mucin in the intercellular matrix. The tumours can occur at any site, but in the dog the skin is most commonly affected, while the heart, liver and spinal canal are unusual locations (Pulley and Stannard, 1978). Myxoid intrathoracic tumours in the dog have been reported in the myocardium, in five cases as cardiac myxomas (Roberts, 1959; Darke and Gordon, 1974; Bright *et al.*, 1990; Machida *et al.*, 2003a; Akkoc *et al.*, 2007) and in another four as cardiac myxosarcomas, one of which was associated with a gelatinous pleural effusion (Briggs *et al.*, 1997; Foale *et al.*, 2003; Machida *et al.*, 2003b; Riegel *et al.*, 2008). Two intrathoracic myxoid liposarcomas have also been described (Messick and Radin, 1989; Boyd *et al.*, 2005).

A 3-year-old female Labrador retriever dog was neutered, but developed haemorrhage and anaemia post surgery, with the packed cell volume (PCV) dropping over 2 days from 33% to 21% (normal range 37–55%). Haematological examination revealed left-shift neutrophilia (band neutrophils 3.5×10^9/l, neutrophils 12.6×10^9/l; normal $3–11.5 \times 10^9$/l) with occasional Döehle bodies. A cardiac dysrhythmia was detected and an electrocardiogram (ECG) showed apparent atrioventricular dissociation with frequent, uniform ventricular ectopic complexes. Couplets and triplets were present, with a maximum instantaneous rate of 290 beats per minute. Echocardiography revealed a heterogeneous myocardium with an irregularly thickened left ventricular free wall and interventricular septum. The endocardium appeared hyperechoic. The serum concentration of cardiac troponin I (CTnI) was increased to 30.5 ng/ml (normal < 0.15 ng/ml). These findings were suggestive of myocarditis. *Toxoplasma* and *Neospora* serum antibody titres were within normal limits. The presence of serum antibody specific for canine distemper virus was consistent with vaccinal immunity. There was no evidence of congestive heart failure and the dog

Correspondence to: C. -C. Sommerey (e-mail: ccs40@cam.ac.uk).

0021-9975/$ - see front matter
doi:10.1016/j.jcpa.2012.01.006

improved with cage rest and supportive care. After 2 weeks the ECG and echocardiogram were unremarkable and the serum concentration of CTnI was normal (0.12 ng/ml).

Four months later, the dog was presented with pyrexia, weakness, tachycardia and a pleural effusion. More than a litre of a viscous fluid was drained from the thorax. There was a leftshift in the neutrophil series, but without neutrophilia (band neutrophils 2.9×10^9/l, neutrophils 6.1×10^9/l). The serum concentration of CTnI was 0.08 ng/ml. Cytological preparations of the pleural fluid had high cellularity and contained a mixed cell population embedded in a thick pink granular myxomatous background. The erythrocytes lined up in parallel rows within the viscous background material. Mesenchymal cells were present and these had large, round to angular nuclei, with coarsely granular basophilic chromatin and one to three large nucleoli. The cytoplasm was deep basophilic with irregular borders and fine vacuolation. Up to 10% of the cells were binucleate and a further 1% were multinucleated giant cells. Non-cohesive clusters were seen in association with extracellular wispy strands of pink matrix material (Figs. 1A and B). These findings were supportive of a matrix-secreting tumour, probably a myxosarcoma.

Radiography and ultrasonography showed that the myocardium was compressed by the pleural fluid and after drainage, thoracoscopy identified a large mass, which was irregular and cystic in appearance, extending from the left ventricle through the pericardium, as well as several smaller masses on the pleural surface. A biopsy sample was taken from the large mass via thoracoscopy. The owner decided against surgical debulking and the dog was humanely destroyed. Necropsy examination was declined.

Microscopical examination was performed on the formalin-fixed and paraffin wax-embedded tissue. Sections were stained with haematoxylin and eosin (HE). There was an infiltrative and poorly-defined proliferation of spindle- to oval-shaped cells set in an abundant mucinous stroma with areas of branching fibrous proliferation. The cells were loosely arranged and showed small amounts of wispy dark eosinophilic cytoplasm and oval dense basophilic nuclei with small prominent nucleoli. Moderate to marked anisokaryosis, frequent karyomegaly and multinucleate cells were seen. There was an average of two mitoses per 40× objective field.

The matrix stained blue with Alcian blue, but was negative when stained by periodic acid—Schiff (PAS) and Perl's Prussian blue stain (Fig. 2). Immunohistochemistry (IHC) revealed strong expression of vimentin (Fig. 3) and weak expression of desmin by atypical mesenchymal cells that were negative for cytokeratin, S-100 protein, myoglobin and factor VIII-related antigen.

These results confirmed that the tumour cells were of mesenchymal origin and, given the observed atypia, this was supportive of a sarcoma. The abundant matrix production and the staining properties, which suggested the deposition of acid glycosaminoglycans, led to the histological diagnosis of a myxomatous soft tissue tumour, with the possible differentials of a myxosarcoma, myxoid liposarcoma, myxoid chondrosarcoma or a low-grade myxoid fibrosarcoma.

A sample of the mass was examined by transmission electron microscopy (TEM). Ultrastructurally, the nuclear outline was irregular with deep indentations

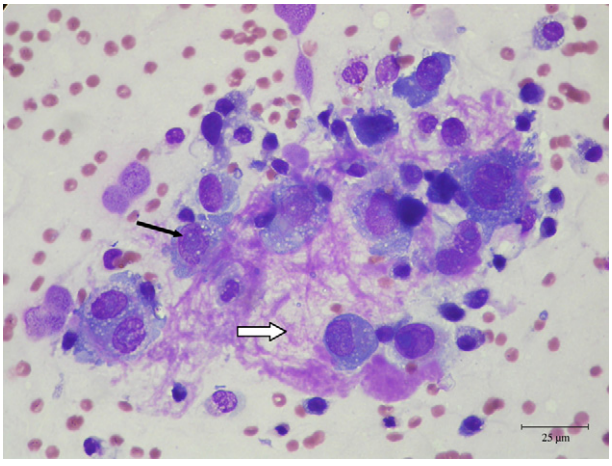

Fig. 1. Cytological appearance of pleural fluid. A non-cohesive cluster of cells with wispy strands of extracellular pink matrix material (white arrow). The mesenchymal cells show oval to angular nuclei. Some are binucleate and some have a large basophilic nucleolus (black arrow). Wright's stain.

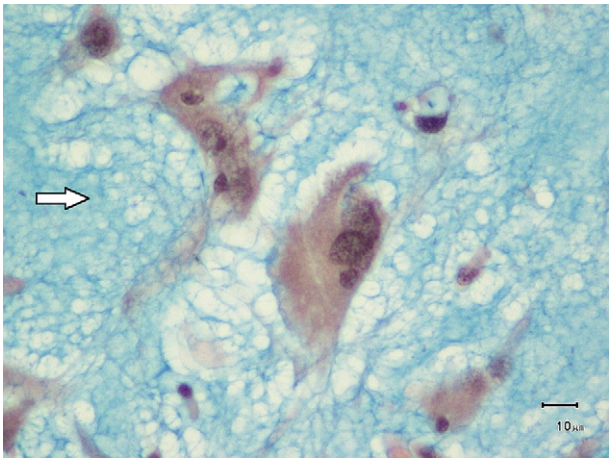

Fig. 2. Biopsy sample of the mass showing the presence of blue matrix (white arrow) between the atypical mesenchymal cells. Alcian blue stain.