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NEOPLASTIC DISEASE

Primary Urinary Bladder Osteosarcoma in a Dog

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Summary

A 13-year-old, female Welsh corgi had a clinical history of haematuria and cystitis for 2–3 months. A 4 × 3 × 2 cm mass was excised surgically from the apex of the urinary bladder. A primary urinary bladder osteosarcoma was diagnosed histologically. Primary urinary bladder osteosarcoma is a rare tumour in man and animals. To the author's knowledge, there is no previously published report of a primary canine urinary bladder osteosarcoma.

Keywords: dog; osteosarcoma; urinary bladder

Urinary bladder tumours are common in dogs, but uncommon in other animals (Meuten and Meuten, 2017). Primary urinary bladder tumours comprise <1% of all canine neoplasms. The average age of affected dogs is 9–10 years at the time of diagnosis. The frequency of the tumours does not appear to be related to sex or breed (Pamukcu, 1974). Primary urinary bladder tumours are more common (96%) than secondary tumours. Other than lymphoma and direct extension of tumours from the prostate, rectum or uterus, secondary neoplasms of the urinary bladder are rare (Meuten and Meuten, 2017).

Approximately 90% of canine urinary bladder tumours are of epithelial origin and are malignant (Meuten and Meuten, 2017). The most common canine primary mesenchymal urinary bladder tumours are leiomyoma, leiomyosarcoma, haemangioma and haemangiosarcoma (Pamukcu, 1974; Meuten and Meuten, 2017).

Osteosarcoma is a malignant mesenchymal tumour, characterized by the formation of osteoid. Extraskeletal osteosarcoma (EOS) is a similar, osteoid-producing neoplasm without primary periosteal or bone involvement. Canine EOS is rare and has been reported in older dogs with a median age of 10 years (Langenbach *et al.*, 1998); it involves various tissues and organs. Primary urinary bladder osteosarcoma is rare. Two cases were recorded in a review of 130,754 biopsy samples, which included 169 EOSs diagnosed at the Veterinary Hospital of the University of Pennsylvania, between 1986 and 1996 (Langenbach *et al.*, 1998). However, there is no independent published report of canine urinary bladder osteosarcoma. The current report describes a case of primary urinary bladder osteosarcoma in a dog.

A 13-year-old, neutered female Welsh corgi was presented with a history of haematuria and cystitis for 2–3 months. Radiographs taken in June 2016 showed mineral opacities in the bladder and focally also in the left kidney. Previous radiographs taken in October 2015 had been clear. A multilobulated, firm, 4 × 3 × 2 cm mass was found at the apex of the bladder and was resected surgically. Urinary bladder stones were not found during surgery. The dog urinated normally after surgery. The mass was fixed in 10% neutral buffered formalin. The mass was decalcified and multiple representative tissue samples were processed routinely and embedded in paraffin wax. Sections (5 μm) were stained with haematoxylin and eosin (HE).

Microscopically, a poorly demarcated, non-encapsulated, multilobulated neoplasm expanded

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the submucosa (Figs. 1 and 2) and infiltrated the subjacent smooth muscle (Fig. 3). The tumour was composed of round to oval and occasional spindle cells that separated and surrounded eosinophilic acellular material consistent with osteoid and osseous trabeculae (Figs. 2 and 4). The neoplastic cells had variably distinct cell borders, ample to abundant eosinophilic cytoplasm, round nuclei and one or more distinct nucleoli. Scatted mitotic cells were present (8 mitoses were observed in 10 randomly selected high-power fields; ×400). The mitotic cells were often present at the periphery of the mass, where the tumour was more cellular. Anisocytosis and anisokaryosis were mild to moderate. The neoplastic cells invaded blood vessels (Fig. 2) and the smooth muscle (Fig. 3). The overlying transitional epithelium was ulcerated focally and the intact epithelium was mildly to moderately hyperplastic (Fig. 2). A primary urinary bladder (vesical) osteosarcoma was diagnosed due to the characteristic microscopical pattern with lace-like osteoid and osseous trabeculae and an absence of epithelial malignancy. Histologically, the neoplasm was similar to osteosarcoma of the bone and other tissues.

The most common canine non-epithelial urinary bladder tumours are leiomyoma, leiomyosarcoma, haemangioma, haemangiosarcoma, fibroma and fibrosarcoma (Benigni *et al*., 2006). Primary urinary bladder osteosarcoma is rare. There is no published report describing a primary vesical osteosarcoma in the dog. Two cases were listed in a series of 169 EOSs diagnosed at the Veterinary Hospital of the University of Pennsylvania (Langenbach *et al*., 1998). Osteosarcoma of the urinary bladder in man is also rare (Young and Rosenberg, 1987; Papandreou *et al*., 2010; Abou Ghaida *et al*., 2014).

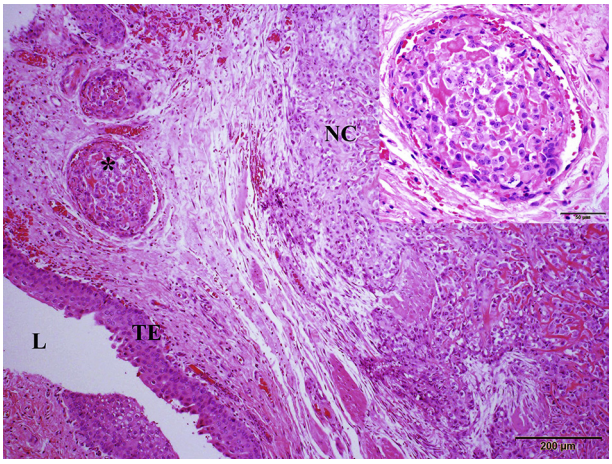

Fig. 2. Neoplastic cells (NC) infiltrate the submucosa and invade blood vessels (*). L, lumen; TE, transitional epithelium. HE. Bar, 200 µm. Inset shows higher magnification of vascular invasion indicated by asterisk. Bar, 50 µm.

EOS often occurs in older dogs (Langenbach *et al*., 1998) consistent with the age of the dog in the current report. The mean age of dogs with soft tissue osteosarcoma (9.7 years) was similar to the mean age of 9.4 years for cases diagnosed with skeletal osteosarcoma in the same time period. Dogs with soft tissue osteosarcoma were mostly female (57%), similar to the sex distribution for all cases of osteosarcoma (Langenbach *et al*., 1998).

The prognosis for canine EOS is poor. The median survival time is 1–2 months and the prognosis for cases with intra-abdominal soft tissue osteosarcoma is very poor (Langenbach *et al*., 1998). Distant metastasis of EOS is common in affected dogs; however, metastasis to the lungs develops less often than it does in dogs with skeletal osteosarcoma (Thompson

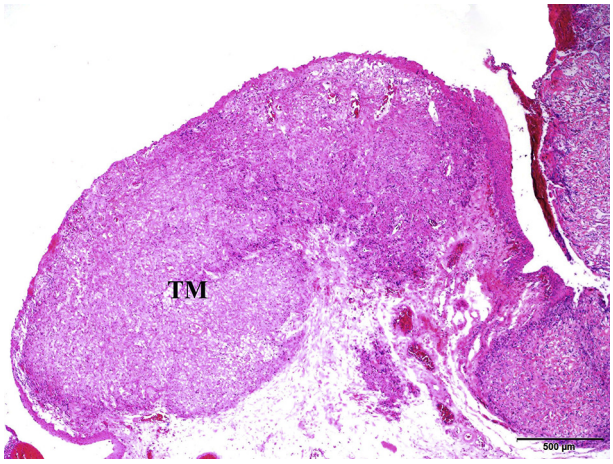

Fig. 1. Sub-gross view of the multilobulated tumour mass (TM). HE. Bar, 500 µm.

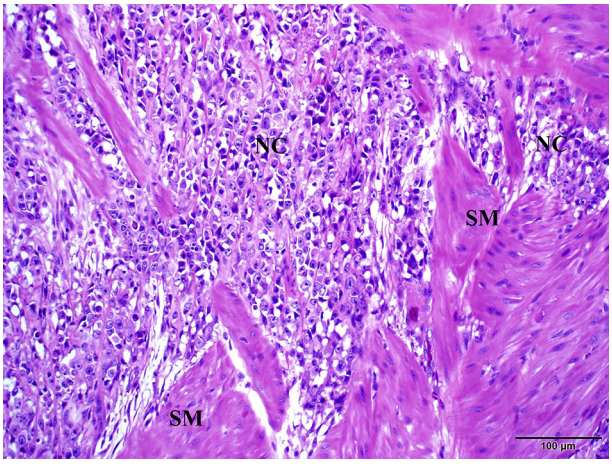

Fig. 3. Neoplastic cells (NC) infiltrate the urinary bladder smooth muscle (SM). HE. Bar, 100 µm.