Primary bone hemangiosarcoma involving the 4th digit in a Siberian Husky dog

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SUMMARY
An 11-year-old female spayed Siberian Husky was presented with a left hind, swollen, bleeding mass involving digit 4. Radiographs revealed osteolytic lesions involving the distal phalanx (P3) and part of the middle phalanx (P2). Digit amputation was performed; histopathology was consistent with hemangiosarcoma. Although no signs of systemic involvement were detected around the time of amputation, the patient was euthanised 47 days later due to regional and distant metastasis.

BACKGROUND
Hemangiosarcoma is a highly malignant tumour originating from vascular endothelial cells.1 2 The tumour may arise in any tissue involving blood vessels.3 4 5 The tumour may be solitary, multifocal within an organ or widely disseminated at presentation.1 3 The most common primary sites reported in dogs include the spleen, skin/subcutis, right atrium and liver.6 The incidence of primary bone hemangiosarcoma is less than 5% of all primary canine bone tumours.3 7 Less than 1% to 3% of dogs diagnosed with hemangiosarcoma have primary bone involvement.3 8 Primary bone hemangiosarcoma has been reported in the following dog breeds: German shepherd, Belgian malinois, rottweiler, doberman, doberman-boxer cross, boxer, pinsher, Irish setter, foxhound, bassett hound, lurcher, collie, cross Terrier, West Highland white terrier, beagle, cocker spaniel, maltese and mixed. The reported skeletal locations have included the scapula, humerus, radius, femur, tibia, vertebral, ilium, ischiium and rib. Hemangiosarcoma tends to be aggressively invasive and metastasises readily.1 2 10 Despite removal of the primary bone tumour via amputation, the prognosis has been poor due to progressive metastasis.2 11 This report describes a case of primary bone hemangiosarcoma involving digit 4 in a Siberian husky.

INVESTIGATIONS
Complete blood count revealed a regenerative anaemia (HCT=32.6% (37%–55%); Red blood cell (RBC)=5.21×10^{12} (5.5–8.5×10^{12}), Red blood cell distribution width (RDW-CV)=14.5% (12%–16%), mild leucocytosis (WBC 21.1×10^{9} (6–17×10^{9}) and 212×10^{9} (200–500×10^{9}) platelet counts. Biochemistry profile revealed a mildly elevated Alkaline phosphatase (ALP) (=145 (5–131 U/L)), creatinine (=1.8 (0.5–1.6 mg/dL)) and Blood urea nitrogen (BUN) (=42.4 (6–25 mg/dL)). Radiographs of the left hind foot revealed a pathological fracture with osteolytic bone lesions. The fracture margin was smooth, and no periosteal reaction was observed. A luxation between the middle (P2) and distal (P3) phalangeal bones was visible (figure 2). Although CT or other advanced imaging were not checked due to owner’s opinion, thoracic and abdominal radiographs were unremarkable (figure 3). No additional staging tests (ie, regional lymph node cytology, thoracic CT or abdominal ultrasound) were performed at the initial visit. A phalangeectomy was performed to the middle phalangeal bone (figure 4). The entire resected tissue was submitted for histopathology. Histopathology of the amputated digit was consistent with osseous hemangiosarcoma and cutaneous involvement. Mitotic count was greater than 20 in 10 hpf. The tumour was excised with an 18-mm proximal dermal margin and 9-mm proximal bone margin. The neoplasm nearly completely effaced the middle phalangeal bone (figure 5A). The fracture margin was smooth, and no periosteal reaction was observed. Immunohistochemistry of the resected tissue was performed to help confirm the diagnosis of hemangiosarcoma. Positive labelling with CD31 or Factor VIII antibodies are indicative of a vascular endothelial tumour. CD31 staining was diffusely and

CASE PRESENTATION
An 11-year-old female spayed Siberian Husky was presented with acute bleeding mass involving the left hind foot. On physical examination, swelling of the fourth digit and bleeding of the subungual tissue were noted (figure 1). The left popliteal lymph node felt normal in size; no enlargement nor abnormal firmness was detected.
strongly positive; Factor VIII staining was scattered. Due to the lack of osteoid production that could be seen with osteosarcoma and the positive CD31 stains that were suggestive of vascular endothelial origin, histopathology results were supportive of a primary bone hemangiosarcoma (figure 5B).

DIFFERENTIAL DIAGNOSIS
The most common digit tumours in dogs include squamous cell carcinoma and malignant melanoma. Osteosarcoma of the digit was also considered, but no neoplastic osteoid production or typical vascular stroma was observed to support an osteosarcoma.

TREATMENT
The owners did not elect further therapy beyond digit amputation. Supportive postoperative medications included cephalosporin antibiotics, tramadol, cimetidine, and ursodeoxycholic acid.

OUTCOME AND FOLLOW-UP
Two weeks after surgery, abdominal ultrasonography and echocardiography were performed. No abnormal findings were detected in the liver or spleen. Only mild mitral regurgitation was detected on echocardiogram; no cardiac mass lesions were seen. No additional diagnostics were performed. One month later, the patient returned with the primary complaint of nausea. On physical examination, multiple, subcutaneous, raised, red, blister-like nodular masses were visible from the inguinal area to the tibia of the left hind leg. Fine-needle aspirates of the skin lesions revealed blood and malignant mesenchymal tumour cells. Only reactive lymphoid hyperplasia was detected via cytology of the left popliteal lymph node. CBC revealed a stable hematocrit (HCT) of 32% (pre-op HCT=32.6% (37%–55%)), platelet counts were mildly decreased at 170×10⁹ (pre-op platelets=212×10⁹ (200–500×10⁹)), and the WBC count was mildly elevated at 23.7×10⁹ (pre-op white blood cell (WBC)=21.1×10⁹ (6–17×10⁹)). No significant abnormalities were noted on the biochemistry profile, except the ALP was higher at 178 (5–131 U/L); the previous azotemia had resolved (creatinine=1.3 (0.5–1.6 mg/dL), BUN=17.7 (6–25 mg/dL)). Thoracic radiographs revealed multiple pulmonary nodules that were not observed previously. A lobar sign involving the left cranial lung lobe was noted, which was suspected to be aspiration pneumonia secondary to the patient’s vomiting (figure 6).

The owners did not elect to pursue further diagnostics, such as abdominal ultrasound, left hind leg radiographs or histopathology of the left hind leg subcutaneous nodules. The patient was discharged with prednisolone, cephalosporin antibiotics,
Primary bone hemangiosarcoma has rarely been reported in different dog breeds and in various skeletal locations, but the cause remains incompletely understood. The neoplasm tends to remain confined to the medullary cavity, spreading proximally and distally along the medullary cavity before clinical signs develop.

It is believed that the spreading pattern may not elicit significant pain until a pathological fracture occurs, resulting in obvious lameness in some cases. None to minimal periosteal reaction is associated with primary bone hemangiosarcoma.

In some cases, it can be difficult to determine whether a bone hemangiosarcoma is a primary lesion or due to metastasis. Metastasis to the bone from other primary sites of hemangiosarcoma has rarely been reported.

In this case, the bone was considered to be a primary lesion for the following reasons: the patient presented with haemorrhagic and osteolytic lesions with no symptoms until the pathological fracture occurred, and no periosteal reaction was seen around the pathological fracture. Even after the phalanx lesion was found, no abnormalities were detected in the liver, spleen, lung or heart. The rapid development of multiple subcutaneous, blood blister-like lesions along the affected hind leg, diffuse lung metastasis and subsequent euthanasia 47 days after surgery was consistent with the aggressive biological behaviour of hemangiosarcoma. The overlying soft tissues of the phalangeal bone at the time of initial presentation appeared only swollen and different from the multiple subcutaneous blood blister-like lesions that later developed diffusely up the left hind leg. While it is possible that a local subcutaneous hemangiosarcoma could have originally invaded the phalangeal bone, inducing osteolysis, based on the initial gross appearance alone of the surrounding structures at the time of amputation, a primary bone tumour was most suspected. Regional radiographs of the subsequent subcutaneous blood blister-like lesions, especially over the tibia, were not performed. No obvious firm, bony-like tissue was noted in the left groin, and no concurrent lameness was noted. Progressive bone metastasis with subcutaneous extension from the amputated phalangeal bone was not suspected; only subcutaneous spread of disease was suspected. Although complete excision was reported histologically via digit amputation, it is possible that the surrounding subcutaneous tissue could have been infiltrated with microscopic satellite hemangiosarcoma, resulting in the subsequent diffuse blood blister-like lesions. Alternatively, the primary bone tumour cells could have spread subcutaneously within such a short time. It is unclear whether the outcome could have been more favourable with a larger surgery beyond digit amputation and if removing the regional lymph node could have had a positive impact.

DISCUSSION

Primary bone hemangiosarcoma has rarely been reported in different dog breeds and in various skeletal locations, but the cause remains incompletely understood. The neoplasm tends to remain confined to the medullary cavity, spreading proximally and distally along the medullary cavity before clinical signs develop.

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To the best of our knowledge, this is the first case report describing a primary bone hemangiosarcoma involving the phalangeal bones in a Siberian Husky. For patients presenting with bleeding, osteolytic bone lesions in digit bones, hemangiosarcoma should be included in the differential diagnostic list.
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