

A RARE CASE OF GIANT CELL-RICH EXTRA SKELETAL OSTEOSARCOMA OF CARDIAC MUSCLE IN A DOG

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Introduction

Osteosarcoma (OS) is the most common primary bone tumor of the appendicular skeleton in dogs and can be defined as a malignant mesenchymal tumor producing osteoid matrix¹. Occasionally, OS can arise in soft tissues without presence of a primary bone tumor, which is defined as extra skeletal osteosarcoma (EOS) and has been found in skin, muscle, adrenal gland, eye, gastric ligament, ileum, kidney, liver, spleen, testicle, vagina and mammary gland but has never been described in cardiac muscle^{1,2}. A rare histological variant of OS is the giant cell-rich extra skeletal osteosarcoma that has, to our knowledge, never been described in dogs, and even less in cardiac muscle.

History

An 11-year-old neutered male Dogue de Bordeaux was presented to the clinic for anorexia, lethargy and cough. On cardiac auscultation, heart sounds were muffled, and an echocardiography revealed a cardiac mass. Blood analysis was normal except for the alkaline phosphatases which were elevated (787 UI/L (range: 12-121 UI/L)). The dog was euthanized, and a necropsy was performed.

Necropsy findings

At necropsy, a high volume of sero hemorrhagic fluid was found in both the abdominal and thoracic cavities. Several mineralized white nodules measuring 1 mm to 3 cm were found in the left and right heart atria and ventricles at the level of the myocardium, protruding in the heart chambers. Similar nodules were found on the serosa of the intestines, mesentery, kidney, liver and internal abdominal wall, as well as more than 100 small mineralized cannonball metastases in the lungs.

Histological findings

Microscopically, all masses appeared similar. Expanding and infiltrating the surrounding tissue, there was a highly cellular, well circumscribed, non encapsulated mass composed of sheets of pleiomorphic polygonal to spindle shaped cells, with a large eosinophilic fibrillar cytoplasm, and indistinct cell borders. Nuclei were round to oval, with 1 to 3 prominent nucleoli and finely stippled chromatin. There was marked anisokaryosis and anisocytosis and presence of numerous giant cells with up to 30 nuclei. Mitosis were rare (1 per HPF). Neoplastic cells were surrounding, and occasionally being entrapped in, large islands of amorphous eosinophilic matrix (osteoid) with multifocal hemorrhages. Alkaline phosphatase positive immunoreactivity was observed in the cytoplasm of neoplastic cells.

Results and discussion

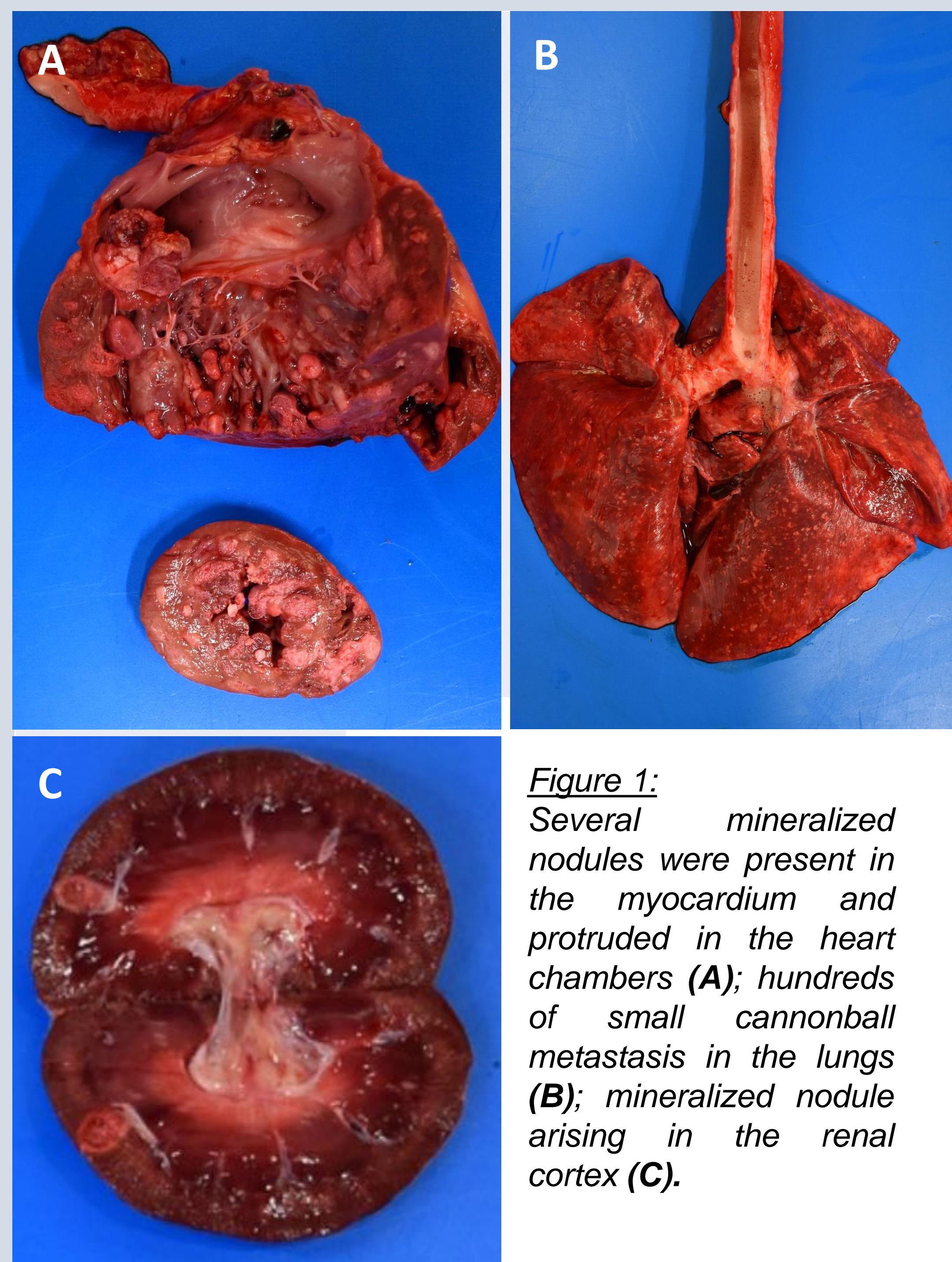


Figure 1: Several mineralized nodules were present in the myocardium and protruded in the heart chambers (A); hundreds of small cannonball metastasis in the lungs (B); mineralized nodule arising in the renal cortex (C).

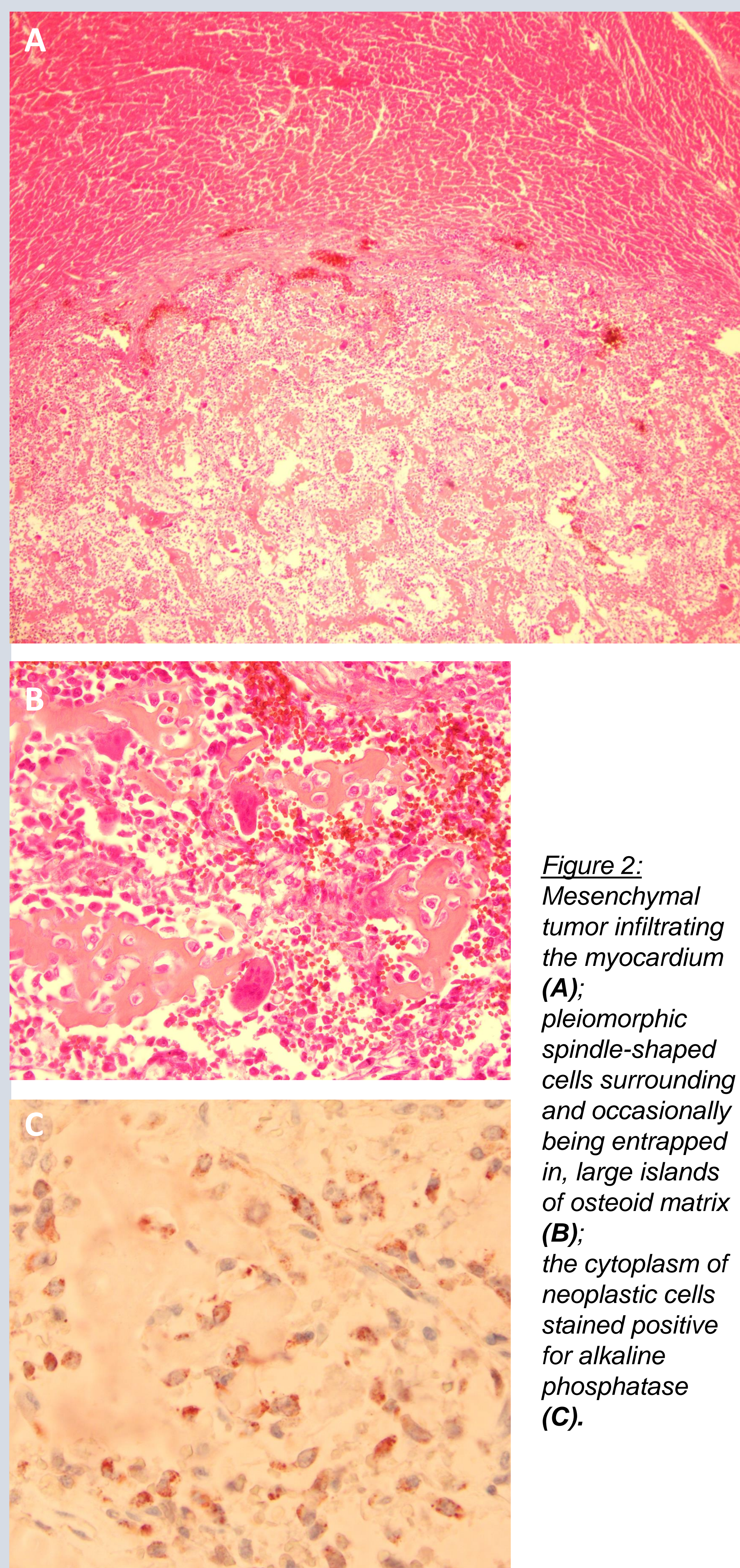


Figure 2: Mesenchymal tumor infiltrating the myocardium (A); pleiomorphic spindle-shaped cells surrounding and occasionally being entrapped in, large islands of osteoid matrix (B); the cytoplasm of neoplastic cells stained positive for alkaline phosphatase (C).

Osteosarcoma (OS) is the most common primary bone tumor found in dogs, arising most frequently in the metaphysis of appendicular skeleton of middle-aged dogs, and is histologically recognizable by mesenchymal tumor cells producing and trapped in an osteoid matrix¹. This tumor has a poor prognosis, because of a high metastatic rate, with rapid onset of micro (circulating tumor cells) and macro metastases in the lungs, but also in the lymph nodes. There are several subtypes of OS, including osteoblastic, chondroblastic, fibroblastic, telangiectatic and giant cell-rich histological variants¹, but it is still challenging to establish a histological based prognosis, since the biological behavior of these subtypes still has to be unraveled. The giant cell-rich subtype is rare in dogs, and is defined as an undifferentiated, high-grade OS in which most of the tumor is composed of osteoclast-like giant cells with variable osteoid matrix². In this case report, all masses were composed of a mixed population of osteoblastic and giant tumor cells. Since no primary bone tumor could be found in this dog, it could be concluded that this is a rare case of a metastatic giant cell-rich extra skeletal osteosarcoma (EOS). Alkaline phosphatase (ALP) positive immunoreactivity supports this diagnosis, because it has been demonstrated that ALP is a significant biomarker and prognostic factor of OS in human and in veterinary medicine^{3,4}. However, diagnosing OS can be challenging, especially in fibroblastic areas, with little osteoid matrix, in which case, additional diagnostic markers of osteoblastic differentiation such as osteopontin, osteonectin and runx2 can be used⁴. In this case report, it is difficult to determine which is the primary tumor site, since several small mineralized nodules could be found on different organs. Interestingly, in humans, EOS is found in deep soft tissues of extremities and retroperitoneum, whereas in dogs, visceral organs are most frequently affected^{5,6}, heart being almost never involved⁷. Primary and metastatic cardiac tumors are extremely rare and include hemangiosarcoma, rhabdomyosarcoma, undifferentiated sarcomas, metastatic lymphoma and metastatic renal carcinoma⁸. It is well known that OS spread by hematogenous route, however cardiovascular metastases are rarely found⁹. A case of a primary intracardiac EOS has been reported once in a dog¹⁰, however giant cell-rich cardiac EOS has never been reported in dogs, even less in humans.

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