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The extraosseal intrathoracic radiopaque bone cyst in West Highland White Terrier – a case report

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Abstract

The aim of this report was to present a clinical case and diagnostics of intrathoracic bone cyst as well as successful outcome of the surgical treatment in a male, 3-year-old West Highland White Terrier dog, weighing 6.9 kg. The dog was admitted in a very poor condition with clinical signs of severe dyspnoea that developed during about one month period of time before admission to our clinic. The dog underwent physical examination and further examinations including radiological examination which revealed a radiopaque mass formation in the cranial mediastinum. Ultrasonographic examination showed the presence of fluid; following thoracentesis revealed pseudochylous fluid. The bone cyst was surgically removed and more than 10 months after surgery the dog's health was very good without any difficulties. Bone cysts in dogs are infrequent; this was the first case at our clinic and presented a successful treatment.

Dogs, aneurysmal cysts, benign tumours, bone mass, thoracotomy

Benign bone tumours are generally rare and usually with abnormal development. They include bone cysts and single or multiple lumps of bone in abnormal places. Bone tumours are not uncommon in veterinary medicine. Benign tumours are generally unpainful with symptoms which depend on the type of compressed surrounding tissue (Vanel et al. 2011). Presence of bone cysts may be asymptomatic, but symptoms may develop at any age, when compression of surrounding structures reaches a critical threshold. Bone cysts may be monostotic or polyostotic and they are usually located in the metaphysis and diaphysis of long bone. The bone cysts are seen most often in young dogs, at the age of 5 to 24 months. Radiographically, the bone is expanded, with thin cortical margins. Recurrence or malignant transformation has not been observed after curettage (Burk and Feeney 2003). Aneurysmal bone cyst (ABC) is a benign but locally destructive lesion of the bone characterized by the presence of spongy or multiloculated cystic tissue filled with blood. Bone cysts represent 2.5% of all bone tumours. An ABC may involve almost any bone, but the most frequent sites are long tubular bones and vertebrae. The sternum is a rare location for an ABC (Singh et al. 2010). The pathogenesis of bone cysts is uncertain. Many theories focus on trauma, with subsequent haematoma formation within the developing metaphysis (Farrow 2003).

The aim of our study was to describe the clinical case with successful treatment of a bone cyst causing significant changes in the health status in one West Highland White Terrier dog.

Case presentation

Clinical symptoms

The 3-year-old male West Highland White Terrier weighing 6.9 kg, was admitted to the Small Animals Clinic of the University of Veterinary Medicine and Pharmacy, Slovak Republic with a history of dyspnoea, fatigue and general exhaustion, which had developed over about a one-month period before admission. The dog had been previously treated

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with antibiotics and non-steroidal anti-inflammatory drugs. Because of its deteriorating condition which included loss of appetite, stress intolerance, unwillingness to walk for prolonged time, frequent lying down and apathy, the dog was refereed to our clinic for further examination.

At the time of admission the dog was lethargic and he also suffered from a restrictive type of costoabdominal dyspnoea. The heart sounds were regular without murmurs and the lung field revealed a vesicular breathing less hearable in the distal part on both sides on auscultation, without significant additional murmurs. The dog's cough was easily provoked with a slight pushing of the trachea. The dog's body temperature was 38.6 °C, the pulse rate was 120/min and the respiratory rate was 60/min. This status was indicated for the radiologic examination.

Radiological examination

Radiological examination was done in the latero-lateral (LL) right-side (Plate III, Fig. 1) and ventro-dorsal (VD) position. Radiographs showed intrathoracic mass located in the cranial thorax cranially to the heart. The mass had an oval shape and measured about 7 × 4 × 2 cm. The ventro-dorsal radiograph determined in the median line a radiopaque round body located in the cranial mediastinum. Observation of lung tissue showed a collapse of the caudal lobes and their compression into the caudo-dorsal part of the chest. Heart demarcation was invisible due to effusion in this area and hydrothorax was diagnosed.

Ultrasound examination

Thereafter ultrasound examination and thoracentesis was performed, and venous blood for haematology and biochemical profile assessment was collected from vena saphena. Ultrasound examination showed the presence of larger fluid volume, a sign characteristic of hydrothorax. The main finding was hyperechoic mass located craniodorsally to the heart with internal anechoic structures. It was a suspected bone mass in the mediastinal area causing irritation of the pleura with subsequent pleural effusion.

Cytology

Thoracentesis was performed after USG and 130 ml white opalescent pseudochylous fluid was removed. The cytological specimen from the fluid was represented mainly with lymphocytes (80% of the total number of cells), variable number of segmented neutrophils and macrophages. The number of nuclear cells did not exceed 1.2×10^9/l (G/l). The content of total protein was 31.8 g/l (47–74 g/l) and albumin 20.5 g/l (26–41 g/l). Triglycerides and cholesterol were not tested. For this reason it cannot be distinguished with certainty whether it was a chylous or pseudochylous effusion. Due to neutrophilia we diagnosed it as a pseudochylous effusion.

Biochemistry

Biochemical profile assessment showed no significant abnormalities of the following determined indices: aspartate aminotransferase 0.42 μkat/l (< 0.6), alanine aminotransferase 0.56 μkat/l (< 0.949), alkaline phosphatase 0.62 μkat/l (< 1.24), creatinine 54.6 μmol/l (46–88 μmol/l), urea 15.4 mmol/l (3.97–8.05 mmol/l), serum glucose 5.82 mmol/l (3.6–5.8 mmol/l), cholesterol 3.15 mmol/l (3.3–7.4 mmol/l), phosphorus 1.51 mmol/l (0.90–1.91 mmol/l), calcium 2.35 mmol/l (2.05–2.86 mmol/l).

Haematology

Haematology showed a normal number of erythrocytes - 6.78 T/l (5.5–8.5 T/l), haematocrit 0.46 l/l, a standard total number of leukocytes - 9.1 G / l (5.5–12) but an increased number of young forms of neutrophils (left shift) indicated a prolonged

inflammatory process associated with suspected pleural irritation. The leukogram was following: segmented neutrophils 71% (55–75), banded neutrophils 13% (0–4), eosinophils 4% (0–5), basophils 0% (0–1), lymphocytes 7% (12–32), monocytes 1% (0–4).

Surgery

Based on these findings we proceeded to the surgical intervention into the thoracic cavity. After premedication and induction of anaesthesia, the dog was intubated and connected to a closed inhalation anaesthesia system. The dog was placed in lateral recumbency on its right side.

The left intercostal thoracotomy was performed in the third intercostal space. A mass was found in the thorax, with an irregular round shape, white-gray colour, and solid consistency on a palpation. The mass was firmly located in the chest, with a shank connected to the ventral part of the body of the first thoracic vertebra. Using bone forceps, the shank was removed at its base and the mass was released and pulled out of the thoracic cavity (Plate III, IV, Figs 2, 3). The intrathoracic mass was smooth, but had rough (ridged) surface and solid bone texture. The thoracic cavity was closed in a standard way. Postoperative performance was completed and at the onset of the swallowing reflex the dog was extubated and placed in an oxygen box. After 2 h the dog was conscious, its breathing was costo-abdominal and regular. The dog was given antibiotics (12.5 mg/kg amoxicilline with clavulanic acid) and non-steroidal anti-inflammatory drug meloxicam at the dose of 0.2 mg/kg (Metacam, Boehringer Ingelheim Vetmedica, Germany) post-surgically.

Histopathological examination of the removing specimen revealed a cystic structure, consisting of large blood spaces filled with white and red blood cells in different developmental stages, separated by various thick bony trabeculae. These findings were consistent with aneurysmal bone cyst (Plate IV, Fig. 4).

After surgery the dog was discharged for follow-up home treatment. Following check-up was performed after 10 days. The dog was alert, without any breathing or other difficulties, the food intake was good, movement was brisk and the dog was oriented in the environment. Stitches were removed from the wound. The lung field was without pulmonary murmurs, radiographs showed good lung permeability. The location and demarcation of the heart was normal. The biochemical and haematological profile was also in the standard. Next check-up was after three months. Radiograph of the chest showed normal results. This finding showed no pathology of the thoracic cavity, with no presence of any new bone formation or fluid in the thorax (Plate V, Fig. 5). The dog was objectively healthy and without difficulties.

Discussion

Various types of cysts occur in bones and may be difficult, or impossible, to distinguish from certain bone tumours radiographically. Cysts in the bone may have a different character. Solitary (unicameral), aneurysmal, subchondral (juxtacortical) and intraosseous epidermoid cysts have been described in different animal species (Meuten 2002).

Aneurysmal bone cysts occur very rarely in animals compared to humans. Except for the dog, they have been reported in cats, horses and bull, in bones of both the axial and appendicular skeleton. The gross appearance of aneurysmal bone cysts closely resembles telangiectatic osteosarcoma and haemangiosarcoma, typically exuding blood from the cut surface. The lesions may contain solid areas in addition to multiple, blood filled cysts. Aneurysmal bone cysts are benign, however, they present expanding, locally aggressive lesions and have a propensity for local recurrence (Yavuz et al. 2004) or malignant transformation (Matthew 2002). In our case, 10 months after surgery, we did not detect any clinical health disorders or radiological changes in the dog.

Aneurysmal bone cysts generally occur in the metaphyseal part of long bones but have been reported in the rib, pelvis and vertebra (Purdy 1985; Biller at al. 1987; Bowles and Freeman 1987; Liu and Thacher 1991; Pernell et al. 1992; Shiroma et al. 1993).

Arteriovenous anastomosis, one of the causes of aneurysmal bone cyst formation may result in haemodynamic changes and bone erosion and resorption. This process may be followed by not only production of vascular channels and fibrous or osseous shell, but also by osseous reparative process including reactive giant cells and stromal cells resulted in fibroblastic and osteoblastic proliferation. From this point of view the differential diagnosis includes giant cell tumour, monostotic fibrous dysplasia, solitary bone cysts, haemangioma, chondromyxoid fibroma, metastatic disease and primary malignant neoplasm, like osteosarcoma, haemangiosarcoma, fibrosarcoma, and plasma cell myeloma.

Diagnosis relies specially on radiographs and magnetic resonance imaging. Treatment usually requires a resection or extensive curettage (Dernell et al. 2007). Amputation (Pernell et al. 1992) or euthanasia (Bowles and Freeman 1987) has been indicated in cases of damage to the nervous system.

In our case, following history, clinical, radiologic and ultrasound examinations, blood biochemical profiles and histological examination of the intrathoracic mass, we can conclude that the first rib on the left side was not related to the intercostal muscles, but stand out freely into the chest cavity. The tip of the first unrelated rib on the left side began to create a bone formation which created a circular bone mass in the cranial part of the ventral thorax. Although this is a rare and life-threatening disease, the prognosis after surgical treatment is good and in this case, more than 10 months after surgery we found the dog to be in very good health despite the initial poor condition before surgery.

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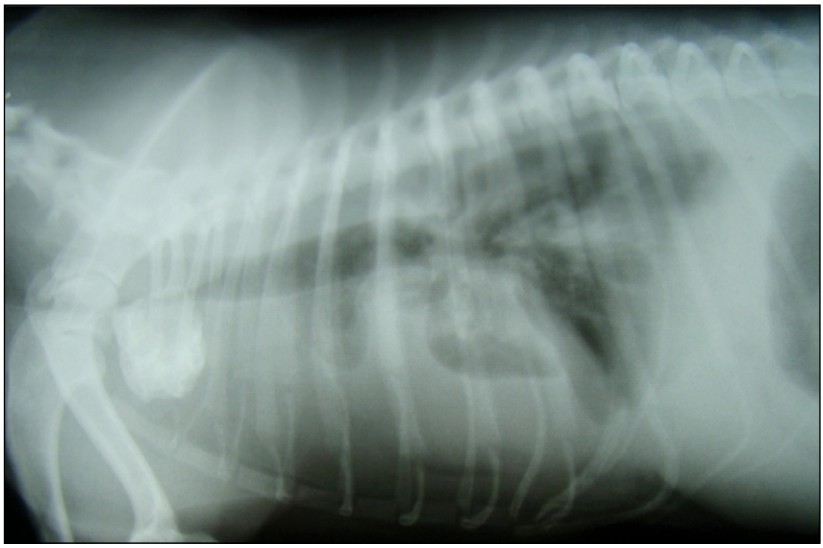

Fig. 1. Latero-lateral radiograph of the dog's thoracic cavity with a radiopaque mass in the cranial part of the thoracic cavity, with the presence of fluid in the ventral part of the thorax and atelectasis of caudal pulmonary lobes.

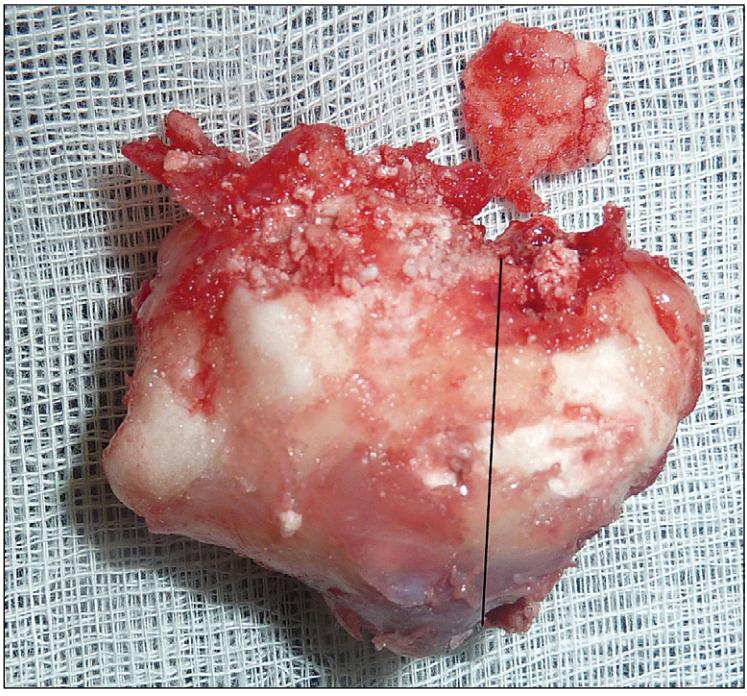

Fig. 2. The extirpated bone mass from the dog's thoracic cavity. The black line shows the approximate line of cutting (Fig. 3).

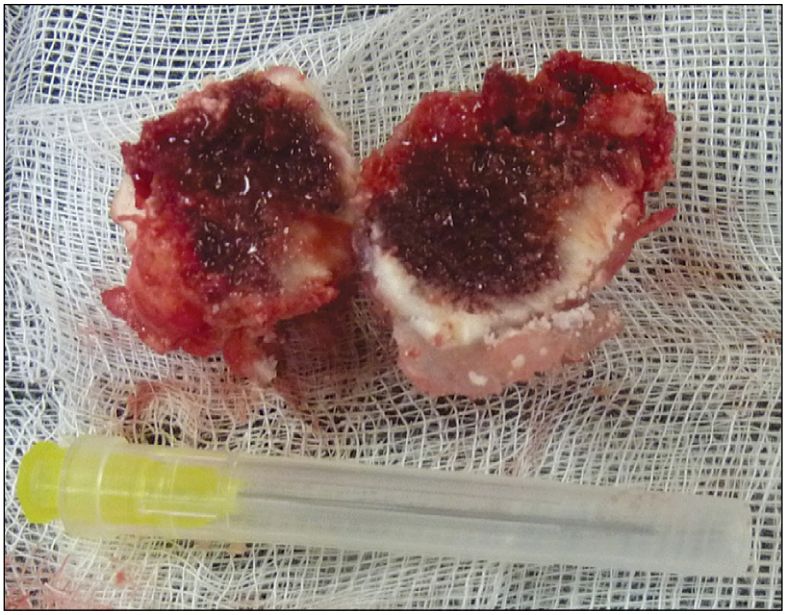

Fig. 3. The bone mass from the dog's thoracic cavity with radiodense lamellar bone after cutting and spongy structure with blood inside.

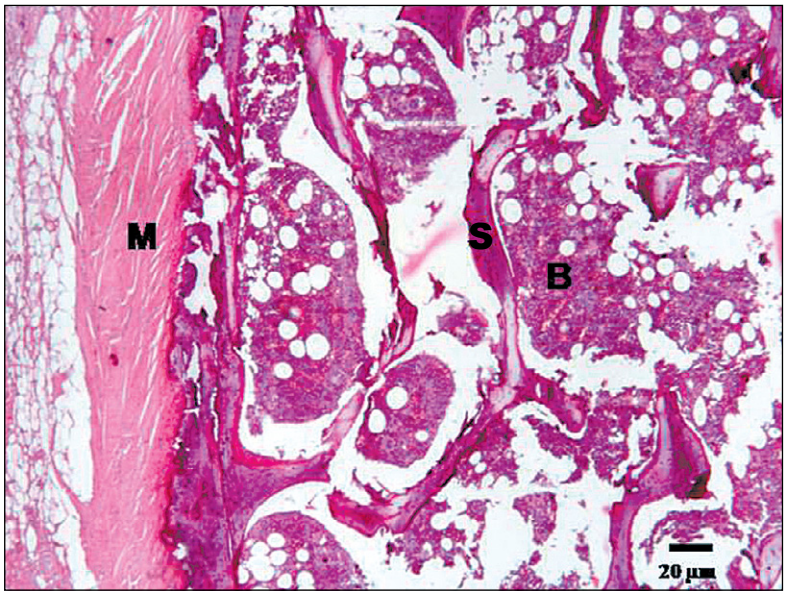

Fig. 4. Histological picture of the bone cyst margin (M) in the dog with large, cavernous spaces filled with blood (B) encircled by bone spicules (S) (haematoxylin and eosin, bar = 20 µm).

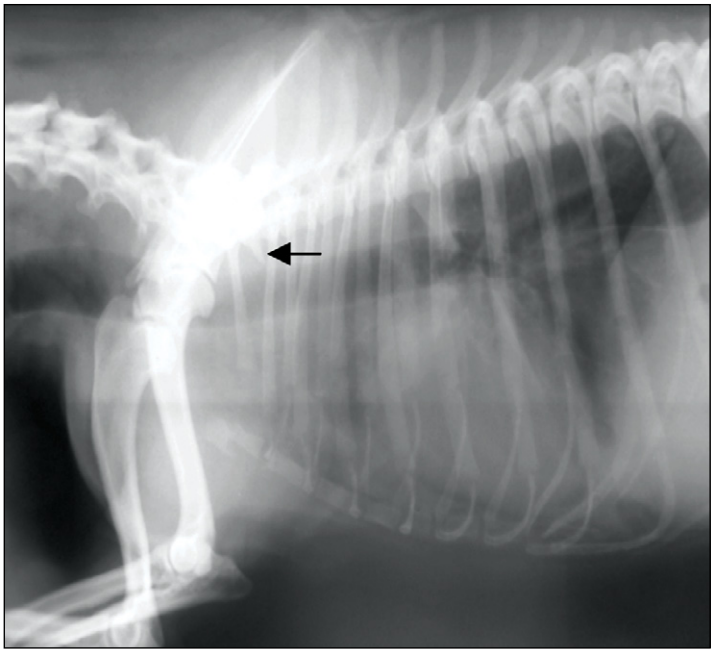

Fig. 5. Latero-lateral radiograph of the dog's thoracic cavity. Situation after removal of bone mass which was based on the first rib on the left side of the chest. A small part of the remnant of the rib is visible.