

# Scapular osteosarcoma in a 14-Month-Old Golden Retriever

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## Abstract

A 14-month-old golden retriever was presented with progressive right front limb lameness of 1.5 months' duration caused by a large spherical mass in the right scapula. Radiographic examination was consistent with skeletal neoplasia, showing a distinctive area of osteolytic and osteogenic activity, adjacent soft tissue invasion and metastatic lesions in the anterior lung fields. The histopathologic examination established the diagnosis of minimally productive, osteoblastic, grade III osteosarcoma. Both scapular osteosarcomas and osteosarcomas in very young dogs are rarely described; to the best of our knowledge, scapular osteosarcomas have not been described at such a young age previously.

## INTRODUCTION

Osteosarcoma (OS) is the most common primary bone tumour in the dog. In general, it is an aggressive malignancy of osteoblasts with a high rate of metastasis.<sup>5,18,20</sup> According to the World Health Organization classification of bone and joint tumors,<sup>17</sup> an OS is a primary malignant neoplasm of mesenchymal origin that gives rise to a variety of patterns but always includes the production of bone by malignant osteoblasts. Its biological behaviour seems to vary depending on location, age or breed.<sup>5,18,20</sup> Although there is a broad range in the age of onset, OS is a disease that mostly occurs in middle-aged to older dogs, with a median age of 7 years.<sup>2,5,18,20</sup> The metaphyseal region of the long bones is the most common primary site.<sup>5,18,20</sup> This paper reports a case of a scapular osteosarcoma in a 14-month old dog, thus presenting a case that has arisen both in an uncommon location and in an uncommonly young age.

## CASE REPORT

A 14 month-old, male entire, golden retriever weighing 25 kg was presented to a private clinic in Limassol, Cyprus with a history of progressive right forelimb lameness of 1.5 months' duration. Upon clinical examination, a large, spherical mass, measuring approximately 30 cm in diameter, concerning the right scapula as well as generalized muscle atrophy of the limb were observed. On palpation, the mass was hard, poorly demarcated, solid, and had irregular and rough surface, while the shoulder was painful when passively pulled. The dog was alert but its temperature was remarkably high (40.7 C). Additionally, mild coughing was

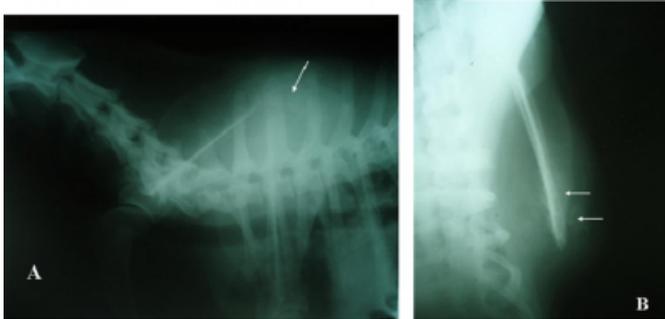
easily reproduced during light exercise and exposure to stress, and mild abnormal sounds in the lung were noticed during thorax auscultation.

Complete blood count, biochemistry profile and urinalysis were unremarkable apart from indicating mild nonregenerative anemia probably due to the chronic nature of the disease. Our initial diagnostic considerations included two main differentials: skeletal neoplasia and granuloma caused by chronic inflammation.

The dog was hospitalized and treated with amoxicillin - clavulanate<sup>a</sup> (Synulox original, Pfizer Hellas A.E., 0.05 ml/Kg s.c. SID) as well as carprofen<sup>b</sup> (Rimandyl, Pfizer Hellas A.E. 0.085 ml/kg s.c. SID) for 10 days. At the end of the treatment the dog's temperature and appetite returned to normal. On radiographic examination both the right lateral (Figure 1A) and the dorsoventral (Figure 1B) view of the front limb showed a distinctive area of osteolytic and osteogenic activity within the scapula. New bone formation extended in a palisading (or so-called sunburst) pattern radiating from the adjacent normal bone, while the surrounding soft tissues appeared swollen.

**Figure 1**

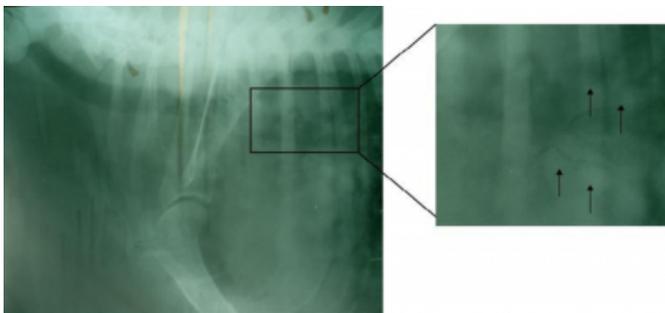
Figure 1: A. Lateral radiograph of the dog, showing evidence of bone lysis as well as osteogenic activity (white arrow). B. Dorsoventral radiograph of the dog, indicating a distinctive area with osteolytic and osteogenic activity, as well as swelling to adjacent normal tissues (white arrows).



In chest radiographs, metastatic lesions were evident within the anterior lung fields (Figure 2). At this point, malignant neoplasia of the scapula with pulmonary metastases was diagnosed and the owner of the dog was informed of the poor prognosis.

**Figure 2**

Figure 2: Lateral radiograph showing metastatic lesions in the anterior lung fields of the dog. Multiple metastatic nodules are distinguished in the pulmonary parenchyma (black arrows on enlarged image).

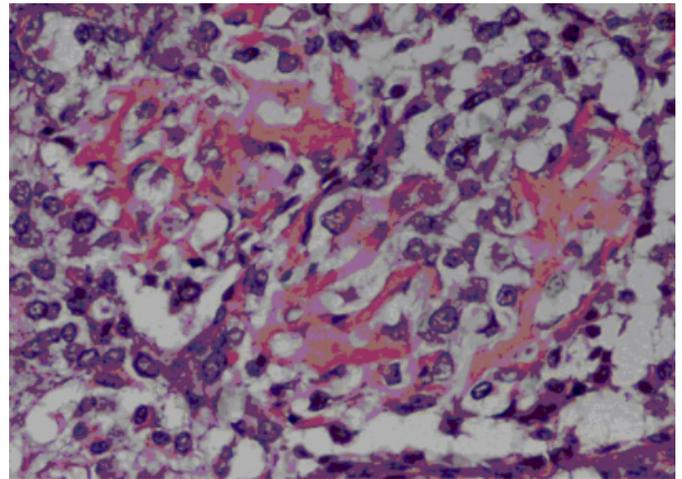


Soft tissue biopsy was performed with a Tru-Cut<sup>®</sup> biopsy needle, while the dog was under general anaesthesia. The tissues were fixed in 10% neutral buffered formalin, processed routinely, embedded in paraffin, and 5 µm-thick sections were stained with haematoxylin and eosin. Histopathologic examination revealed the presence of a tumour composed of moderately to highly pleomorphic cells that appeared to invade neighbouring muscle tissue and that were arranged in loosely or densely packed sheets. The tumour cells were mainly ovoid or spindle in shape and were at places producing and were embedded in small osteoid spicules. The mitotic index was very high, with 4 to 7 mitoses observed per high power field. In the loosely arranged areas, fine, possibly myxoid extracellular matrix

was present. Large areas of haemorrhage were observed, possibly associated with the biopsy procedure. Necrotic areas were not observed, possibly due to the rather small size of the area examined, although areas undergoing necrosis were evident. A diagnosis of minimally productive, osteoblastic, grade III<sub>11</sub> osteosarcoma was offered (Figure 3).

**Figure 3**

Figure 3: Photomicrograph of a histological section of the case described showing moderately pleomorphic tumour cells producing and being embedded in osteoid, a feature characteristic of osteosarcoma. Haematoxylin & eosin, x400.



<sup>a</sup> Synulox original, Pfizer Hellas A.E. <sup>b</sup> Rimandyl, Pfizer Hellas A.E. <sup>c</sup> Tru-Cut, Baxter General Healthcare, Deerfield, Illinois

Following the histological diagnosis, the grave prognosis was again explained to the owner. The option of palliative surgery with or without chemotherapy was offered, however the owner could not afford such a demanding therapeutic management, elected to have the dog euthanized and did not give permission for necropsy.

**DISCUSSION**

Osteosarcoma is the most common primary bone tumor in dogs, accounting for up to 85% of malignancies originating in the skeleton.<sup>5,18,20</sup> It mainly occurs in middle-aged to older dogs, although there is a large range in the age of onset.<sup>2,5,18,20</sup> Although there is a second small peak in the age of onset of OS at 18 to 24 months,<sup>14</sup> the number of OS cases that have been reported in younger dogs, such as the OS in a 14-month-old dog presented here, is very limited. The youngest dog reported with OS to date is a 3-month-old puppy with an OS in the mandible.<sup>7</sup> Other OS cases reported in young dogs include a 6-month-old puppy,<sup>15</sup> a 10-month-

old Great Dane, <sup>6</sup> and an 11-month-old dog. <sup>21</sup> Remarkably, none of the aforementioned cases was located in the scapula. Overall, approximately 75% of OS occur in the appendicular skeleton, with the remainder occurring in the axial skeleton. <sup>5,18</sup> The metaphyseal region of the long bones is the most common primary site. <sup>5,13,18,20</sup> Although OS of irregular bones is not generally rare <sup>1,12,13,16</sup>, scapular OS is quite uncommon. In a study of 194 cases, Brodey (1964) reported that the four major weight-bearing bones (radius, tibia, femur, humerus) gave rise to 70% of osteosarcomas. <sup>2</sup> In another study of 31 cases with OS in the appendicular skeleton, Cavalcanti (2004) indicated that the most frequently affected bones were the radius and ulna, femur and tibia, while the scapula was the less frequently affected one. <sup>3</sup> To our knowledge, it has not been reported in a dog 14 months old or younger.

Radiographically, OS should mainly be differentiated from other bone tumors, bacterial osteomyelitis and the less frequently encountered mycotic osteomyelitis. These bone infections may result in a monostic aggressive lesion. However, there may be other radiographic evidence, such as pulmonary infiltrates or thoracic lymphadenopathy or clinical signs of systemic debilitation that support the diagnosis of an infectious process. In cases in which the signalment and radiographic evidence prove insufficient, then bone biopsy is necessary for a definite diagnosis. <sup>19</sup>

Metastasis is the most common complication of cancer leading to death. Concerning bone tumors other than osteosarcoma, metastases occur in about 25% of cases in small dogs and less than 5% in large dogs. <sup>4</sup> On the contrary, metastasis in cases of OS is very common and arises early in the course of the disease and it is mainly asymptomatic. <sup>5</sup> A surprising finding in our case is the fact that, despite being very young, the 14-month-old dog had already developed radiographically detectable metastases. However, in a previous study with medical records from 45 dogs with OS arising from flat or irregular bones, it was claimed that OS arising from the rib or scapula had the highest prevalence of metastases, <sup>8</sup> although the number of cases per location may be limited to draw conclusions relating to the biological behaviour of OS depending on their site.

In domestic animals, OS can be histopathologically classified as poorly differentiated, osteoblastic, chondroblastic, fibroblastic, telangiectatic, and giant cell type. <sup>10,17</sup> A multipotential OS with various mesenchymal differentiations in a 1.5 year old dog has been recently

reported in the literature. <sup>9</sup> In primary OS, the subtype most frequently observed is the osteoblastic productive one, as in our case, representing the conventional form of OS, in which the dominant extracellular matrix produced by the tumor cells is osteoid or bone. <sup>11</sup>

To conclude, we have reported a case concerning the youngest dog (14-month old) in the veterinary literature with OS in the scapula and radiographically detectable metastases upon presentation in the clinic.

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