Large subcutaneous tumour in a roe deer

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Signalment

Adult (age unknown), female roe deer (*Capreolus capreolus*)

History

A large mass had been noted on the neck of a wild roe deer by members of the public. Hunters were subsequently asked to identify and dispatch the deer for welfare reasons. The carcase was submitted the following day for post mortem examination to The Royal Veterinary College Diagnostic Laboratories.

Necropsy findings

A 71cm ovoid mass weighing 5147g occupied the distal third of the neck, on the ventral, left hand side with multifocal ulceration on the ventral surface (Figure 1A). The mass was well demarcated and separated easily from the surrounding tissue, with only small focal adhesions to surrounding structures. It was fluctuant to parenchymatous and contained multiple foci of mineralisation (Figure 1B).

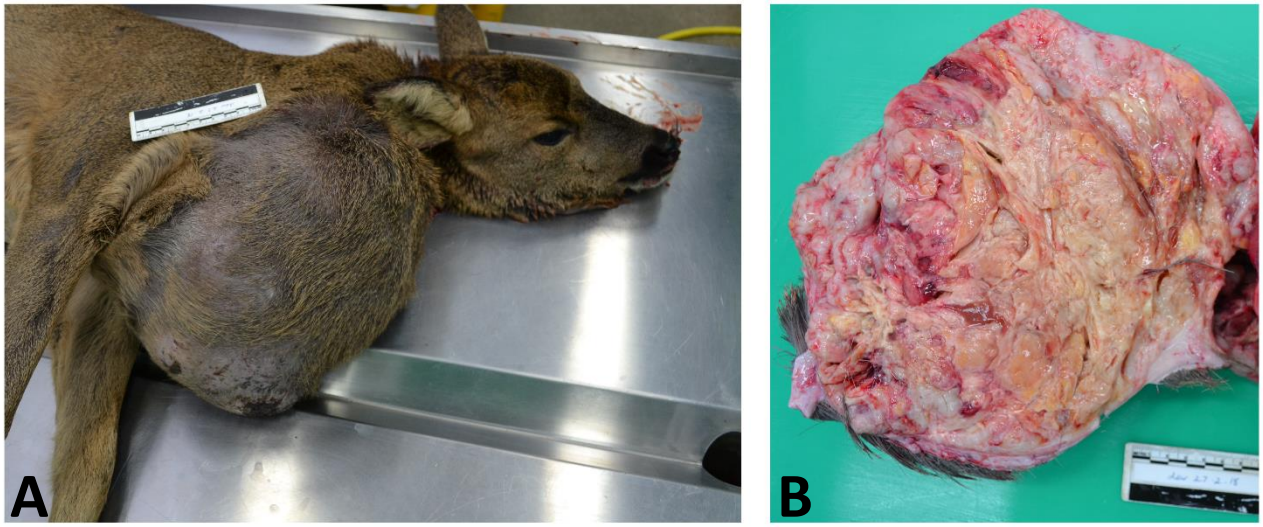

Figure 1: Gross pictures from necropsy of an adult female roe deer. **A)** Large, subcutaneous mass in situ. **B)** Cross section of the mass.

Mild enlargement of the right prescapular lymph node was also noted. The left prescapular lymph node could not be identified. No other evidence of metastasis was found.

The deer had no remaining fat deposits and bone marrow fat had started to undergo serous atrophy, suggestive of cachexia. There were three hairless foetuses within the uterus.

Impression smears of various areas of the mass were made (Figures 2 & 3).

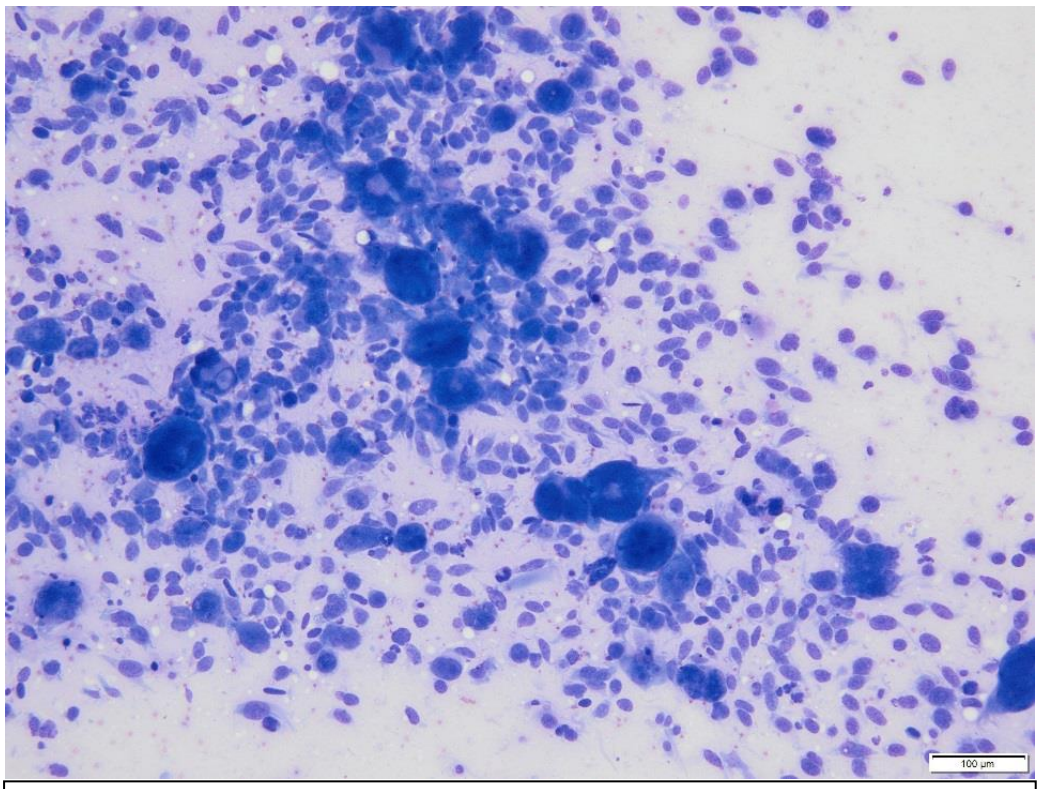

Figure 2: Impression smear from a large subcutaneous mass in a roe deer, 10x objective, modified Wright's stain. Scale bar = 100µm.

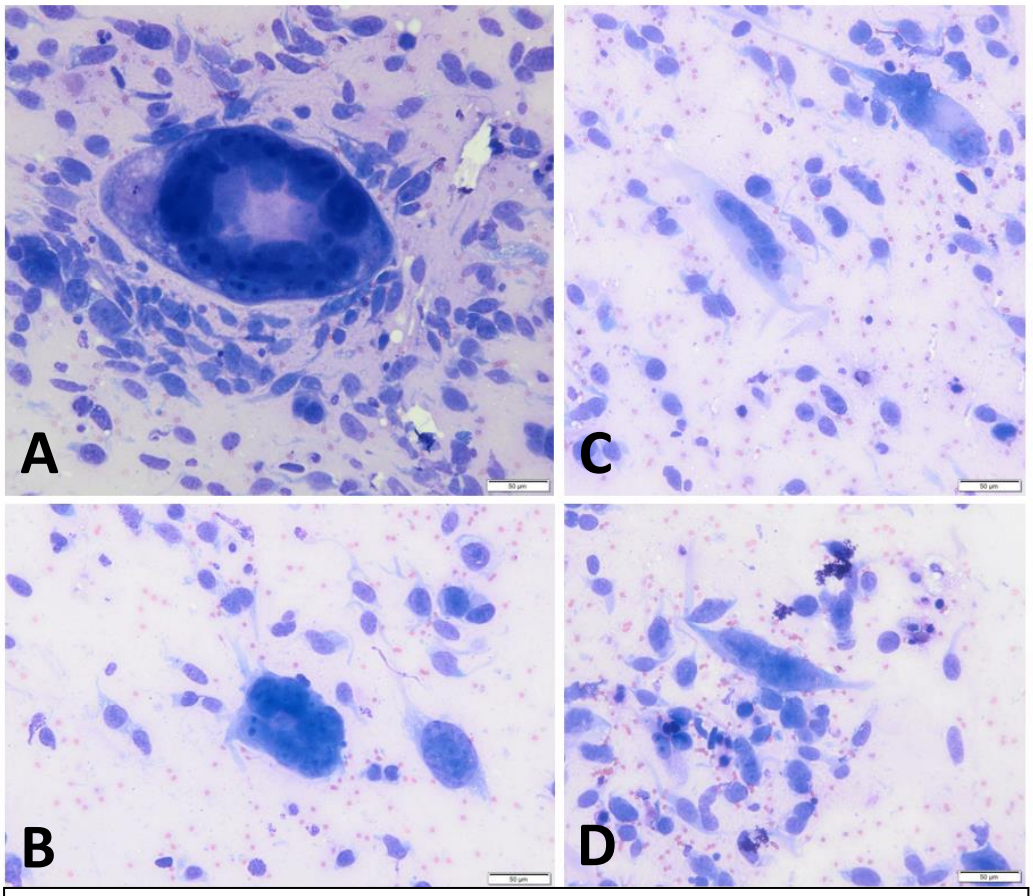

Figure 3 A-D: Impression smear from a large subcutaneous mass in a roe deer, 20x objective, modified Wright's stain. Scale bars = 50µm.

Cytological findings

Impression smears yielded very high nucleated cellularity, occasional erythrocytes and rare lysed cells on a pale pink background (Figure 2). High numbers of fusiform mesenchymal cells were present, with an oval to cigar-shaped nucleus, approximately 10-20µm in size, with finely stippled chromatin, multiple prominent nucleoli, and low amounts of mid basophilic, wispy cytoplasm, occasionally containing small vacuoles. Cells exhibited marked anisocytosis and anisokaryosis, including frequent macrocytosis and karyomegaly (up to approximately 50µm), frequent bi- and multinucleation (over 10 nuclei per cell), with intracellular anisokaryosis and occasional satellite nuclei. Occasionally, nuclei of multinucleated cells were arranged peripherally (Figures 3A & 3B) or in a row (Figures 3C & 3D). Cells had nucleoli that varied in size and number (highest numbers were too numerous to count), including macronucleoli. Rare cells were performing cell cannibalism. Mitotic figures were rarely seen. Rare pink matrix was seen in the background, often admixed with the neoplastic cells. Necrosis was observed in abundance in certain areas of the mass, with scattered necrotic cells in other areas.

Cytological findings were consistent with a sarcoma. Given the high numbers of multinucleated giant cells, a pleomorphic soft tissue sarcoma with giant cells was the top differential, but a perivascular wall tumour or peripheral nerve sheath tumour (due to presence of crown-like cells), a rhabdomyosarcoma (given possible strap cells), or a liposarcoma (based on cytoplasmic vacuolation) were also considered at this stage, although the degree of pleomorphism would be unusual for the former.

Histological findings

Histologic examination revealed an unencapsulated, multilobulated neoplasm that was infiltrating and expanding the subdermal connective tissue. Sheets and streams of oval to plump spindloid neoplastic cells with variably distinct cell borders and a small to moderate amount of eosinophilic cytoplasm were seen. The neoplastic cells had large oval to elongated nuclei with coarsely stippled chromatin and 1-2 prominent eosinophilic nucleoli. There was marked anisocytosis, anisokaryosis and cellular pleomorphism with megalocytosis and many karyomegalic and/or bizarre cells and macronucleoli observed (Figures 6A-D). Islands of osteoid were seen within the mass (Figure 6D), as well as multifocal trabeculae of woven bone and/or fibrocartilage around the periphery which blended with adjacent fibroplastic connective tissue (Figure 5). Thirteen mitotic figures were observed in 10 HPFs including bizarre mitoses and mitotic activity within giant cells (Figure 6A). Widespread areas of necrosis were also observed.

The same population of neoplastic cells forming the mass were also found in the right prescapular lymph node, accompanied by associated nodal fibrosis and lymphoid hyperplasia.

Findings were most consistent with an extra-skeletal giant cell-rich osteosarcoma (GCR-OSA). A giant cell tumour of bone was initially considered but was ruled out based on the degree of osteoid production, the marked atypia and lymph node metastasis.

Other findings

After necropsy had been performed, a section of the mass was placed in hydrogen peroxide, revealing a large spicule of bone, measuring 6x2x2cm (Figure 4).

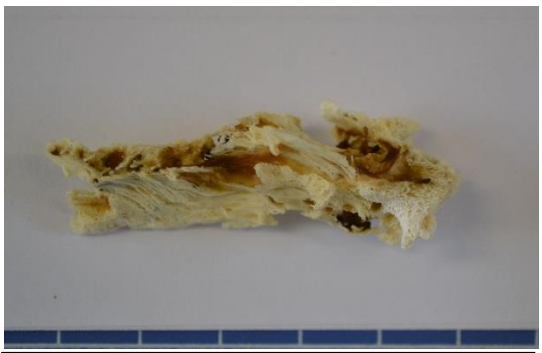

Figure 4: Bone spicule from within the mass.

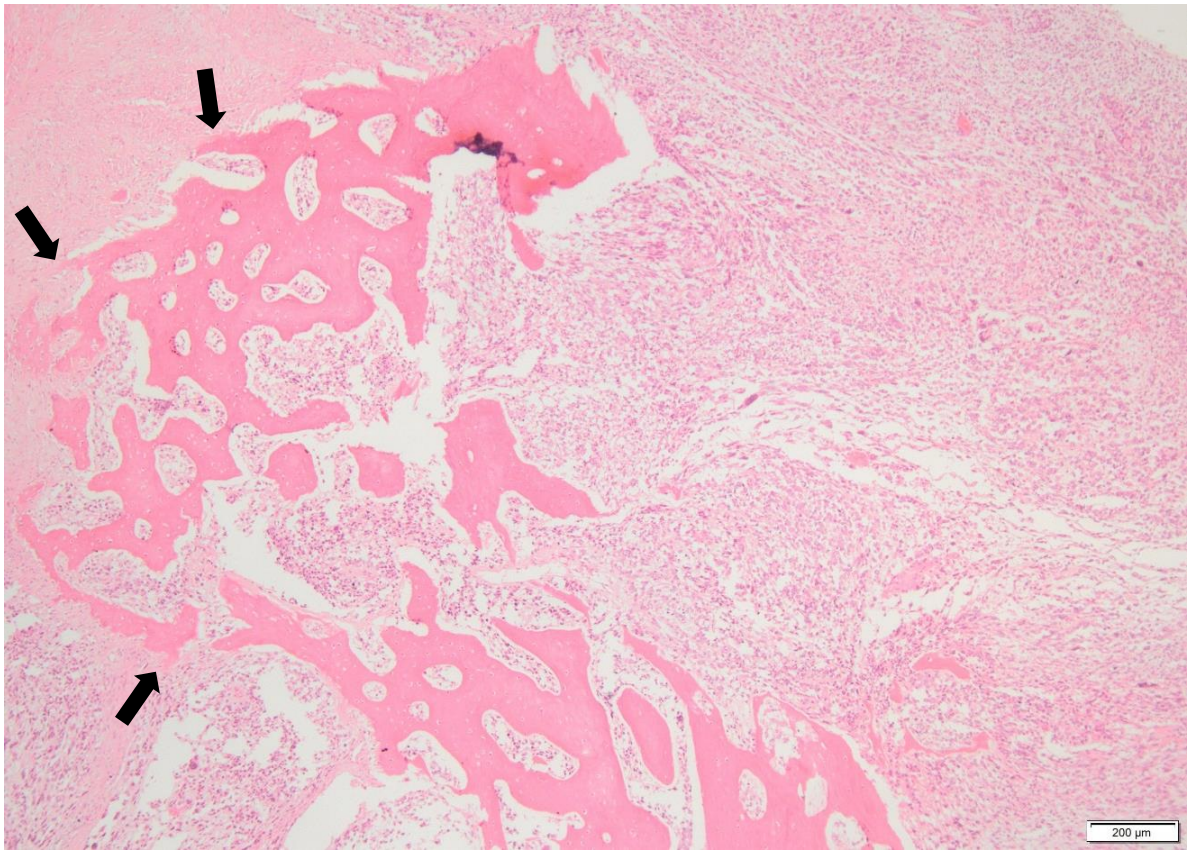

Figure 5: Tissue section from a large subcutaneous mass in a roe deer (4x objective, H&E). Note how the neoplastic cells are arranged in sheets and streams (right), with woven bone on the periphery of the mass blending into the adjacent fibroplastic connective tissue (arrows).

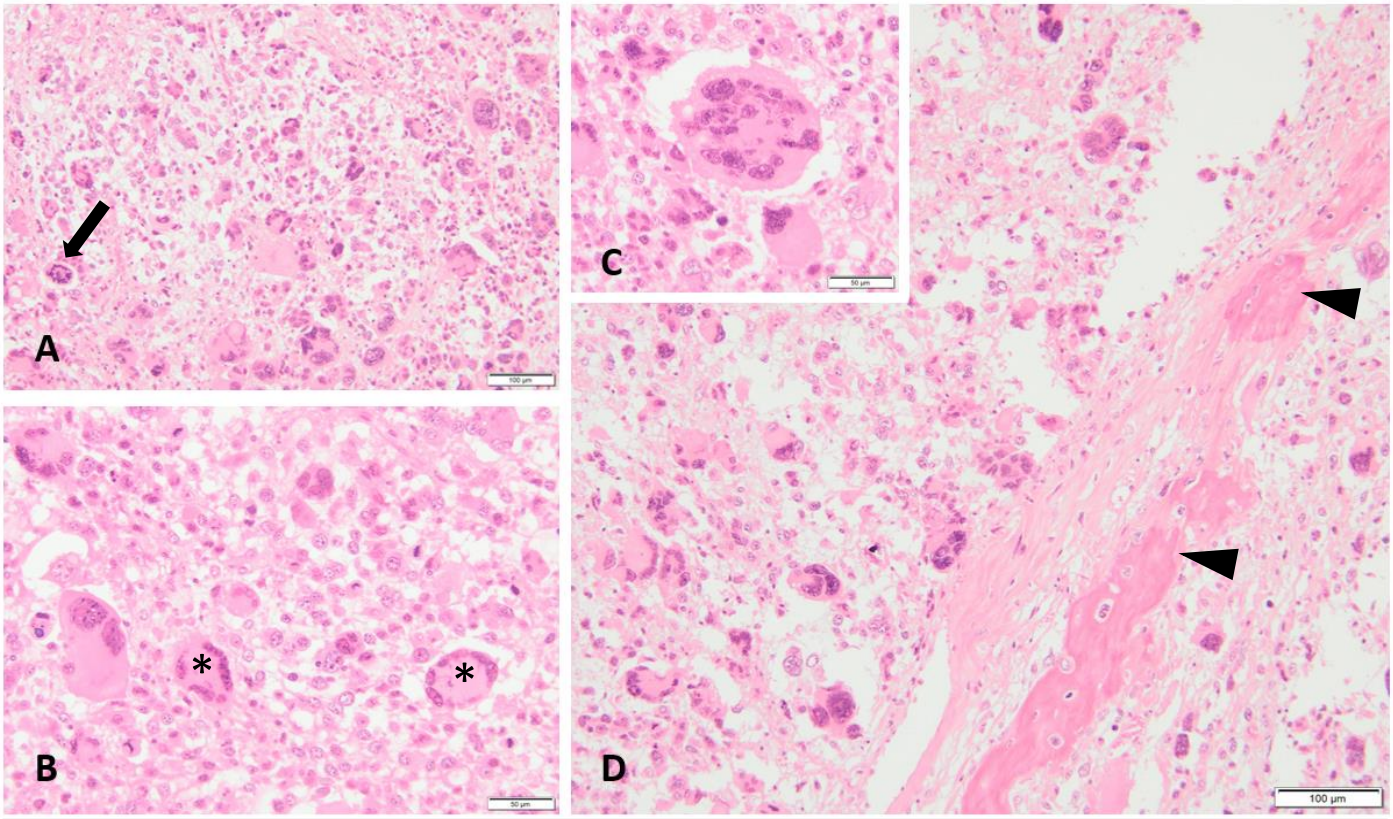

Figure 6 A-D: Tissue section from a large subcutaneous mass in a roe deer, H&E. Note the high numbers of multinucleated giant cells, some of which have peripherally placed nuclei similar to those seen on cytology (B; stars). Aberrant mitoses are present (A; arrow) as well as islands of osteoid (D; arrowheads). A, B & D = 10x objective. C = 20x objective.

Discussion

Roe deer are a common species of deer in the UK. Studies in other countries have revealed that neoplasia is responsible for approximately 2% of morbidity and/or mortality in this species[1, 2], although the prevalence of virally-induced fibropapillomas has been reported to be as high as 55% in endemically affected areas[3]. Another uncommon but externally visibly neoplasm is the "antleroma", which is thought to be caused by aberrations in testosterone levels[4].

Osteosarcomas (OSAs) have been rarely reported in this species[1, 2, 5] but, to the author's knowledge, this is the first reported case of a giant cell variant. In humans, GCR-OSA is defined as "an osteosarcoma in which more than 50% of the tumour consists of numerous uniformly distributed osteoclastic giant cells amidst oval or spindle mononuclear cells embedded in a fibrovascular stroma"[6]. Reports in veterinary species include those in a cat[7], a dog[8] and a mink[9], all of which were skeletal. Extraskeletal GCR-OSAs are even less common; two case reports have been documented in humans, involving the intestine[10] and the parotid salivary gland[11]. Whilst extraskeletal osteosarcomas have been reported in cats and dogs[12-14], to the author's knowledge, this is the first extraskeletal GCR-OSA reported in veterinary literature. It should be noted, however, that whilst no gross bony lesions could be identified, a small primary bone mass could have been missed at necropsy.

With regards to tumour behaviour, in one study of 61 dogs with soft tissue OSAs, only three had metastases in the lungs[12]; this is in contrast to the behaviour of canine skeletal OSAs, which commonly exhibit pulmonary metastasis[15]. A smaller study of 11 dogs with extraskeletal OSAs also found a low rate of pulmonary metastasis, with metastasis to lymph nodes being the most common presentation[14]. In our case, there was no evidence of pulmonary metastasis; local invasion and nodal metastasis was observed. It is unclear from this case if the mass originated within the subcutaneous tissue or, given the lack of detection, from the left prescapular lymph node although remnants of lymphoid tissue are not described in the mass. Furthermore, the blending of the trabeculae of woven bone in the periphery of the mass with adjacent subdermal connective tissue could indicate malignant transformation of metaplastic bone, which in itself could have arisen secondary to prior trauma to this site.

The presence of foetuses in the uterus would be suggestive of this animal being in good health in spite of the presence of the mass. However, the marked degree of fat loss indicates otherwise, therefore it may be that the mass (combined with the pregnancy) was causing acute cachexia, suggesting rapid tumour growth. Similar findings were present in other reported GCR-OSAs in veterinary species[7, 9].

OSA was not initially considered as a differential diagnosis based on cytology alone, mainly due to extraskeletal location, absence of more typical osteoblastic cell morphology, and the lack of overt osteoid matrix. However, the latter does not often exfoliate well and, in hindsight, impression smears closer to the mineralised areas may have yielded more matrix.

To our knowledge, this is the first report of an extra-skeletal GCR-OSA in a veterinary species. This case highlights that a GCR-OSA should be considered as a differential diagnosis for cytological samples of mesenchymal tumours with high numbers of pleomorphic multinucleated cells, even when overt osteoid matrix is lacking on cytological preparations, or when the mass is not overtly associated with skeletal bone.

Acknowledgements

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