

# A tricky tumour to diagnose

By Cristina Gans

A young dog presents with a tumour, but immunohistochemistry shows this is no ordinary soft tissue sarcoma.

## History

A three-year-old mixed-breed dog presented with a rapidly enlarging mass on the left side of the head, just below the left ear base. Cytology of the mass and the mandibular lymph node was non-diagnostic. Serum biochemistry and CBC showed no abnormalities. Multiple punch biopsies were taken and submitted for histopathology. Upon confirmation of a malignant neoplasm from these initial biopsies, the mass was surgically excised and submitted for histopathology.

## Histopathology

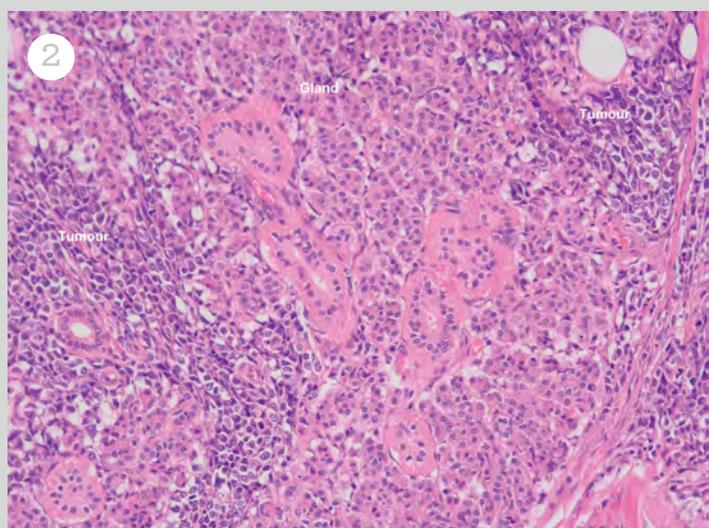
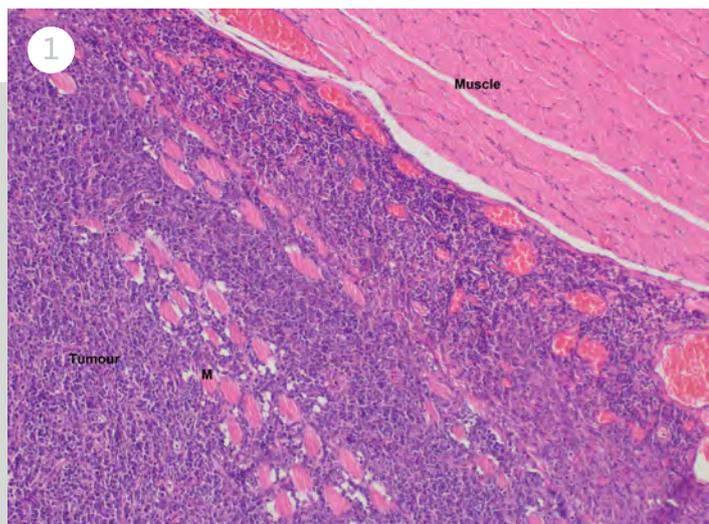
Histology revealed a population of neoplastic cells infiltrating the adjacent musculature and salivary gland (Figures 1 and 2). The neoplastic cells displayed a variable morphology, with both spindle cells and round cells evident (Figures 3 and 4). A high mitotic count was present. Large aggregates of lymphocytes were present both within the tumour stroma and in the periphery of the mass.

Differential diagnoses considered for this mass included a poorly differentiated soft tissue sarcoma, poorly differentiated carcinoma, amelanotic melanoma or lymphoma. Because routine histology was unable to provide a definitive diagnosis, and further therapeutic options were dependent on a definitive diagnosis, immunohistochemistry (IHC) was pursued. After initial IHC tests were performed, the diagnosis of a rhabdomyosarcoma (RMS) was also considered.

## Immunohistochemistry

IHC is a molecular technique that can be used for the diagnosis and prognosis of specific tumours and to identify infectious agents. It employs the use of target antibodies to identify a specific antigen or 'marker' in the tissue in question. Through identifying a number of unique antigens within the tumour, pathologists are more likely to be able to provide definite diagnoses for poorly differentiated tumours.

In this case, the tumour displayed strong positive immunoreactivity for vimentin (a marker of mesenchymal cells) and desmin (a marker of muscle) and scant immunoreactivity for smooth muscle actin. The tumour displayed no immunoreactivity for Melan A (a marker of melanocytes), cytokeratin (a marker of epithelial cells) and CD3 and CD20 (markers of lymphocytes), although there were aggregates of CD3 and CD20-positive lymphocytes throughout the mass.



**FIGURE 1:** Sheets of neoplastic cells infiltrating and surrounding bundles of muscle fibres (labelled M). Haematoxylin and eosin stain, 100 x magnification.

**FIGURE 2:** Neoplastic cells infiltrating and surrounding glandular tissue. Haematoxylin and eosin stain, 200 x magnification.

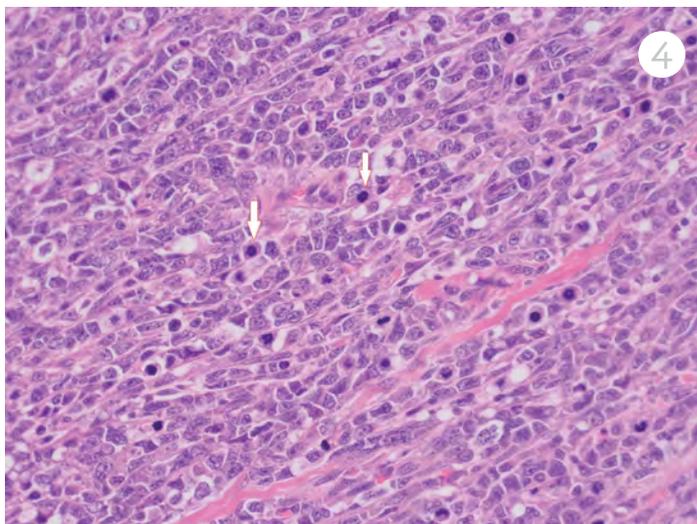
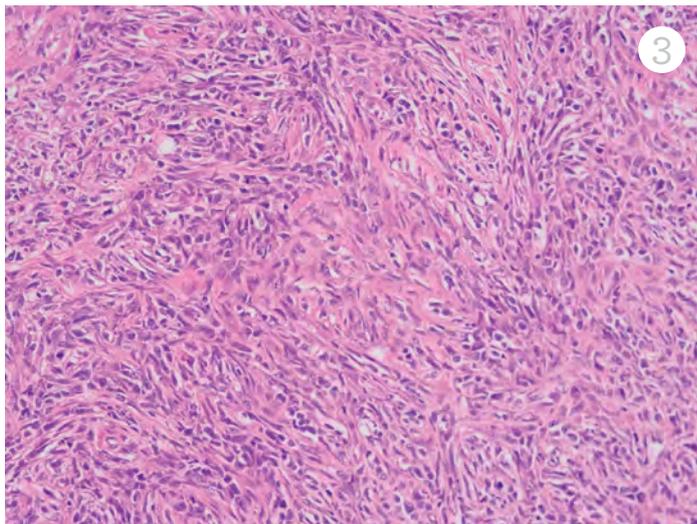
## Diagnosis

The final diagnosis was a RMS, with histological features suggestive of an embryonal variant.

## Discussion

RMSs are malignant tumours of skeletal muscle that are classified according to histological and gross features as embryonal, alveolar or pleomorphic varieties. These classifications are based on human designations, but all have been reported in dogs (Cooper and Valentine, 2016). RMSs exhibit rapid growth, which can result in relatively short survival times in affected patients (Caserto, 2013).

The embryonal variant has been reported in both juvenile and adult dogs, and it is most commonly reported on the head and neck. Botryoid RMSs, a subtype of embryonal RMSs, are the most common variant. They are found in the urogenital tracts of young dogs and grossly resemble a bunch of grapes. The alveolar variant has been reported in the hips, mandibles and uterus of juvenile dogs. Pleomorphic RMSs have rarely been reported in adult dogs.



**FIGURE 3:** Neoplastic cells displaying a spindle-shaped morphology. Haematoxylin and eosin stain, 200 x magnification.

**FIGURE 4:** Neoplastic cells display a round cell morphology. Large numbers of mitotic figures are present within this field. (White arrows are pointing to two mitotic figures.) Haematoxylin and eosin stain, 400 x magnification.

RMSs are uncommonly reported, but it is possible that they are underdiagnosed (Caserto, 2013). Their most distinctive feature on histopathology is the presence of cross-striations in tumour cells, otherwise known as 'strap cells'; however, these cells are rarely present. More commonly, RMSs are poorly differentiated and can appear similar on histology to other poorly differentiated or high-grade soft tissue sarcomas. Further diagnostic techniques such as IHC are often required to get a definitive diagnosis.

Clinically, the main differences between RMSs and soft tissue sarcomas are the age of onset, location and survival time (Caserto, 2013). RMSs are more typically found in younger dogs (less than two years of age) and involve the head, neck and urogenital tract, whereas soft tissue sarcomas involve the skin and subcutis of the trunk and limbs of middle-aged to older dogs. The reported metastatic rate for an RMS is 50%, and although there are probably too few cases in the literature to draw serious conclusions from this figure, it is possible that the metastatic rate is higher than those of high-grade soft tissue sarcomas (Caserto, 2013; Dennis et al., 2011).

In conclusion, a RMS is a differential to be considered when faced with soft tissue masses in a young dog, and cases such as these may require further testing (such as IHC) to differentiate it from other poorly differentiated tumours such as high-grade soft tissue sarcomas.

#### Case outcome

Other than palliative care, further treatment was not pursued. In the month following the diagnosis the dog became progressively weak and developed enlarged regional lymph nodes. Due to his rapid deterioration and poor prognosis, the owners elected euthanasia. <sup>19</sup>

*Cristina Gans is a veterinary pathologist with Gribbles Veterinary.*

#### REFERENCES:

- Caserto BG.** A comparative review of canine and human rhabdomyosarcoma with emphasis on classification and pathogenesis. *Veterinary Pathology* 50, 806–26, 2013
- Cooper BJ, Valentine BA.** Tumors of muscle. In: Meuten DJ (ed). *Tumors in Domestic Animals*, 5th Edtn. Pp 425–66, Wiley, 2016
- Dennis MM, McSparran KD, Bacon NJ, Schulman FY, Foster RA, Powers BE.** Prognostic factors for cutaneous and subcutaneous soft tissue sarcomas in dogs. *Veterinary Pathology* 48, 73–84, 2011

**ACKNOWLEDGEMENT:** Thank you to Grace Miller and Veterinary Centre Oamaru for providing the case history for this article.