Case Report

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Glomus cell tumour on the head of a cat

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Abstract

Case summary A solitary, sessile, non-ulcerated, freely mobile cutaneous mass approximately 1 cm in diameter on the left temporal region of a 7-year-old neutered female cat was examined. A fine-needle aspirate and wedge biopsy were performed by the referring veterinary surgeon and indicated a neoplasm of uncertain cell lineage. On histopathological examination, the deep dermis contained a discrete, non-encapsulated and vascular neoplasm with morphological and immunophenotypical features typical of a glomus cell tumour. Neoplastic cells were immunopositive for vimentin, muscle actin and smooth muscle actin, and immunonegative for cytokeratin, S100, desmin and von Willebrand factor (factor VIII-related antigen).

Relevance and novel information Glomus cell tumours arise from modified smooth muscle cells and are rare in animals, particularly cats. Specific immunohistochemistry is of fundamental importance in the correct diagnosis of these tumours and should be considered for masses when cytology and histology results are inconclusive or uncertain.

Keywords: Glomus cell tumour; arteriovenous anastomosis; perivascular tumour; head; immunohistochemistry

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Introduction

The glomus body is a specialised form of arteriovenous anastomosis regulated by the sympathetic nervous system, and its function is principally thermoregulatory.[1] Essentially, the structure consists of an afferent arterial segment, an efferent venule and an anastomotic vessel, termed the Suquet–Hoyer canal, which connects the arterial and venous capillary circulation.[2] When open, these structures will increase the blood flow to the skin, resulting in warming or cooling of a specific area.[2,3]

The type of cell that comprises the wall of the Suquet–Hoyer canal is called the glomus cell and is classified as a modified smooth muscle cell. Tumours arising from this cell type can show different phenotypes, such as glomus cell, smooth muscle cell or blood vessel and, based on this morphological differentiation, may be subtyped as a glomus cell tumour, glomangioma and glomangiomyoma.[4]

Glomus cell tumours are rare in animals, although these neoplasms have been occasionally described in non-human primates,[5,6] horses,[7,8] cows,[9,10] dogs[1,11–14] and one cat,[15] usually as a single benign growth or, rarely, as multiple masses.[9] To date, most of the glomus cell tumours reported in animals have arisen from the distal extremities, most commonly in the digit,[7,11,12,15,16] although other locations are described such as the carpus,[14] antebrachium,[1] ischial tuberosity,[17] genital[13] and abdominal organs.[9,10]

In humans, this type of neoplastic structure has been described in the subungual region and pad of fingers and toes, as well as ears, hands and other locations of the body,[11] developing in the deep dermis and subcutis.[4]

This report describes a skin neoplasm that shares the same histopathological and immunohistochemical characteristics of previously described glomus cell tumours in small animals but in a unique location and only the second such tumour described in a cat.

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Case description

A solitary mass was found on the left temporal region of a 7-year-old neutered female cat. Since noticing the mass 2 weeks before seeking veterinary advice, the owner reported no discernible change in its appearance. A fine-needle aspirate was performed by the referring veterinary surgeon, which yielded evidence of an atypical population of mesenchymal cells, suggestive of a sarcoma. Histopathological examination of a wedge biopsy revealed that the mass was a tumour of an uncertain type, with a carcinoma being considered more likely than a sarcoma. A fine-needle aspirate of the left mandibular lymph node did not yield any abnormality. Following these preliminary investigations, the cat was then referred for further evaluation.

Upon examination, there was a small (8 mm diameter), sessile, non-ulcerated, non-painful mass in the left temporal region, which appeared to be contained within the skin and was freely mobile over the subcutis (Figure 1). The regional lymph nodes were normal by palpation and the remainder of the clinical examination was unremarkable.

Figure 1 Appearance of the mass at the initial presentation

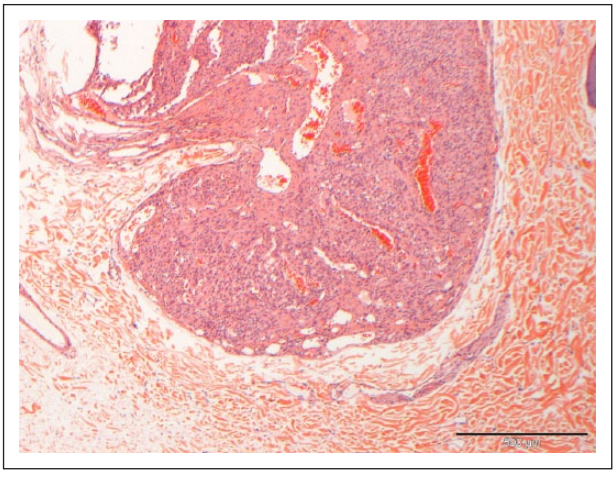

Figure 2 Glomus cell tumour characterised by a discrete non-encapsulated mass associated with numerous blood vessels. Haematoxylin and eosin (bar = 500 µm)

The cat was admitted for additional clinical staging. A fine-needle aspirate of the draining mandibular lymph node was confirmed to be cytologically free of metastasis, and inflated lungs radiographs of the thorax did not reveal any sign of pulmonary metastasis. Excision of the mass with 1 cm lateral margins and one fascial plane deep followed. The tissue was fixed in 10% neutral buffered formalin and submitted for histopathological examination.

On histopathological examination, the deep dermis contained a discrete neoplasm. The neoplasm was composed of solid aggregates of relatively uniform round-to-polygonal and occasionally spindled cells surrounding and entrapping blood vessels (Figure 2). Neoplastic cells contained abundant pale eosinophilic cytoplasm and single round, central open nuclei with single distinct nucleoli (Figure 3). Mitotic rate was low: the mitotic index (mitoses per 10 high power dry fields) was 2. Findings were consistent with a glomus cell tumour and excision was reported as complete.

Immunohistochemistry was then performed to confirm the diagnosis and rule out the less likely differentials of an angioleiomyoma, adnexal tumour or Merkel cell tumour. Peritumoural small blood vessels and nerves were present; the latter were immunopositive for S100 (Figure 4). More than 95% of the neoplastic cells were strongly immunopositive for vimentin, muscle actin, smooth muscle actin (SMA) (Figure 5) and neuron-specific enolase (NSE), and immunonegative for cytokeratin, S100, desmin and von Willebrand factor

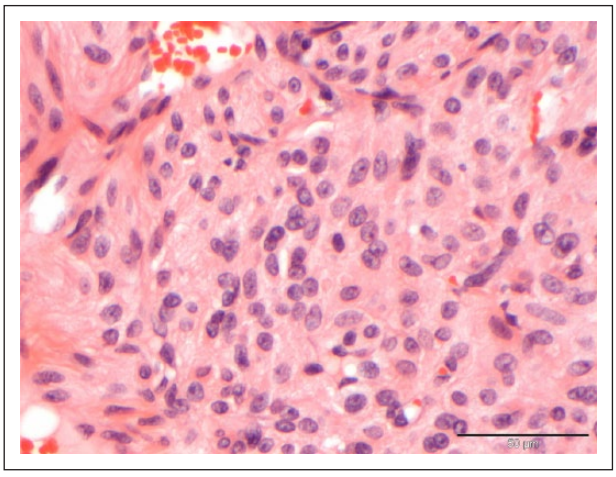

Figure 3 Higher magnification of the tumour showing the densely packed round-to-polygonal cells that contain single round-to-ovoid nuclei and moderate amounts of pale eosinophilic, mildly vacuolated cytoplasm. Haematoxylin and eosin (bar = 50 µm)

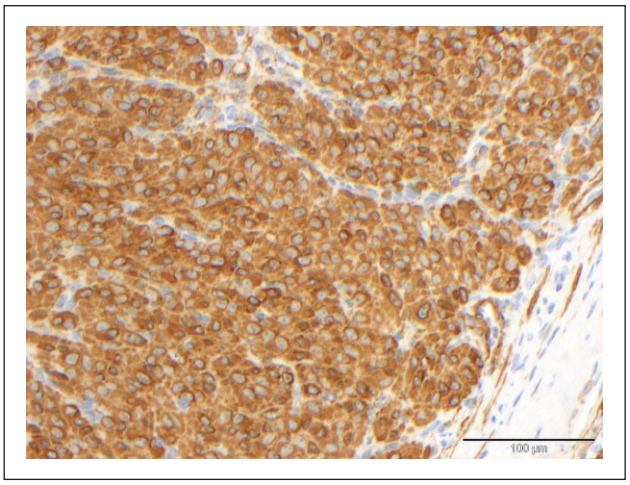

Figure 4 Immunohistochemistry for S100 stain highlights the peritumoural nerve bundles (bar = 100 µm)

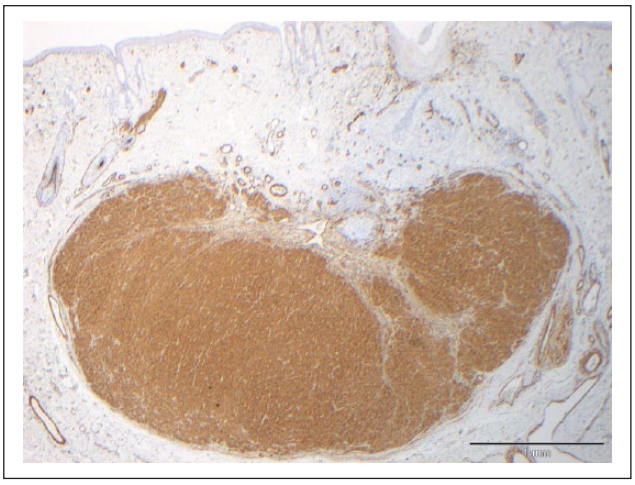

Figure 5 Immunohistochemistry for smooth muscle actin shows diffuse strong immunopositivity. DAB (3,3'-Diaminobenzidine) as chromogen (bar = 1 mm)

(factor VIII-related antigen). Notwithstanding the NSE positivity, the immunohistochemical profile was that typically described in association with glomus cell tumours,[14] and did not support epithelial, vascular endothelial, smooth muscle leiomyoma/angioleiomyoma or a Merkel cell (neuroendocrine) tumour.

There was no evidence of local recurrence, regional lymphadenopathy or any other health problems in the 3 years to date after surgery.

Discussion

Glomus cell tumour is a rare tumour in small animals, with only eight reports since 1960. This neoplasm arises from the supportive cells of a glomus body, which is a particular form of arteriovenous shunt in the periphery with a local thermoregulatory function.

In humans, although other locations are reported, the subungual region seems to be the most common area in which glomus cell tumours are found,[4] and this is similar in animals, with only few exceptions.[9,10,13,17]

This tumour type has only been described once before in a cat, where the tumour was located on a digit.[15] Morphological features of that case, such as the specific vascular pattern and the cord-like arrangement of the neoplastic cells, were similar to the current case and strongly suggested the diagnosis of a glomus cell tumour, as described in human cases.[3] In this case, the diagnosis of a glomus cell tumour was made on the discrete nature of the tumour, the morphology of the neoplastic cells in association with blood vessels, the peritumoural nerve fibres, and the supportive immunohistochemical staining pattern.

Glomus cell tumours are typically immunopositive for vimentin, SMA and muscle actin, and immunonegative or focally immunopositive for desmin. In regard to the immunohistochemical findings, cytokeratin negativity ruled out the similarity of the cord-like appearance to some adnexal tumours such as basal cell tumour[15] or trichoblastoma.[12] Immunopositivity of vimentin, which is considered a general non-epithelial/mesenchymal marker, was confirmed and was in keeping with results reported in association with a glomus cell tumour. Moreover, the high positivity of muscle actin and SMA established the smooth muscle cell (or derivate) origin of the examined mass. All neoplastic cells were negative for von Willebrand factor (a vascular endothelial marker), S100 (a neural/melanocyte marker) and desmin (a muscle marker), indicating no direct support for a vascular endothelial tumour (haemangioma), melanocytic neoplasm or leiomyoma, respectively.

Significance of the immunopositivity for NSE is uncertain. This marker is typically reported as negative in human glomus cell tumours (although it does not appear to be routinely applied in all cases) and was negative in the previously reported cat.[15] It is, however, not a particularly specific marker and, as the immunopositivity for muscle actin and SMA essentially ruled out a Merkel cell tumour (neuroendocrine tumour), additional and more specific markers for neuroendocrine lineage, including chromogranin and synaptophysin, were not pursued as there was no indication for such.

Human glomus tumours label positively with vimentin marking for mesenchymal cells and SMA,[4,18–20] and this pattern was observed in all previously reported veterinary cases. Immunoreactivity for desmin is variable, but positivity to this marker was described in few human cases.[21,22]

Lack of local recurrence or regional lymphadenopathy was consistent with the benign biological behaviour of the tumour, as previously reported in the dog and cat,[1,11, 12,15] and humans.[4]

Conclusions

The present case report describes the histological and immunohistochemical findings associated with a glomus cell tumour of a cat. This tumour is rare in domestic species and it has only been described once before in a cat, and has never been described on the skin of the face in domestic animals.

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