COMPANION OR PET ANIMALS

Thyroid haemangiosarcoma in a seven-year-old female Shih Tzu

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SUMMARY

Canine thyroid tumours are uncommon and the majority of tumours are carcinomas or adenomas, with only very few mixed tumours or metastases from distant sites described to date. A primary thyroid haemangiosarcoma has never been reported in veterinary medicine. In this case report, we describe a dog with a history of a large, non-painful, mobile ventral neck mass in the right paralaryngeal region. CT and ultrasound-guided fine needle aspirates were used for clinical staging. The mass was surgically excised and histopathological examination indicated a haemangiosarcoma. Abdominal ultrasound revealed the presence of splenic nodules and splenectomy indicated the presence of haemangiosarcoma. Chemotherapy with doxorubicin was started, but the dog was euthanased after three rounds of therapy, 97 days after the mass was discovered.

BACKGROUND

Canine thyroid tumours are uncommon in veterinary medicine, accounting for 1.1–3.8 per cent of all canine tumours. 1 2 No sex predilection has been reported and these tumours tend to affect middle age to older animals, with boxers, beagles, golden retrievers and Siberian huskies being over-represented. 3 4 Affected animals are normally asymptomatic, until a large, mobile, generally non-painful mass in the ventral aspect of the neck is noticed. 5–7 However, these patients can present with a wide array of clinical signs depending on the size of the tumour, the presence of unilateral or bilateral disease, the presence of local tissue invasion and distant metastasis and whether the serum T4 is elevated. 3 Thyroid tumours tend to metastasise to the lungs and regional lymph nodes, 3 with the mandibular, retropharyngeal and superficial cervical lymph nodes being the most affected, but other organs can also be involved. 3 5

Adenocarcinomas and adenomas are by far the most common tumour types, with an incidence of 99.3 per cent 1 and 100 per cent 8–10 of all tumours in several studies. In one study of 545 thyroid tumours, only one was identified as haemangiosarcoma (HSA), which was a metastasis from a non-specified distant site. 1 Furthermore, eight reports of thyroid carcinosarcomas have been described, but none of them had an HSA component. 11 12

In human medicine, a diagnosis of angiosarcoma, an umbrella term used to describe HSA or haemangioendotheliomas, or in other words, a vascular endothelial malignant neoplasm, affecting the thyroid gland is rare, with only around 50 cases described to date. 13 Most human cases appear to be distributed to the Alpine regions of Europe and are thought to be associated, with iodine deficiency and long-standing goitre. 14 Thyroid angiosarcomas in human beings are usually highly malignant tumours with a poor prognosis and the most common presenting symptom is a fast-growing neck mass. 14

CASE PRESENTATION

An 8.2 kg, 7.5-year-old neutered female Shih Tzu presented with a unilateral, large, firm, rounded mobile mass in the right jugular groove extending caudally from the paralaryngeal region (figure 1). The mass had been noticed one week before referral, with no other clinical signs. This animal was treated in the eight months before referral for suspected spinal pain, due to intermittent, sudden, unexplained episodes of neck pain, initially with prednisolone (Prednidale, Dechra Veterinary Products Limited), followed by meloxicam (Metacam, Boehringer Ingelheim) and underwent dental prophylaxis, with five dental extractions, two months before the referral with no abnormalities noted on physical examination or on a pre-anaesthetic blood biochemical panel.

INVESTIGATIONS

A CT scan using a 16 slice multidetector unit (Brightspeed, General Electric Medical Systems; Milwaukee) of the neck and chest was performed under sedation. After evaluation of the precontrast series, iohexol (Omnipaque 350 mg/ml; GE Healthcare) was administered at a dose of 600 ml/kg delivered through the cephalic vein using an automatic angiographic injection system at a fixed injection rate of 2 ml/s (MEDRAD Stellant CT Injection System; Bayer). The CT revealed a 6.5 cm (cranio-caudal) × 3.6 cm (diameter) oval-shaped soft tissue mass, with a central focal area of mineralisation, lying adjacent to and continuous with the lateral aspect of the right thyroid gland (figures 2–4). The mentioned thyroid gland was reduced in size, with its cranial half appearing to be replaced by mass tissue. The right retropharyngeal lymph node was not visible and the right prescapular lymph node was not enlarged. There was no evidence of pulmonary metastasis.

A further ultrasound (US) examination, while under sedation, confirmed the gross appearance of the mass as being consistent with a thyroid tumour (figure 5) and several US-guided fine needle aspirates (FNAs) were taken. An in-house cytological examination of the aspirates was deemed suspicious.
of an epithelial neoplasia, as they revealed few bare nuclei cells
on a blood rich background, but considered to be non-diagnostic.

DIFFERENTIAL DIAGNOSIS
The clinical findings suggested a diagnosis of a thyroid carci-
нома and surgical excision of the mass was planned.

TREATMENT
A ventral midline cervical approach was made, confirming a
large right thyroid mass with some invasion to the sternothyroid
and sternohyoid muscles (figure 6). Through blunt and sharp
dissection using a vessel sealing device (LigaSure Small Jaw Open
Sealer/Divider, Medtronic) surgical device, the mass was excised
while preserving the neurovascular structures in the neck and
sent for histological analysis (figure 7). No ipsilateral thyroid
gland was present after the removal of this mass and the left
thyroid gland was examined and deemed unremarkable. Due
to an absent CT and surgically detectable lymphadenopathy, no
lymph node was excised at the time of surgery.

OUTCOME AND FOLLOW-UP
On gross examination, the mass was sectioned in its entirety and
no normal tissue was identified. Histopathological examination

Figure 1  Presurgical view of the ventral neck mass.

Figure 2  Dorsal plane reconstruction showing right thyroid mass
and both thyroid glands (precontrast sequence). Soft tissue algorithm.
There is a large, mixed attenuating mass (yellow arrow) lateral
and cranialateral to the right thyroid gland (blue arrow). The left
thyroid gland (red arrow) is seen as an elongated hyperattenuating
structure adjacent to the air-filled trachea. The right thyroid gland is
more caudally located, shows similar attenuation to the left gland, is
continuous with the caudomedial border of the mass and is reduced in
size.

Figure 3  Transverse plane image through the caudal region
of the mass. Soft tissue algorithm. This image demonstrates the
intimate location of the mass in contact with the right thyroid gland.
Both thyroid glands are visible on this image, seen as the paired
hyperattenuating structures adjacent to the trachea. The cross-sectional
area of the right thyroid gland is less than that of the left.

Figure 4  Dorsal plane reconstruction showing the right thyroid mass
after administration of contrast. Its cranio-caudal dimension is measured
at 65 mm in length. There is marked, patchy, rim enhancement over the
cranial and medial margins of the mass, moderate rim enhancement
over the caudal and lateral margins of the mass, and mild heterogenous
post contrast enhancement throughout the remainder of its structure
(pre 25–30 Hu, post 35–50 Hu).
Figure 5  Longitudinal plane US image through the central region of the mass. US, ultrasound.

Figure 6  Mid-line ventral neck incision with minimal dissection. A portion of the mass can be seen right to the mid-line (the head of the animal is towards the left in the picture) with a focal invasion of the adjacent musculature.

Figure 7  Excised thyroid haemangiosarcoma.

Figure 8  Histopathology image of the mass showing irregular blood-filled vascular channels lined by multiple layers of neoplastic spindeloid cells indicating a haemangiosarcoma. H&E. Bar=100 µm.

of the mass indicated a HSA characterised by malignant endothelial cells lining irregularly branching and blood-filled vascular channels (figure 8). The tumour was well-circumscribed and no normal tissue, including that of thyroid gland, was identified in the multiple sections examined. Given the multicentric nature of HSA, further clinical staging was advised and chemotherapy was discussed.

Abdominal US was performed nine days after surgery, at the referring veterinary clinic, which revealed a 1.2 cm diameter nodule in the head of the spleen. Two weeks later, a further scan showed that the original splenic mass had increased in size to 1.5 cm in diameter and a second 1.2 cm diameter splenic mass was present in the tail of the spleen. A splenectomy was performed and no additional lesions were identified in the abdominal cavity. Histopathological examination of the splenic masses showed areas of neoplastic cellular proliferation, consisting of blood-filled clefts and channels with spindle to polygonal cells with dark eosinophilic cytoplasm and oval nuclei with finely stippled chromatin and large central prominent nucleoli, compatible with HSA, with an average mitotic rate of one per high power field, as well as areas of nodular hyperplasia.

Chemotherapy was discussed and a single agent chemotherapy protocol with doxorubicin (1 mg/kg intravenous every three weeks) was initiated two weeks after the splenectomy. Abdominal and cardiac US scans were performed two weeks after the first round of chemotherapy, and no abnormalities were detected. Haematological and biochemical panels taken before the second and third round of chemotherapy were unremarkable. Unfortunately, due to the deterioration of this patient’s quality of life, she only underwent three rounds of chemotherapy, before being euthanased 97 days after diagnosis, due to a general loss of quality of life with lethargy, weakness, anorexia, adipsia and haematochezia being reported by the owner. Further investigation or a postmortem examination were not performed.

DISCUSSION

Primary thyroid tumours are uncommon in dogs, and the vast majority are epithelial tumours, mainly adenocarcinomas. To the author’s knowledge, this is the first report on an HSA in the canine thyroid gland. HSA of the thyroid gland is described infrequently in human medicine.
Since HSA is a tumour of vascular endothelium, they may arise from any tissue with a blood supply, but certain organs are more commonly affected than others. Primary nodal HSA affecting the cervical lymph nodes, although infrequent, have been described previously in dogs. Considering the absence of normal thyroid tissue in any histopathology sections, it can be considered as a potential differential diagnosis. However, a disparity in tumour location, clinical signs and the replacement of the cranial half of the thyroid gland by the mass tissue in the CT scan would be more supportive of the diagnosis of thyroid HSA. Histopathological absence of thyroid tissue could be due to an effacement of the gland by the tumour or to the absence of any minimal thyroidal tissue remaining in the particular planes of sections examined.

When animals present with HSA at multiple sites, it can be difficult to determine which was the primary site and which sites represent metastasis. It is not clear whether the thyroid gland or the spleen was the site of the initial lesion, although the thyroid lesion was larger and detected earlier. In dogs, splenic HSA tends to spread primarily to the lungs, liver, omentum, right atrium and mesentery, whereas non-splenic HSAs typically spread initially to the lungs and spleen, followed by liver, right atrium, kidneys, brain and then other less common sites. The thyroid gland has never been listed as a site of metastasis in dogs. Hence, metastasis of a thyroid HSA to the spleen would appear to be more likely than metastasis of a splenic HSA to the thyroid gland. In addition, the thyroid mass was considerably larger (32 cm³; 6 cm×3.4 cm×3 cm), with associated areas of haemorrhage and a large area of central necrosis, than the splenic nodules. As such, we are inclined to believe the thyroid tumour to be the primary lesion. However, due to the multicentric nature of HSA, the absence of abdominal imaging during the initial staging and the main site of metastasis in human thyroid angiosarcomas being the lungs, it is impossible to be certain.

The CT scan and US examination supported the diagnosis of thyroid carcinoma given the location, CT and US appearance of a thyroid carcinoma. However, neither a CT nor an US scan are 100 per cent specific for this or any histological type of tumour. While HSA can have a few precontrast and post-contrast CT morphological characteristics similar to a thyroid carcinoma, such as attenuation or texture, cavitation and intratumoural vascularity, thyroid carcinomas can also have a varying appearance on CT examination. Dystrophic calcification, as detected in this study, is commonly seen in epithelial tumours such as prostatic adenocarcinomas, thyroid carcinomas, primary lung tumours and hepatocellular carcinomas but is not a common finding with HSA.

In both human and veterinary medicine, while FNAs of suspected thyroid tumours, even those performed with US guidance, may be supportive of thyroid carcinoma, they can be non-diagnostic in more than half of the cases, namely due to haemodilution of the sample, and may not allow differentiation between adenoma and carcinoma. A tissue biopsy is normally the only way to obtain such differentiation. However, due to a potential risk of tumour seeding during the biopsy, haemorrhage due to high vascularity of thyroid carcinomas and local coagulopathies, if the thyroid mass is largely mobile, not invading the surrounding tissues and in the absence of visible metastasis, surgical excision is preferred to biopsy.

A mean survival time cannot be extrapolated from a singular case only, but the witnessed thyroid haemangiosarcoma in this patient, carried a poor prognosis in spite of surgery and the use of other adjuvant treatments, with a survival time of 3 months which is similar to the poor prognosis seen in some human reports.

### Learning points

- Thyroid malignant neoplasias are rare in dogs and, normally, consist of either carcinomas or adenocarcinomas. Nonetheless, other neoplasias such as the one described in this paper must always be considered as a differential diagnosis.
- While a discussion regarding the importance of abdominal imaging should always take place with clients that present a patient for thyroid tumour staging, the multicentric and metastatic nature of haemangiosarcomas (HSAs) would deem it necessary, if the thyroid neoplasia is determined to be an HSA.
- Finally, it seems that the outcome for a thyroid HSA in dogs is similarly poor, compared with that reported for thyroid carcinomas, with short survival times.

### Contributors

LM: main author responsible for writing the article. SB: main clinician involved with the case, provided the clinical data and helped in writing the case report. ES: pathology specialist responsible for the histopathology report of the excised mass and also reviewed the case report. PM: imaging specialist responsible for the CT and US report and also reviewed the case report.

### Funding

The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

### Competing interests

None declared.

### Patient consent for publication

Not required.

### Provenance and peer review

Not commissioned; externally peer reviewed.

### Data availability statement

All data relevant to the study are included in the article.

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