



NOTE

Wildlife Science

Tracheal chondrosarcoma in a blue tegu (*Salvator merianae*)

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83(6): 981–983, 2021

doi: 10.1292/jvms.21-0145

Received: 10 March 2021

Accepted: 18 April 2021

Advanced Epub:

28 April 2021

ABSTRACT. An 8-year-and-1-month-old female blue tegu (*Salvator merianae*) was brought to a clinician with severe cough. The patient died 11 days later despite supportive care, and necropsy was performed by a clinician. The lumen of the distal trachea was almost completely occluded by a milk-white, hard mass measuring 1 cm in diameter. Histopathologically, the mass comprised spindle-shaped to polygonal cells arranged in a loose sheet with abundant production of basophilic cartilaginous matrix, consistent with chondrosarcoma. Reports of tracheal neoplasms in reptiles are limited, and to the best of our knowledge this represents the first pathological documentation of tracheal chondrosarcoma in a reptile.

KEY WORDS: blue tegu (*Salvator merianae*), chondrosarcoma, trachea

Blue tegus (*Salvator merianae*) are a lizard species belonging to the family Teiidae, a subspecies of the Argentine black and white tegu. Adult Argentine black and white tegus can reach about 130 cm in length, and are native to South America [8]. The prevalence of neoplasms in reptiles has been reported to be nearly equal to that in mammals [3, 5], and the prevalence of neoplasms is reportedly higher in lizards and snakes than in chelonians and crocodylians [5]. Common neoplasms in lizards include lymphomas, soft-tissue sarcomas, and squamous cell carcinomas [5]. A few respiratory neoplasms have been reported in snakes, chelonians and lizards [4]. Pulmonary papillomatosis in green turtles is the most commonly reported respiratory neoplasm in reptiles, followed by pulmonary fibroadenoma in multiple chelonian species and pulmonary adenocarcinomas in multiple snake species [4]. However, respiratory neoplasms appear uncommon in reptiles [1]. Neoplasms of the trachea have been reported in 6 cases: adenosquamous carcinoma in a California kingsnake (*Lampropeltis getula californiae*), T-cell lymphoma in a Boa Constrictor (*Boa constrictor*) and chondromas in four ball pythons (*Python regius*) [1, 2, 7, 10]. This report describes pathological findings of tracheal chondrosarcoma in a blue tegu.

This case involved an 8-year-and-1-month-old female blue tegu weighing 4.58 kg. The patient was brought to the animal hospital with a chief complaint of dry cough (day 1). As respiratory infection was suspected, antibiotics were administered. After 7 days, a bronchodilator was added due to worsened respiratory signs. The tegu died on day 12, and necropsy was performed by a clinician. Representative organs removed were fixed in 10% neutral-buffered formalin and submitted to the Laboratory of Veterinary Pathology at Nihon University for histopathological examination. Immunohistochemistry was performed using routine methods. Briefly, sections were immunohistochemically labelled with mouse monoclonal proliferating cell nuclear antigen antibody (PCNA; diluted 1:200; Dako, Tokyo, Japan) and mouse monoclonal Ki-67 antibody (diluted 1:150; Dako). After deparaffinisation, antigen retrieval was achieved using target retrieval solution, pH6 (Dako) at 121°C for 20 min for all antibodies. Labelling was visualised with 3,3'-diaminobenzidine substrate (FUJIFILM Wako Pure Chemical Corp., Tokyo, Japan), and sections were counterstained with Mayer's hematoxylin. Positive immunohistochemical controls consisting of normal small intestine from the blue tegu were included.

A tracheal mass was identified during trimming of formalin-fixed tissues. Approximately 90% of the tracheal lumen in the distal aspect of trachea was occluded by a milk-white, firm mass in the distal trachea (Fig. 1). No significant gross lesions were observed in any other organs. Tissues were embedded in paraffin, sectioned at a thickness of 5 µm, then stained with hematoxylin and eosin, and toluidine blue (TB). Histologically, the tracheal mass was a moderately cellular, expansive neoplasm with local invasion into the tracheal submucosa and cartilages (Fig. 2). The neoplasm comprised a loose sheet of spindle to polygonal cells with abundant production of basophilic cartilaginous matrix (Fig. 3). Cartilaginous matrix showed metachromasia on TB staining (Fig. 4). Neoplastic cells showed distinct cell borders with moderate amounts of eosinophilic homogeneous to foamy cytoplasm. Nuclei were small and round with coarsely stippled chromatin and distinct nucleoli. Anisocytosis and anisokaryosis were mild to

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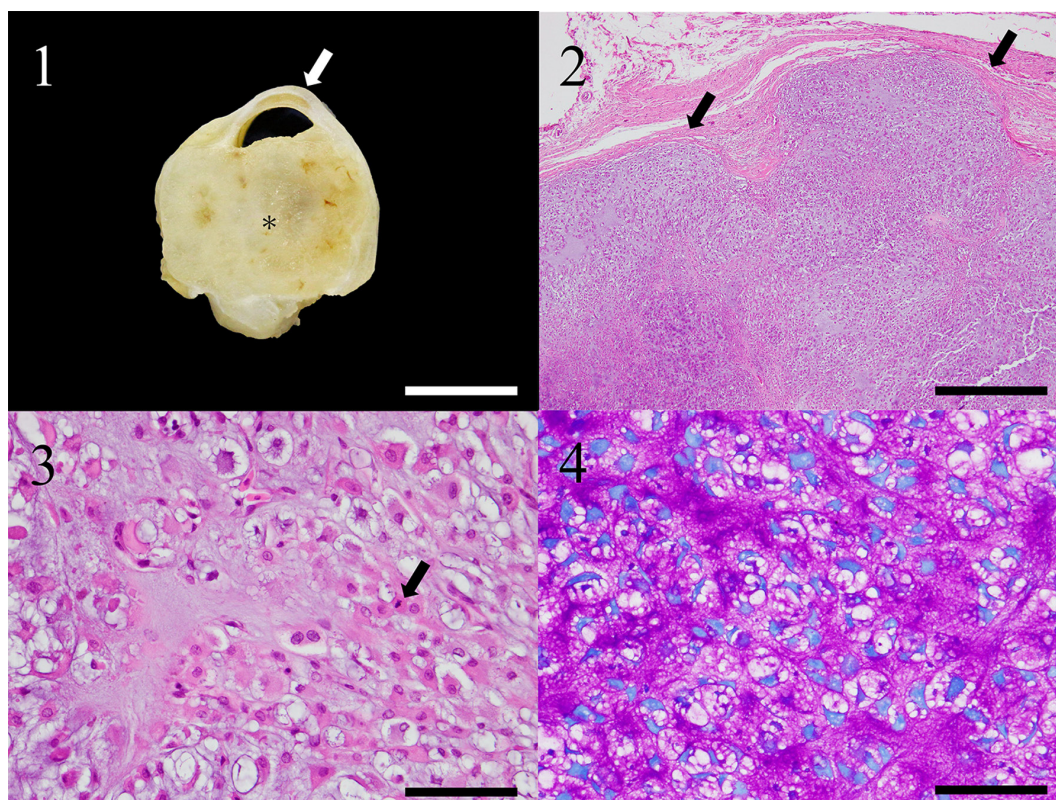


Fig. 1. Gross findings of the distal trachea. On cross-section, the tracheal lumen is almost completely occluded by a milk-white mass, resulting in prominent narrowing of the airway. White arrow; trachea. Asterisk; mass. Bar=6 mm.

Fig. 2. Histological findings of the tracheal mass. The mass is an expansile neoplasm with local invasion into the submucosa and tracheal cartilage. Black arrow; local invasion. Hematoxylin and eosin stain. Bar=500 µm.

Fig. 3. Histological findings for the tracheal mass. The neoplasm comprises spindle-shaped to polygonal cells with abundant production of basophilic cartilaginous matrix. Black arrow; mitotic figure. Hematoxylin and eosin stain. Bar=50 µm.

Fig. 4. Cartilage matrix produced by the neoplastic cells shows metachromasia. Toluidine blue stain. Bar=50 µm.

moderate, and 0–1 mitoses were seen per 10 high-power fields (400×). Binucleated cells were scattered throughout the neoplasm. No evidence of vascular invasion or metastatic lesions in other organs was seen. The histological findings for this neoplasm were consistent with chondrosarcoma. Other significant histological lesions included mineralization and fibrosis of the aorta, pulmonary edema and hepatocellular fatty degeneration. Immunohistochemically, approximately 40–50% of the neoplastic cells were positive for anti PCNA antibody, with adequate immunopositivity to controls. With anti-Ki-67 antibody, both the neoplastic cells and controls were immunonegative.

The tracheal mass was histologically consistent with chondrosarcoma. The neoplastic cells were well-differentiated, but the neoplasm showed local invasion into subjacent tissue in addition to moderate expression to anti-PCNA antibody, so the neoplasm was considered malignant. Histologically, primary differential diagnoses for this case included chondroma and myxosarcoma, both of which were excluded based on histological characteristics. The airway in this case was apparently narrowed by the neoplasm, and the lesion was considered clearly related to the respiratory signs and also the direct cause of death due to respiratory failure.

In veterinary medicine, tracheal neoplasms are considered rare. Primary tracheal neoplasms reported in animals include leiomyoma, chondroma, chondrosarcoma and adenocarcinoma [11]. A limited number of reports have described tracheal neoplasm in reptiles, with adenosquamous carcinoma in a California kingsnake, T-cell lymphoma in a Boa Constrictor (*Boa constrictor*) and chondromas in four ball pythons [1, 2, 7, 10]. In the report of chondromas in ball pythons, the expansile mass in each case comprised well-differentiated chondrocytes without mitoses [2]. Morphologically, the present mass resembled chondroma, but chondrosarcoma was diagnosed based on local invasion. Chondrosarcoma is a malignant neoplasm that produces cartilage matrix. These neoplasms often arise from flat bones such as ribs and nasal turbinates [11]. The neoplastic cells are undifferentiated mesenchymal cells that differentiate into chondrocytes [11]. Well-differentiated chondrosarcoma is distinguished from chondroma by the presence of invasiveness, mitoses and binucleated cells. In dogs, cats and sheep, chondromas grow more slowly and metastasize more infrequently than chondrosarcomas [11]. Metastases often form in the lungs, liver, kidneys, heart and bones [11]. In a report of chondrosarcoma identified in the lower jaw of a corn snake (*Elaphe guttata*), metastases were observed in the heart, lungs, kidneys, spleen and eyes [9]. Moreover, metastasis was observed in the liver of a gray rat snake (*Elaphe obsoleta obsoleta*) [6]. In the present case, no metastatic or related lesions were observed.

To the best of our knowledge, this represents the first pathological documentation of tracheal chondrosarcoma in a lizard. Although neoplasms of the trachea are rare in reptiles, neoplasms including chondrosarcoma should be included among future differential diagnoses when non-specific respiratory symptoms lacking the expected response to medical treatment are observed.

POTENTIAL CONFLICTS OF INTEREST. The authors have nothing to disclose.

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