

# Metastatic Chondrosarcoma in a Corn Snake (*Pantherophis guttatus*)

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**ABSTRACT:** An approximately two-year-old corn snake (*Pantherophis guttatus*) presented with a swelling of the mandible. The animal was treated for two months with no response. Unfortunately, the snake's condition deteriorated and it was euthanized. Grossly, the mass in the mandible was yellow–white and replaced normal bone and soft tissue of the jaw. Additional masses were noted in the heart, kidney, lung, pancreas, and eye. The mass in the mandible was comprised of a sheet of amorphous basophilic material resembling typical cartilage matrix with slightly irregular lacunar spaces. Tumor cells had abundant cytoplasm, vesicular or hyperchromatic nuclei, and prominent nucleoli. Mitotic figures were not seen. Scattered foci of neoplastic cartilaginous cells were noted in the heart, lung, kidney, pancreas, and eye. The final diagnosis for this case was secondary chondrosarcoma. Chondrosarcomas are not considered a common form of neoplasia in reptiles. When it is diagnosed, it appears to be more commonly associated with the vertebral column. Chondrosarcomas should be considered in the differential list for snakes (or other reptiles) that present with masses associated with the bone or cartilage.

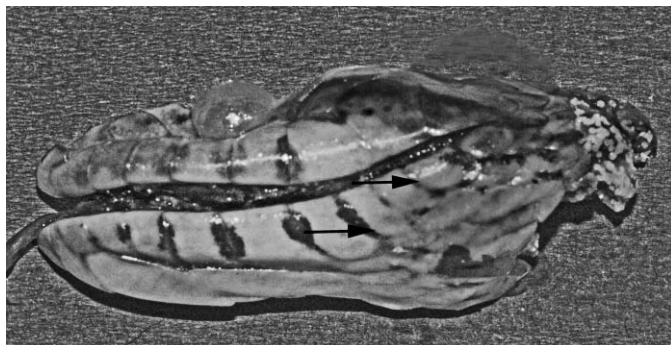
**KEY WORDS:** Chondrosarcoma, corn snake, neoplasia, *Pantherophis guttatus*, reptile, snake.

## INTRODUCTION

Chondrosarcomas are malignant tumors with cells that produce a matrix of cartilage with no osteoid (Thompson and Pool, 2002; Healey and Lane, 1986). They can arise in bone or periosteum, although the latter site is rare in animals. Chondrosarcomas are most frequently reported in dogs and are considered relatively common in sheep (Else, 2007) but are not common in other animals. Metastatic lesions are usually seen in the lungs but can be found in any tissue (Thompson and Pool, 2002).

## CASE REPORT

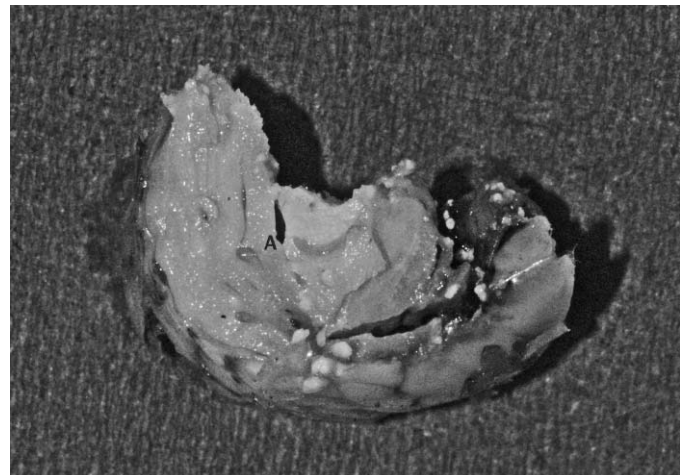
An approximately two-year-old corn snake (*Pantherophis guttatus*) presented with a swelling of the mandible. The overlying skin was slightly discolored (Fig. 1). The lesion was treated with systemic and topical antibiotics for two months with no response. Unfortunately, the snake's condition deteriorated, and it was euthanized.



**Figure 1.** Area of mandibular swelling and discoloration (arrows) attributable to a chondrosarcoma.

Grossly, when sectioned, the mass in the mandible was yellow–white and replaced normal bone and soft tissue of the jaw (Fig. 2). White, glistening masses were noted in numerous internal organs, including the heart (Fig. 3), kidney (Figs. 4 and 5), lung, pancreas, and eye.

The mass in the mandible was comprised of a sheet of amorphous basophilic material resembling typical cartilage matrix with slightly irregular lacunar spaces. Multiple cells were present in some lacunae. The tumor cells had abundant cytoplasm, vesicular or hyperchromatic nuclei, and prominent nucleoli. Mitotic figures were not seen. Within the myocardium, multiple foci of moderately undifferentiated chondrocytes and irregular lacunae were seen (Figs. 6 and 7). Scattered foci of neoplastic cartilaginous cells were noted within pulmonary parenchyma (Fig. 8). The masses

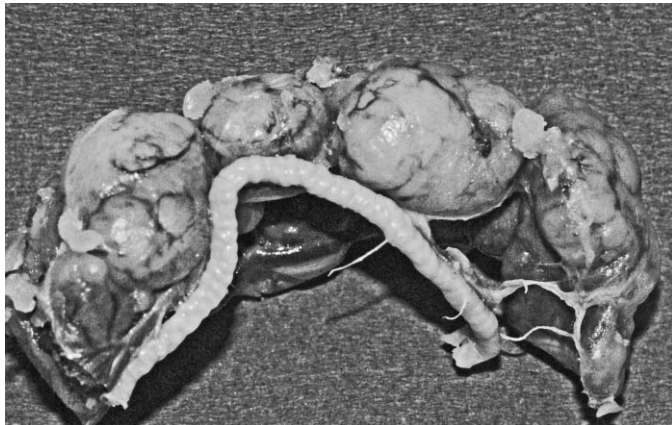


**Figure 2.** Cut section of mandible to illustrate the replacement of normal tissue by neoplastic cartilage (A).



**Figure 3.** Multiple foci of metastatic chondrosarcoma in both the atrium and ventricle of the heart of a corn snake (arrows). Some foci are large and have the gross appearance of cartilage, whereas others are less well differentiated from myocardial tissue.

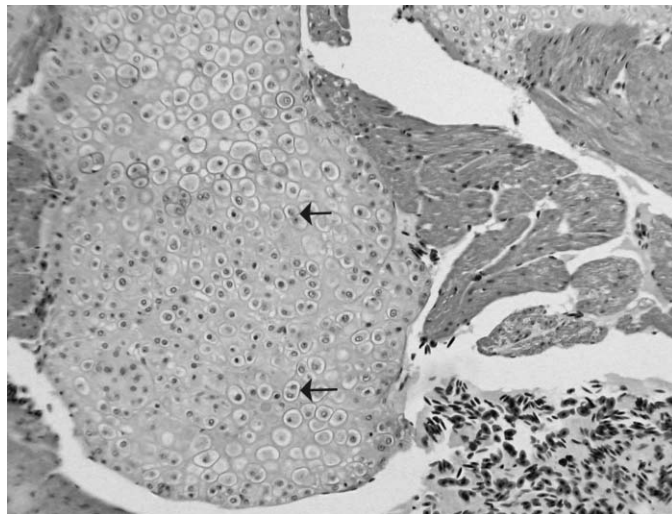
in the kidney and pancreas were comprised of multiple to confluent foci of neoplastic cartilaginous cells. There was a proliferative mass present within the retina and subretinal tissues of one of the eyes (Fig. 9). It was comprised of moderately undifferentiated cartilage cells forming a diffuse irregular sheet. Multiple cells were present in some lacunae. There was variable distortion of the retina.



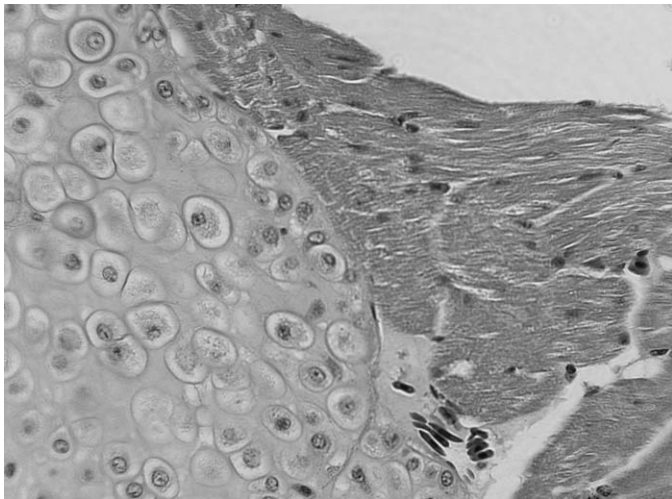
**Figure 4.** Multiple masses of metastatic chondrosarcoma in the kidney of a corn snake.



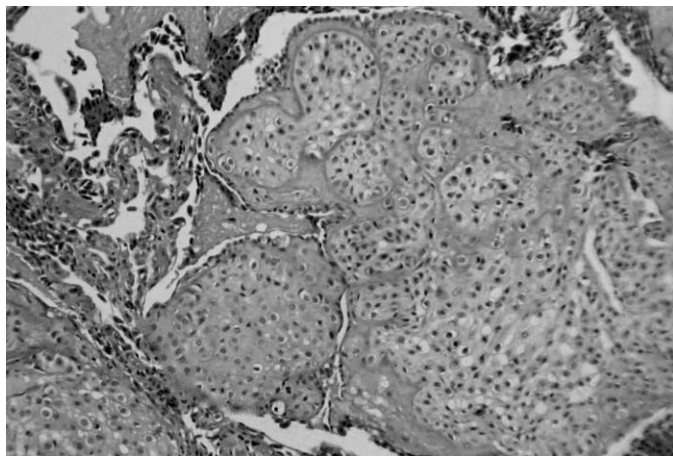
**Figure 5.** Section of metastatic renal chondrosarcoma illustrating the smooth, glistening appearance of the tumor.



**Figure 6.** Metastatic chondrosarcoma replacing myocardium. The cartilage is fairly well differentiated, and scattered lacunae contain two chondrocytes (arrows). Hematoxylin and eosin.



**Figure 7.** Additional detail of Figure 6. Note the smooth tumor margins. Hematoxylin and eosin.

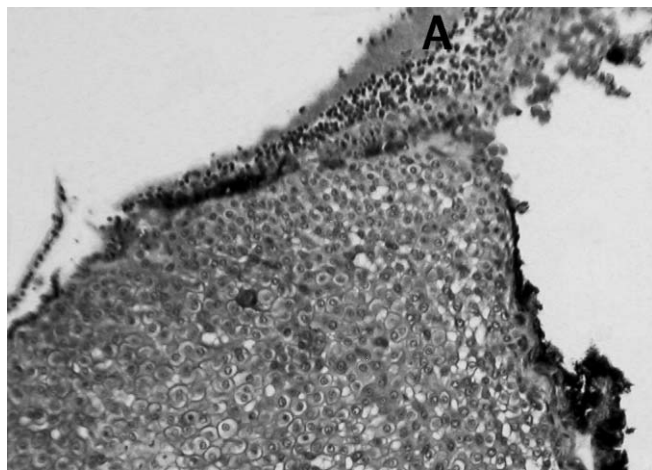


**Figure 8.** Metastatic chondrosarcoma in the lung of a corn snake. Hematoxylin and eosin.

## DISCUSSION

Primary chondrosarcomas are considered to arise *de novo* (Mankin *et al.*, 1980), with secondary chondrosarcomas arising from preexisting cartilage. Based on this classification, the tumor in this snake was considered to be a secondary chondrosarcoma, with the primary site being the mandible. In human medicine, chondrosarcomas are classified into 3 histologic grades: I (high cellularity, plump nuclei), II (increased cellularity, distinct nucleoli, foci of myxoid change), and III (prominent nuclear atypia, mitosis), with the higher grade being positively correlated with the potential to metastasize (Lakshmanan, 2011). Using this classification scheme, the authors considered this tumor to be an intergrade between I and II, realizing that the histologic appearance and biologic behavior of the tumor in snakes may not have a direct correlation.

In a review of reptile tumors, one chondrosarcoma, site not provided, was listed in a corn snake (Maudlin and Done, 2006). Vertebral chondrosarcomas have also been described



**Figure 9.** Metastatic chondrosarcoma in the eye of a corn snake replacing and impinging upon the retina (A). Hematoxylin and eosin.

in corn snakes (Dawe *et al.*, 1980; Garner *et al.*, 1995), and in one case, visceral metastasis was noted (Dawe *et al.*, 1980). A vertebral chondrosarcoma metastasizing to the liver has also been reported in a rat snake (*Elaphe [Pantherophis] obsoleta obsoleta*) (Honour *et al.*, 1993), a close relative of the corn snake. Other tumors with a chondroid component have been reported in a variety of reptiles (Maudlin and Done, 2006), but only seven tumors total were listed. An osteoid chondrosarcoma has also been reported in a desert monitor (*Varanus griseus*) (Schönbauer *et al.*, 1982).

Chondroid tumors are infrequent in reptiles, with corn snakes seeming to have a higher prevalence based on the literature. Grossly, these tumors must be differentiated from other forms of neoplasia and when metastatic from disseminated abscessation/bacterial infection (Page-Karjian *et al.*, 2012).

Differential diagnoses, in addition to chronic infection, should include chondroma, chordoma (depending on location), fibrosarcoma, osteosarcoma, and metastatic tumors of any type. Chondrosarcomas are usually readily diagnosed with routine hematoxylin and eosin staining, and immunohistochemical staining is not routinely indicated. S-100 and vimentin are usually positive in low and intermediate grade sarcomas but can be focally negative in high-grade tumors (Lakshmanan, 2011).

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