USE OF STANDING COMPUTED TOMOGRAPHY FOR THE DIAGNOSIS OF A PRIMARY RESPIRATORY ADENOCARCINOMA IN A SCARLET MACAW (*ARA MACAO*)

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Abstract

An adult female scarlet macaw (*Ara macao*) was referred for evaluation of increased respiratory noise. Previous treatment with antibiotic agents by the referring veterinarian did not improve clinical signs. Upon presentation, when manually restrained, the patient became severely tachypneic with increased respiratory effort. Standing whole-body radiographic images revealed a soft tissue mass at the cranial aspect of the cardiac silhouette, but the origin of the mass could not be ascertained because of superimposed structures. Owing to the bird's significant respiratory compromise and concern for risks of general anesthesia, a standing computed tomography (CT) scan was performed without sedation to further assess the origin of the suspected mass. The CT images showed the presence of a large infiltrative intracoelomic soft tissue mass with adjacent keel osteolysis. After attempts at supportive care with nebulization, antibiotic therapy, and antifungal agents, the patient's condition declined and was subsequently euthanized. The results of the postmortem examination confirmed a large intracoelomic neoplasm with involvement of the keel, lungs, and adjacent air sacs. The mass was diagnosed as a primary respiratory adenocarcinoma, believed to have originated from the intraosseous air sac epithelium, with local pulmonary, air sac, and intracoelomic metastasis.

Key words: Adenocarcinoma; Air sac; *Ara macao*; Computed tomography; Neoplasia; Scarlet macaw

A 30-year-old female scarlet macaw (*Ara macao*) was referred to The Animal Medical Center for evaluation of a 2-week history of increased, "moist" respiratory noise. There had been no changes in respiratory pattern observed at home. One other bird, a cockatoo (*Cacatua* sp.), was also in the same house as the macaw. The macaw had been acquired as a chick by the present owner with no previous history of a significant medical problem during the approximate 30-year period of ownership. The bird's diet consisted of commercial pellets, vegetables, fruits, and some table foods.

The referring veterinarian had performed blood tests including a complete blood count (CBC) and plasma biochemical analysis 3 days before presentation. Results of the CBC were within reference intervals. Results of the plasma biochemical analysis indicated that the patient was suffering from hypoproteinemia (total protein = 2.6 g/dL, reference interval: 3.4 to 4.2 g/dL) and

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hypoalbuminemia (albumin = 1.1 g/dL, reference interval: 1.3 to 1.7 g/dL) with a normal globulin concentration, hyperkalemia (5.4 mEq/L; reference interval: 2.9 to 3.9 mEg/L), and a mild increase in the uric acid concentration (10.1 mg/dL; reference interval: 1 to 6 mg/dL).[1] The referring veterinarian then placed the patient on a twice-daily course of enrofloxacin (unknown dose); no improvement had been appreciated during the 2-week treatment period.

On presentation, the bird was bright, alert, weighed 1036 g, and was in good body condition (BCS 3/5). Although minimally restrained for physical examination, the macaw became extremely dyspneic, with harsh respiratory sounds heard diffusely on pulmonary auscultation. Cardiac auscultation was difficult because of the increased respiratory noise. The midkeel was widened with a rounded margin. The remainder of the physical examination was unremarkable.

Standing dorsoventral and lateral whole-body radiographs revealed an increased soft tissue lesion in the cranial coelomic cavity, dorsal to the keel, effacing the cardiac silhouette margins (Figs. 1 and 2). However, it was difficult to determine the origin of this suspected mass because of positioning and superimposition with the adjacent anatomic structures within the bird's body. Decreased coelomic detail was also noted, caused by either coelomic effusion, organomegaly, a coelomic mass, or lack of coelomic fat. Owing to the patient's respiratory status, properly positioned orthogonal whole-body radiographs or computed tomography (CT) examination under general anesthesia could not be safely performed. Rather, a standing whole-body CT was performed by placing the bird in a plexiglass induction box with flow-by oxygen supplementation. However, because the macaw was not anesthetized, intravenous (IV) contrast could not be administered. Pending radiologist's review of the standing CT scan and further diagnostic imaging, the patient was treated initially with terbutaline (0.01 mg/kg intramuscular), enrofloxacin (20 mg/kg subcutaneous, Baytril; Bayer Heathcare LLC, Fort Dodge, KS USA), 1 dose of furosemide (0.25 mg/kg intramuscular), and nebulized with cefotaxime (100 mg in 10 mL sterile saline for 15 minute). The bird was discharged on continued treatment with enrofloxacin, amoxicillin-clavulanic acid (125 mg/kg orally, every 12 hours), cefotaxime nebulization, itraconazole (10 mg/kg orally, every 24 hours), and terbutaline (0.02 mg/kg orally, every 8 to 12 hours) for empirical treatment of pneumonia and air sacculitis.

FIGURE 1. Standing dorsoventral whole-body radiograph of a scarlet macaw exhibiting severe dyspnea. A large lobulated soft tissue mass obscures the normal margination of the cardiohepatic silhouette in the cranial coelomic cavity (white arrowheads).

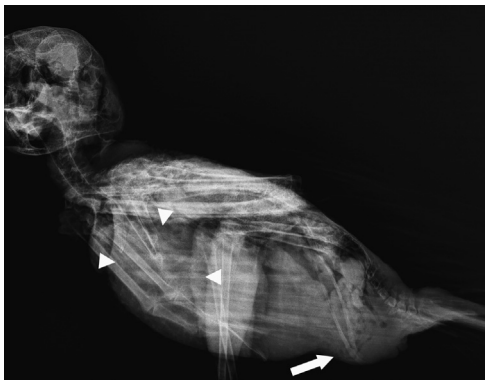

FIGURE 2. Standing lateral whole-body radiograph of the macaw described in Figure 1. The wings are superimposed over the keel on the lateral view; however, an increased soft tissue opacity is noted in the cranial coelomic cavity (white arrowheads). The caudal aspect of the coelomic cavity is also distended (white arrow).

Four days later, the patient was presented for re-examination. The owner reported little change in clinical signs since discharge from the hospital, and the bird had coughed occasionally after the owner administered the oral medications. As before, the macaw became dyspneic during light manual restraint. Physical examination findings were similar to those identified when the patient