ACVR CT/MRI society – Case of the Month
May 2019

This month’s case was provided by:

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• Signalment:
  o 10-month old male Peregrine Falcon

• History:
  o Presented with a 2-day history of lethargy and anorexia.
  o Upon physical examination the following abnormalities were noted:
    ▪ A drooping right wing
    ▪ Severe halitosis
    ▪ Increased respiratory movements, increased respiratory noises and crackles upon pulmonary and air sac auscultation
  o The following abnormalities were noted on the hematology and biochemistry:
    ▪ Mildly increased fibrinogen at 4g/L
    ▪ Mild hyperproteinemia at 44 g/L [25-40 g/L]*
    ▪ Mild hyperglycemia at 19.8 mmol/L [11-16 mmol/L]*
    ▪ Mildly increased AST at 115 U/L [20-52 U/L]*
    ▪ Mildly increased creatinine at 1631 U/L [357-850 U/L]*
    * References Exotic Animal Formulary, 5th edition, Carpenter 2017

• Study performed:
  A CT examination centered on the thoracic and abdominal portions of the coelom is evaluated both before and after administration of intravenous contrast medium.
Findings:

- Extending obliquely but overall vertically at the cranial aspect of the thorax on the right, from just dorsal to the keel to the right dorsal aspect of the thorax (region of the right interclavicular air sac), spanning almost all of the thoracic height, and extending through the esophageal lumen, there is an elongated mineral dense structure. The structure is about 2.5 cm in length. At its caudal and dorsal aspect, the structure continues as a second elongated mineral dense portion, which is orientated from cranio-dorsal to caudo-ventral and that is about 1.8 cm in length (overall the structure has a “V” shape). The caudo-ventral aspect of this structure is located in the esophageal lumen, just caudal to the tracheal bifurcation. The thoracic esophageal lumen is regionally moderately distended and contains multiple small mineral dense fragments, as well as a mild amount of soft tissue dense and gas dense material.

- Extending cranio-dorsally from the right lateral aspect of what appears to be the caudal cervical vertebra (slightly cranial and medial to the dorsal aspect of the previously described large mineral dense structure) and coursing caudally, ventrally and laterally along the right thorax on about 2.5 cm, there is another elongated, faintly mineral dense structure. The caudal aspect of this structure is located immediately dorsal to the bifurcation of the subclavian artery into axillary and pectoral arteries. The structure is located outside the esophageal lumen, is predominantly located along the right thoracic wall, at the right lateral aspect of the interclavicular air sac, and is potentially in the cranial thoracic air sac caudally. The cranial aspect of the lesion abuts the vertebral canal.

- At the periphery of the dorsal aspect of the two long mineral dense structures previously described, there is increased soft tissue density that partially obliterates the right aspect of the interclavicular air sac, and extends dorsally up to the level of the cranial thoracic and caudal cervical vertebrae. Their medullary cavity is difficult to delimit from soft tissue on the right, and the former is possibly focally attenuated by the latter. The right cervical air sac is mildly narrow.

- Focally in the cranio-ventral aspect of the right lung fields, there is a marked increased soft tissue density that silhouettes with the pulmonary vasculature. Ventral to this, extending focally in the cranial thoracic air sac, is mild soft tissue dense material.

- In the proventriculus and in the ventriculus, there are multiple mineral dense structures as well as soft tissue dense material and a mild amount of gas dense material. No other substantial abnormal finding is noted.
• Conclusions:
  1. Perforating esophageal foreign bodies at the cranial aspect of the thorax (one of them being completely extra-esophageal). These likely represent bones from consumed prey.
  2. Adjacent right-sided aerosacculitis and pneumonia.
  3. Questionable focal right-sided caudal cervical and cranial thoracic vertebral abnormalities. If real, the most likely differential diagnosis would be focal osteomyelitis/granuloma formation.
  4. Regional esophageal luminal distension and small mineral dense intraluminal foreign bodies, abnormal in location. This likely indicates an esophageal stasis secondary to the esophageal perforation and subsequent inflammation/infection.
  5. Small mineral dense foreign bodies in the proventriculus and ventriculus, can be expected as a normal finding in this species.

Discussion: The pneumonia and aerosacculitis explain the respiratory signs. The reported abnormal position of the right wing could be secondary to regional paravertebral inflammation/infection and paravertebral foreign body extension, leading to neuritis. Although not definitively identified, regional inflammation or mechanical irritation of the brachial plexus, especially given its proximity with the caudal aspect of the extra-esophageal foreign body, cannot fully be excluded. It is not possible to rule out an extension of the infectious process in the vertebral canal.

• Outcome/Follow up:
  o A combined esophageal endoscopy and coelioscopy through the interclavicular air sac were performed. Signs of inflammation and fibrin were noted at the perforation site via coelioscopy. Small pieces of prey were accumulated in the esophagus adjacent to the foreign bodies upon endoscopy. The largest perforating foreign bodies were withdrawn via coelioscopy (found to be prey bones). The smaller intra-esophageal mineral dense foreign structures were withdrawn via endoscopy. The esophageal tear was left to heal by second intention. The patient recovered well from the procedure and was discharged with antibiotics and Tramadol. He was reevaluated two months post-operatively and was found to be doing well.

• Comments:
  o Esophageal and gastrointestinal foreign bodies have been reported in various species of birds.\(^1\)-\(^4\) In captive psittacine birds, young cockatoos are at greater risk of foreign body ingestion, and commonly ingested objects include bedding, grit, pieces of toys, and cage hardware. In outdoor non-psittacine birds, ingested objects are more likely to include sand, plant material, glass and large metallic objects.\(^2\) The latter is especially true for pigeons.\(^1\) Additionally, parent-feeding of trash to nestlings was found to increase morbidity and mortality in reintroduced populations of California Condors.\(^5,6\) Trash ingestion can lead to acute zinc toxicosis, retarded growth and feather development, ventriculus and crop stasis, amongst other.\(^5\) One study found junk ingestion to be the most important cause of death in nestlings.\(^6\)
Perforating foreign bodies have been more infrequently reported. They are typically metallic and located at the level of the ventriculus.\textsuperscript{1-3} Noteworthy, during gastric cycles, muscular contractions of the ventriculus are powerful enough to force objects through its wall.\textsuperscript{1} In the case presented here, the perforating foreign bodies were prey bones, which are normally ingested in prey birds. Hypotheses regarding the etiology of the esophageal perforation included a choke, or a pre-existing mural dysmotility or lesion, secondary to a laceration or ulceration, for example. As already reported in the literature\textsuperscript{1}, the CT scan allowed precise depiction of the location and nature of the lesions and allowed appropriate planning and choice of the interventions required for removal of the foreign bodies. Both an air sac coeliotomy and an esophageal endoscopy were performed based on the location and extent of the perforating foreign bodies.

- References: