

## **RADIOGRAPHIC CHANGES SEEN WITH VEHICLE TRAUMA IN BIRDS**

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### **SEEKING A CASE DEFINITION**

Vehicle trauma is a common cause of presentation in wild birds that arrive at the veterinary clinic. A study of the incidence of presentations in wildlife revealed that vehicle trauma causes 12-22% of all admission into care (Tribe and Brown, 1999). However, this study did not take into consideration the number of wild birds that arrive at a veterinary clinic for assessment before being transferred to a wildlife carer. Many of these birds are severely traumatised and euthanased. At Healesville Sanctuary, 75% of the 1500 admissions yearly are due to vehicle trauma (Baker, pers comm., 2010). Thus the true incidence of vehicle trauma would be higher, and associated with a poor prognosis. Severe appendicular fractures may prompt euthanasia. However, in some birds there are no obvious radiographic changes then a tentative diagnosis of cranial trauma may be made by the examining veterinarian. It is these birds that are then sent into the wildlife carer system. Failure to adequately identify the nature of the trauma can result in poor welfare outcomes for these individuals. When they die between one and three days later, their bodies may not be submitted for necropsy and confirmation as to whether it was cranial or chest trauma is not determined.

Review of radiographs examined in the same species presenting for different problems has revealed radiographic changes that appear consistent with blunt trauma to the chest of birds. These changes are not seen in birds with distal appendicular fractures, nor in pet birds that present with metabolic causes of illness. Species in which these comparisons have been made include the twny frogmouth, kookaburra and various raptor and psittacine species

### **CLINICAL SIGNS**

Unfortunately, the clinical signs in birds that may relate specifically to chest trauma may also be related back to cranial trauma. However, unlike birds with cranial trauma, chest trauma patients are usually able to perch, have a strong bite when their mouth is opened, and a lack of blood at the choana, eyes, or nostrils.

Blood at the larynx, bruising on the chest and a depressed mentation are usually seen. They appear unable or unwilling to fly on initial presentation. Unfortunately, these clinical signs are not pathognomic for chest trauma.

### **RADIOGRAPHIC CHANGES**

There has been a consistent change observed in the shape of the cardiohepatic silhouette in more than 20 birds assessed this year. The heart is separated from the liver by an area of radiolucency - the V for vehicle sign! This may be present on both lateral and dorsoventral views.

In normal birds, the heart sits in close contact with the liver, often complicating its measurement

(Pees et al., 2006) and obscuring the apex. In the case of chest trauma, the cardiac profile may appear shortened on the dorsoventral view, since the apex of the heart appears to have been tilted forward into closer contact with the keel.

Other radiographic changes that may be present but more difficult to determine include increased opacity in the air sacs from bleeding into the airsacs. At necropsy, this is seen to be due to bleeding into the airsacs. Additionally, the lungs may appear more opaque, due to congestion, and the hepatic profile may be distended, possibly by a haematoma. This change occurs consistently to the right liver lobe. The left liver lobe is in closer contact with the proventriculus and ventriculus, whereas the right liver lobe does not have these close anatomical associations and appears to be able to move forward as a consequence of collision and contact the keel. The result of this trauma is rupture of the liver capsule and formation of a haematoma (see below).

The index of suspicion of possible chest trauma is increased with fractures of the pectoral girdle and the proximal humerus. Distal fractures of the antebrachium and carpus do not appear to be associated with concurrent chest trauma in the majority of cases, although larger number of cases needs to be examined to confirm this observation.

### **CONFIRMATION AT NECROPSY**

Traditional necropsy techniques of birds have involved cutting the ribs to lift the keel up and off the coelomic contents. With more careful dissection to trim the air sacs and other fibrous attachments surrounding the heart and liver prior to lifting the keel, it is possible to appreciate that the radiographic changes seen correlate to the appearance at necropsy. Instead of the heart sitting in close proximity to the two liver lobes, its apex has changed orientation by up to 45 degrees towards the keel.

Gross haemorrhage on the internal aspect of the keel may be observed. Petechial haemorrhages on the surface of the heart may also be seen. Gross haemorrhage from a haematoma of the right liver lobe may be observed. Congestion of the lungs and airsacs may also be seen.

### **THE HUMAN EQUIVALENT**

In vehicle trauma, the passengers of the vehicle travel forward on the seatbelt at the moment of impact and this results in myocardial contusion. Heart damage is assessed by patient-side units that detect enzymes specific for heart-muscle, troponin. This enzyme has been tested in cattle with traumatic reticuloperitonitis and Gunes et al. (2008) has demonstrated that it elevates in the presence of damage to the heart.

### **FUTURE DIRECTIONS**

In cases of suspected chest trauma, further evaluation using diagnostic tools that are readily available in veterinary clinics can be performed.

- A PCV/TPP may provide some evidence of internal haemorrhage. Serial evaluation of the PCV on the day of arrival and on the following day may suggest ongoing blood loss. The PCV of acutely traumatized birds should fall in the normal range for the avian species. Decreases may indicate blood loss.
- Perform an ECG trace to determine if arrhythmias of the heart are present (Potkin et al.,

1982). This has not been routinely performed on avian patients and should be considered when the bird can be safely anaesthetised.

- Liver ultrasound may reveal the presence of hypoechoic areas due to a haematoma.
- Endoscopy of the right side of the body may reveal haemorrhage in the air sacs or a haematoma of the liver.
- Evaluation of patient-side units that measure troponin to determine the validity of this enzyme in avian patients with chest trauma compared to appendicular fracture trauma is warranted as a simple tool to assist in the diagnosis of chest trauma after vehicle impact.

## REFERENCES

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