COMPUTED TOMOGRAPHIC DIAGNOSIS OF CORACOID SUBLUXATION IN A NEW ZEALAND FALCON

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INTRODUCTION

Window strike, or any blunt collision at speed, is a common cause of fractures and dislocations to the bones that form the stable apparatus of the shoulder, particularly of the coracoid bone. Cervical spine trauma is another possible consequence and window strike is a common cause of death in many avian species (Dunn, 1993), usually due to brain oedema and haemorrhage (Veltri and Klem, 2005).

Coracoid fractures are one of the more common injuries seen after blunt trauma and coracoid luxations are relatively uncommon in birds (Guzman et al , 2007). The clinical signs associated with coracoid luxations or subluxations include wing drop, inability to fly or ability to fly only short distances (Bennett, 1997).

Radiography is an excellent diagnostic tool for most bone lesions and trauma, which are normally readily visualised (Naldo, 2004). However, coracoid subluxations can be difficult to diagnose radiographically if there is minimal displacement. There is an increase in use of computed tomography (CT) in veterinary science which provides greater detail and 3 dimensional views of the animal (Gumpenberger and Henninger, 2001). Where cost was usually prohibitive, it is now becoming an affordable tool, especially where endangered species are concerned.

This paper outlines a clinical case where coracoid subluxation was diagnosed by the use of CT scan in an endangered New Zealand Falcon.

CASE REPORT

A female wild NZ Falcon was found by a member of the public after it struck a window of their house with force. It was found lying on its back and gasping. It was taken to a local rehabilitator and after 24 hours was referred to the New Zealand Wildlife Health Centre (NZWHC) in Palmerston North.

On presentation, the falcon was quiet but alert and responsive and in sternal recumbency. It was thought that the bird was a subadult, but the exact age was unknown.

On physical examination, no palpable fractures of the wings or legs were found, nor any gross evidence of trauma. There was a slight drop of the left wing and the falcon appeared unable to weight- bear on the legs, although she was observed to hock sit in the cage. Both feet were clenched but did respond to pain and showed some minor voluntary control when stimulated. Cranial reflexes and mentation appeared normal as did appetite when offered bite sized prey, however the tail flick response was reduced and she appeared unable to straighten the legs voluntarily. Survey radiographs were unremarkable with no obvious bony abnormalities or injuries on either dorsoventral or lateral views. All blood test results (haematology and routine biochemistries) came back in the normal range and blood lead was also negative.

An assessment of moderate paresis (due to cervical inflammation, bruising or nerve damage, synsacral luxation, undiagnosed pelvic or spinal fracture, or other heavy metal toxicosis) and left wing drop (bruising, radial nerve damage, undetected coracoid or clavicular injury) due to window strike was made. Initial therapy consisted of oral fluid therapy (15 mls 0.9% NaCl PO bid) and Butorphic (butorphanol) at 4mg/kg IM bid for the first 24 hours, followed by non-steroidal anti-inflammatories (Metacam, meloxicam at 0.2mg/kg PO sid) and cage rest.

Over the following few days the falcon showed a steady improvement. From sternal recumbency on presentation, within 24 hours the bird was able to stand in a crouched position, place feet in a normal position and walk a few steps. While her proprioception was difficult to assess, she could accurately strike out with the feet, showing voluntary motor control. The feet were able to clasp strongly, the tail flick was mildly positive and vent tone was normal.

Within 7 days the falcon was able to stand, walk, run and pounce on 'prey' in an apparently normal fashion and had a positive tail flick response. She even managed to escape from her cage one day and was found at the top of a bank of cages – it was therefore assumed that she could fly. Due to the normal diagnostic tests and relatively rapid improvement, the falcon was sent to a local rehabilitator for flight assessment prior to release back to the wild.

The rehabilitator sent the falcon back after noting that she still had a dropped wing, was unwilling or unable to fly and appeared to have an unusual gait. Subsequent blood tests revealed a very high Uric Acid (UA) of 1597 µmol/l (ref. range 240-980 µmol/l). Treatment for kidney disease was initiated with intensive fluid therapy – an IV catheter was placed in the medial metatarsal vein and twice daily fluid therapy of 20 mls 0.9% NaCl slowly over 10 minutes (80ml/kg/day). This was continued until a normal UA was seen and then the fluid therapy discontinued. The following week the UA was still within the normal range and it was assumed the high UA had been pre-renal in nature. The falcon was sent back to the rehabilitation facility, however two weeks later, she had still not been observed to voluntarily fly and so it was decided to assess the bird by Computed Tomography (CT) for further investigation.
The CT scan revealed a left coracoid subluxation from the sternum with mild displacement.

Additionally a possible rotation between two cervical vertebrae was observed, with the more

cranial cervical vertebrae slightly rotated in a left direction relative to the thoracic vertebrae. No fractures or subluxations of any of the cervical vertebrae were evident and the clinical significance of this rotation is unknown, although several radiologists concurred that this was not a normal degree of rotation and possibly represented cervical instability.

Treatment was conservative and to date the falcon is doing well with at a raptor rehabilitation centre. She is able to fly short distances and is steadily improving.

DISCUSSION

The coracoid bone acts as a solid strut in the avian thoracic girdle, articulating with the sternum to provide stability between the wing and the sternum. In flight, when the pectoralis major contract on the downward stroke, the coracoids prevent the thorax from collapsing (King and McLelland, 1984).

Coracoid subluxations can be difficult to diagnose radiographically if there is minimal displacement, yet cause significant morbidity for the animal. Coracoid subluxations should be considered as a differential in birds that have a dropped wing or inability to fly in the absence of obvious radiographic changes.

Surgical repair may be necessary, especially in birds such as raptors that require accurate and acrobatic flight. Due to the chronic nature of the lesion and the apparent improvement in flight, this falcon was treated conservatively, however should full flight fail to return, surgery may be required. The initial paresis in this NZ Falcon has not been explained, but may have been due to cervical spine injury, or brain oedema or haemorrhage (Vetri and Klem, 2005). The rapid recovery from this paresis suggests that the cervical or brain injury was mild.

CT is a non invasive diagnostic technique providing thin cross-sectional radiographic scans. CT allows further detail of the patient to be evaluated than can be assessed by normal radiographs, as it solves the problem of superimposition of body organs and bone. 3-dimensional reconstructions can provide even further information and provide an excellent tool for conveying information to students or owners (Gumpenberger and Henninger, 2001). Computed Tomography has proved to be a very valuable diagnostic tool in this case, however assessment of the vertebral column was limited by the size of the bird and the CT definition currently available.

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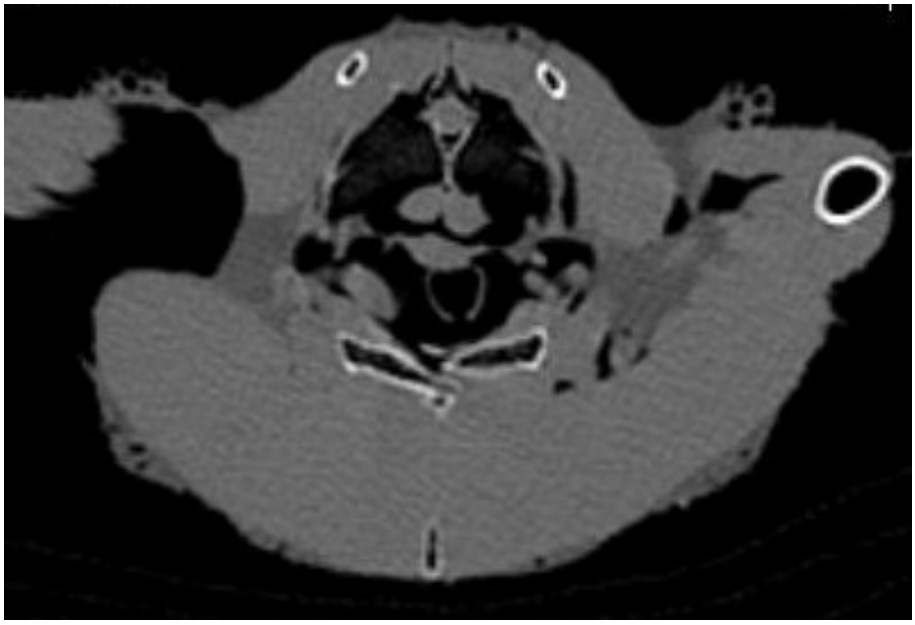

CT scan showing a left sided coracoid subluxation on cross section.