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Cervical Dorsal Spondylosis with Spinal Cord Compression in a Black Swan (*Cygnus atratus*)

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ABSTRACT: Cervical dorsal spondylosis with spinal cord compression in a black swan (*Cygnus atratus*) was confirmed radiographically and morphologically. Clinically ataxia was associated. Noninflammatory, degenerative changes of the synovial joint cartilage were associated with the spondylosis.

Key words: Cervical dorsal spondylosis, black swan, *Cygnus atratus*, case report.

An aged, adult, male black swan was presented with ataxia of 2-mo duration. Other clinical signs were not noted by the owner. The swan was alert and aware of his surroundings. Neurologic examination of the swan revealed limb and truncal ataxia during voluntary movement. It could stand and fully extend its pelvic limbs intermittently, but it tired easily. Symmetrical motor weakness and lack of conscious proprioception were evident in the pelvic limbs. Muscle tone of the wings was normal and some voluntary movement was demonstrated. In an apparent attempt to adjust for proprioceptive deficits in ambulating, it used its neck in weaving movements. Cranial nerves and sensorium to head and body were normal. Muscle tremors were not noted. Anal sphincter response was quick.

Radiographic examination showed abnormal axial alignment of the C2-3, C3-4, C4-5 and C5-6 articulations. Periarticular calcification and poor definition of the intervertebral space were present at C4-5 (Fig. 1).

Necropsy including careful dissection of the cervical vertebral column revealed dorsal protrusions of hard, tan-white tissue at the intervertebral spaces of C3-4, C4-5 and C6-7. Tissue bulging onto the floor of the vertebral canal was most severe at C4-5. Gross changes were not present in the adjacent spinal cord.

Compression of the spinal cord was confirmed on routine histology. Diffuse axon swelling and necrosis associated with dilated myelin sheaths were observed primarily in the white matter. Mild gliosis, swollen astrocytes, and depletion of ventral horn cell bodies were present also. These microscopic changes were most severe at C4-5.

Histologically, the cartilage of the synovial articular surfaces appeared degenerative when compared to normal intervertebral joints of two swans which were presented for necropsy because of gunshot wounds. Clumping of enlarged chondrocytes associated with increased basophilia of the territorial cartilage matrix was noted. Cartilage matrix of the interterritorial regions appeared more lucent and hyalinized in some areas. Hyalinization of the cartilage was most severe dorsally. Osseous and fibrous connective tissue proliferation involving the intervertebral ligament and fibrous meniscus resulted in osteophyte formation (Fig. 2). These changes were consistent with dorsal spondylosis of the vertebral bodies and were most severe at C4-5, but present at C3-4 and C6-7 as well. Fibrous thickening of the ventral intervertebral ligament was noted also. Unique, synovial lined, fibrous menisci were noted between the articular surfaces of the intervertebral bodies in the two normal swans (Fig. 3). In the abnormal swan, the meniscus was completely missing at C4-5 (Fig. 2). The menisci at C3-4 and C5-6 were thickened and hyalinized.

Cervical intervertebral degenerative joint disease and cervical spondylosis have not been previously reported in birds. Spondylolisthesis (kinky back) in broiler chickens is well characterized (Wise, 1970;

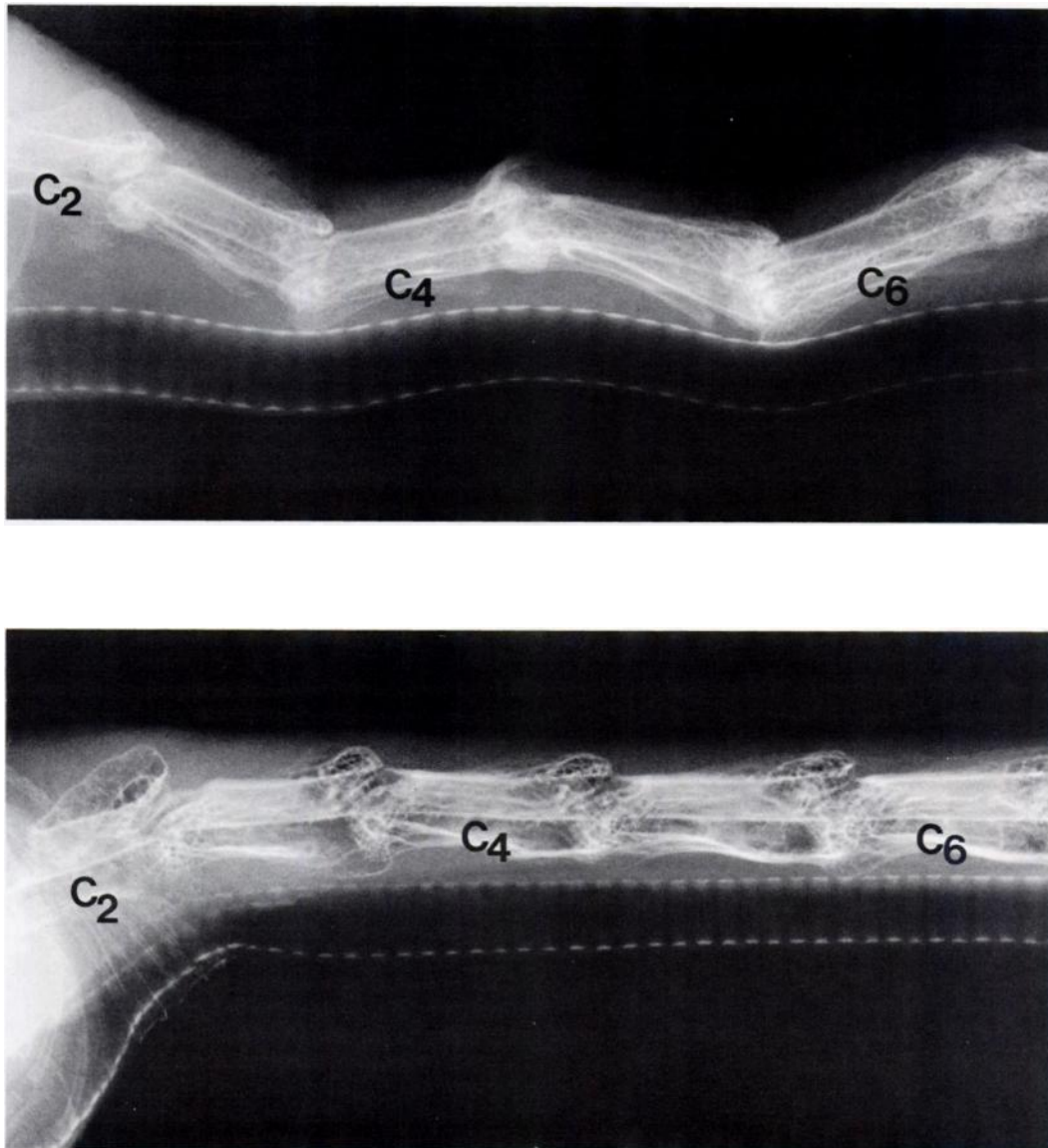


FIGURE 1. Upper photograph; lateral recumbent radiograph of the fully extended, cranial cervical spine of a black swan with cervical dorsal spondylosis. Ventral subluxation of C3-4 and C5-6 and dorsal subluxation of C4-5 and C6-7 are present (C2, axis; C4, fourth cervical vertebra; C6, sixth cervical vertebra). Lower photograph; unaffected, fully extended dead swan neck as a normal comparison.

Riddell and Howell, 1972; Riddell, 1973). Spondylosis is a common condition of vertebrae in bulls (Thomson, 1969; Weisbrode et al., 1982), pigs (Doige, 1979, 1980), and dogs (Morgan, 1967; Morgan et al., 1967; Wright, 1980), but rare in other mammalian species (King and Smith, 1958; Gloobe and Nathan, 1973; Lagier, 1977; Paterson, 1984; Jubb et al., 1985). In affected mammals, ventral and lateral osteophyte formation resulting in spurs or complete osseous bridges uniting the vertebral bodies are common. Dorsal or dorsolateral osteophyte formation, as oc-

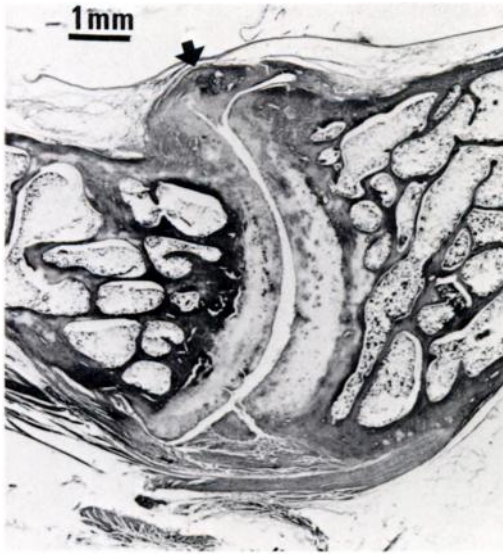


FIGURE 2. Photomicrograph of C4-5 from swan with dorsal spondylosis. Dorsal osteophyte formation (arrow) resulted in spinal cord compression. Intervertebral meniscus is missing.

curred in this swan, is uncommon in mammals (Jubb et al., 1985).

In mammals, spondylosis is thought to be caused by degenerative changes in the annulus fibrosis and intervertebral disk.

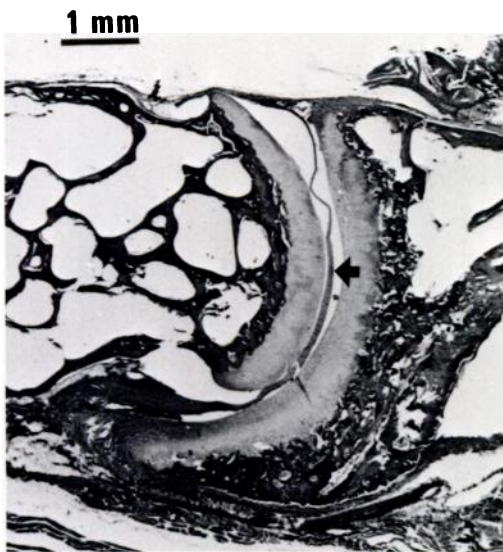


FIGURE 3. Photomicrograph of C4-5 from normal swan with intervertebral meniscus (arrow).

Factors that result in abnormal mobility of the vertebrae, such as continuous heavy strains, may cause the degenerative changes (Thomson, 1969; Doige, 1979, 1980; Jubb et al., 1985). It has been observed that in birds the joints between intervertebral bodies are synovial (McLelland, 1984). In this swan, noninflammatory, degenerative changes of the synovial joint cartilage were associated with the spondylosis. The degeneration, rupture and atrophy of the unique, synovial lined, fibrous intervertebral meniscus may have been important also to the pathogenesis.

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