What Is Your Diagnosis?

History

A 1-year-old sexually intact male mixed-breed dog was evaluated within an hour of being hit by an automobile. On physical examination, the rectal temperature was 38.5°C (101.2°F), the heart rate was 160 beats/min, and the respiratory rate was 60 breaths/min. Femoral pulses were weak and mucous membranes tacky. The dog was alert and responsive; both pupils were miotic, and conjunctival hemorrhage was detected in the right eye. Direct and indirect pupillary light reflexes were absent in the right eye. Several small lacerations were detected on the head, and a contusion was detected on the lateral side of the left stifle joint. The dog was nonambulatory and unable to move both hind limbs. Signs of deep pain were detected in all limbs. A catheter was placed in a lateral saphenous vein, and fentanyl (4.4 µg/kg [2 µg/lb], IV bolus) was administered. The dog also received standard treatment for shock. No abnormalities were detected on abdominal and thoracic radiographs. Fluids were administered IV and the dog received antimicrobials and analgesics during the night.

The following morning, the dog had signs of cervical pain and held its head in a guarded position and slightly to the right. The dog was unable to move both hind limbs, and movement was decreased in both forelimbs. Radiographs of the skull and cervical portion of the vertebral column were obtained (Figure 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page.

Figure 1—Lateral (A) and ventrodorsal (B) radiographic views of the cervical portion of the vertebral column of a 1-year-old sexually intact male dog evaluated for signs of persistent cervical pain and neurologic deficits after being hit by an automobile.
Radiographic Findings and Interpretation

Craniodorsal luxation of the atlas from its articulation with the occipital condyles is evident (Figure 2). The caudal articulation of the atlas with the axis is normal. There is no radiographic evidence of bony fractures associated with the atlas or the occipital condyles.

Comments

Fractures and luxations of the atlas and axis are common after traumatic injuries to the cranial cervical portion of the vertebral column.1 However, luxations of the atlanto-occipital (AO) joint have been infrequently reported in dogs and cats.2–6 Traumatic injuries of sufficient force to disrupt the AO articulation commonly result in substantial additional injuries and are often fatal. Clinical signs observed in a patient with AO luxation vary depending on the severity of the lesion. Clinical signs may include pain response to manipulation of the head or neck; displacement of 1 wing of the atlas dorsally relative to the skull on palpation; anisocoria; proprioceptive deficits in some or all limbs; paraplegia, or quadriplegia; and urinary incontinence.7 Concurrent injuries to the cerebrum or brainstem, particularly the ascending reticular activating system, can lead to varying degrees of decreased consciousness.

Orthogonal view plain radiographs are suitable for diagnosing AO luxation; however, care must be exercised when moving and positioning any patient with suspected instability of the cervical portion of the vertebral column to avoid further injury. This is especially important when sedation or anesthesia is administered and the patient’s protective responses to pain are reduced. Other imaging modalities, such as computed tomography, can be used to more accurately identify fractures associated with the trauma and to facilitate reduction planning.7

Prognosis for dogs and cats that have survived a traumatic AO luxation is guarded. Treatment options include closed reduction and surgical stabilization. Closed reduction of the AO joint has been reported in 3 dogs2,3 and 1 cat.4 Surgical reduction and stabilization have been reported in 2 dogs, both via a dorsal approach.5,6 In all cases, the patients returned to a neurologically normal condition between 1 and 8 months after reduction and temporary external stabilization for 2 to 8 weeks. It appears that formation of fibrous connective tissue after the initial ligament damage has the potential to provide adequate stability to the AO joint after traumatic luxation. The owners of the dog of this report chose to euthanatize the dog. Necropsy revealed AO joint disarticulation with no evidence of articular fracture fragments.