

CUTTING EDGE

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Visualizing lesions affecting the spinal cord has always been challenging, since many are not apparent on routine radiographs. We are frequently presented with patients that have the complaint of ataxia, paresis or spinal pain. Choosing which imaging tests to perform can be confusing. Each form of imaging has its place and its own unique benefits and pitfalls.

Lesions that may be readily diagnosed with plain radiographs of the spine include spinal fractures, luxations, vertebral anomalies (such as hemivertebrae or spina bifida), discospondylitis, and some vertebral body tumors.

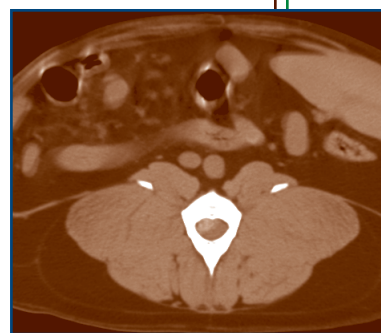
Because the spinal cord and discs cannot be visualized, plain radiographs are inadequate in the diagnosis of intervertebral disc

ADVANCES IN SPINAL IMAGING

Plain radiographs of the spine are useful in evaluating the vertebral column for position of bones, continuity of the spinal column and spinal canal, bone density, changes in the articular facet joints, and integrity of vertebral body end plates and disc spaces. Good positioning and radiographic technique are critical for evaluating the spine. Many lesions may be missed completely and many anatomically normal things can be misinterpreted as pathology, if good positioning and technique are not applied. This is particularly true if one is evaluating the width of the disc spaces. Sedation or general anesthesia may be required.

extrusion, spinal cord or nerve root tumors, or congenital spinal cord defects (such as syringomyelia).

Myelography involves the injection of iodinated contrast into the subarachnoid space. Radiographs performed following this injection allow visualization of the outline of the spinal cord. Compressive lesions can be readily seen using this technique. Disc extrusion or extradural spinal cord tumors are commonly diagnosed with a myelogram. Vertebral instability, such as that seen in dogs with Wobbler's syndrome, is most readily appreciated on myelographic views taken with the neck in several different positions: neutral, flexed, extended, and lateral distraction.



Extruded disc material at the right side of the spinal canal.

Each form of imaging has its place and its own unique benefits and pitfalls.

Case Study 1: Hercules

Hercules was a 4 year old neutered male Dachshund with a history of acute paraplegia in the last 12 hours. At presentation, he was paraplegic and had no deep pain sensation in either pelvic limb. He had

apparently normal thoracic limbs and normal pelvic limb reflexes. His lesion was localized to the T3-L3 spinal cord. A CT scan was performed.

The CT images showed mineralized disc material extruded at L3-4, extending cranially over the body of L3. This material is lateralized to the right side, and causes moderately severe compression of the spinal cord at this site.

A hemilaminectomy was performed at L3-4 on the right side. A large amount of extruded disc material was removed from the spinal canal. Two months' post-op, Hercules had regained deep pain sensation and was beginning to show some voluntary motor function in both pelvic limbs, although he was still non-ambulatory.

Case Study 2: Jordan

Jordan was a 3 year old intact male Labrador retriever with a 2 month history of poorly

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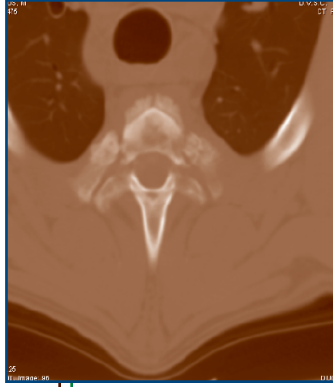
Case Study (cont.)

localized pain. No orthopedic abnormalities or neurologic deficits were identified on physical exam, but he did have an elevated body temp or 104.5 degrees. He was painful on deep spinal palpation in the mid-thoracic region. Plain radiographs of the spine showed no obvious abnormalities. A CT scan was performed.

There are multiple lytic areas in the T8 endplate, vertebral body and the costovertebral junctions. There is also evidence of proliferation of bone ventral to the vertebral body and intervertebral space. The T7 vertebral endplate is also affected on subsequent images.

These abnormalities are consistent with discospondylitis or osteomyelitis. Bacterial or fungal organisms may cause discospondylitis. When discospondylitis or osteomyelitis begin, radiographic lesions may not be seen for up to 4 weeks or more. CT is more sensitive and may allow visualization of bony changes earlier in the disease process.

Blood and urine cultures, brucella titer, and fungal titers were submitted. Jordan was treated with clavamox for presumed Staphylococcus discospondylitis. Clavamox was continued for 12 weeks. Within 2 weeks of beginning treatment, Jordan's pain was improved.



Lysis of the endplate, vertebral body, and costovertebral junctions.

A myelogram does not allow us to evaluate the cauda equina for nerve root compression, such as is seen with lumbosacral stenosis, since the canine spinal cord ends around L5. Intramedullary spinal cord lesions, such as neoplasia or congenital syringomyelia, may be difficult to see or may be missed with a myelogram, since the parenchyma of the spinal cord is not visualized.

Because it involves injection of contrast media into the subarachnoid space, a myelogram is an invasive procedure, and there is some risk associated with it. General anesthesia is required. Possible complications of myelography include transient post-myelogram seizures and worsening of the patient's neurologic status.

CT (computed tomography) is basically radiography performed in an axial plane. CT is excellent for evaluation of bone detail, and is ideal for visualizing bone tumors, spinal fractures, and discospondylitis. Soft tissues are better visualized than on plain radiographs, but interpretation of subtle soft tissue lesions can still be difficult. In the case of type I disc extrusion in chondrodystrophic breeds, such as dachshunds, the disc material that is

extruded is often mineralized. This mineralized disc material can be easily seen on a CT scan, and any lateralization of the disc material is also apparent. This is not necessarily true for larger dogs or dogs with type II disc disease, in which there is typically no mineralization of the disc. In these patients, a myelogram in combination with a CT scan is often needed.

Modern CT scanners are very fast, often completing a scan in a matter of minutes. A CT scan (without a myelogram) is non-invasive for the patient as well. Unfortunately, it is often impossible to know whether or not a myelogram will be needed prior to the scan.

MRI allows the best visualization of soft tissue lesions, and is especially useful for diagnosing intramedullary spinal cord lesions, such as neoplasms, syringomyelia, arachnoid cysts, and even occasionally infarcts. It is also good at diagnosis of disc disease in dogs. MRI is non-invasive, but does require significant time to perform. It is the most expensive imaging modality and because of the time required, scanning of a large area (such as the thoracolumbar spine) in a large dog can be problematic.

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