

surgery

internal medicine

emergency & critical care

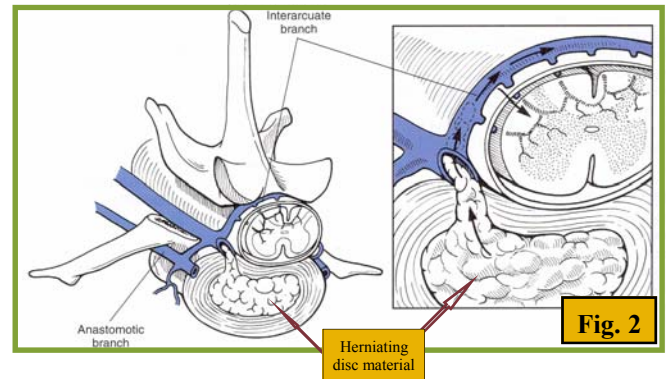
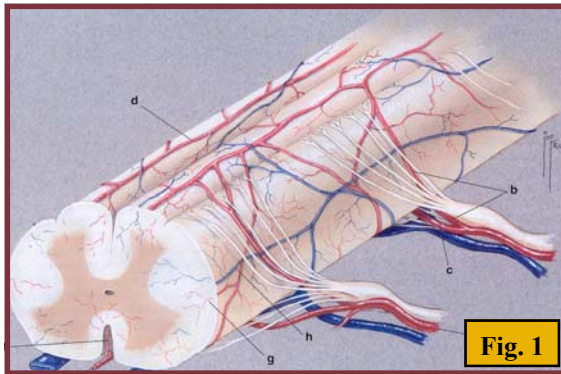
dermatology

radiology, ultrasound & CT scan

# Spine ● Fibrocartilaginous Embolism

## Fibrocartilaginous Embolism (FCE) aka: Ischemic Myelopathy:

The blood supply to the spinal cord is very complicated and segmental in nature (Fig. 1). Each region of the spinal cord has its own vascular supply to provide blood which brings in nutrients and oxygen. “Ischemia” results when any tissue is deprived of blood (and thus oxygen). Ischemic Myelopathy” or “Fibrocartilaginous Embolism” (FCE) results when a region of the spinal cord is deprived of blood due to an obstruction or clot in the blood supply to a specific region of the spinal cord. With FCE, the obstruction or clot is caused by herniated disc material that gets into the vascular system and causes the obstruction (Fig. 2). This is basically a “stroke” of the spinal cord. The severity of injury is directly dependent on the location and extent of the vascular obstruction (stroke).



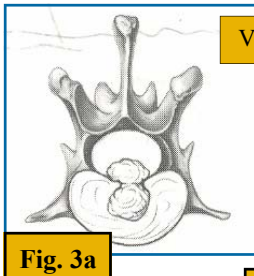
### Clinical Signs:

- 1) Large or Giant Breed dogs and Miniature Schnauzers, most common
  - 2) Any breed can suffer this injury
  - 3) Acute (sudden) onset of symptoms:
  - 4)
    - a. Explosive activity or mild trauma → yelp of pain with onset of symptoms
    - b. Severe neurological deficits
      - UMN or LMN signs (paresis to complete paralysis with loss of deep pain)
      - **\*Asymmetrical symptoms** (e.g. near complete paralysis in only one limb)
      - Predisilection for the cervical or lumbar intumescence (50% of cases)
    - c. Symptoms may progress for several hours (lameness progressing to paralysis) but typically **\*do not progress beyond 24 hours**
    - d. **\*Lack** of spinal hyperesthesia (back pain) is typical
- \*classic triad of symptoms (see adjoining box)**

Classic presentation for FCE is a large or giant breed dog (or Miniature Schnauzer) that presents with an acute onset of **\*asymmetrical** rear limb paresis or paralysis, **\*non-progressive** in character, and **\*non-painful** on examination, following an episode of vigorous or explosive activity such as jumping to catch a ball or twisting in heavy mud or sand.

## Pathogenesis: FCE vs. Type I disc herniation

In more typical disc herniations, the disc material (nucleus pulposus) ruptures up through the annulus fibrosus and puts pressure directly on the spinal cord causing compression and disruption of nerve pathways (Fig. 3a & b). Disc material can also rupture laterally (to the side as seen in Fig. 4) thus placing pressure on the side of the spinal cord but still having an overall compressive effect. With FCE, the disc material ruptures laterally and penetrates into the spinal vascular system (Fig. 1 & 5) causing obstruction of blood flow to a region of the spinal cord as mentioned previously. One study documented embolization of arteries in 40% of cases, veins in 37% of cases, and of both in 23% of cases. This obstruction causes ischemia and subsequent necrosis (death) of the affected region of the spinal cord. Symptoms and prognosis for recovery are thus greatly dependent on the degree and region of spinal cord that suffers this injury.



Ventral midline disc herniation

Fig. 3a

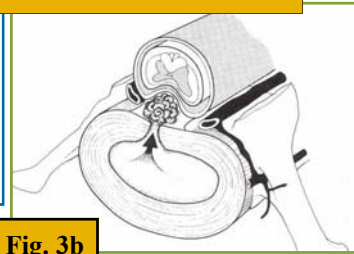
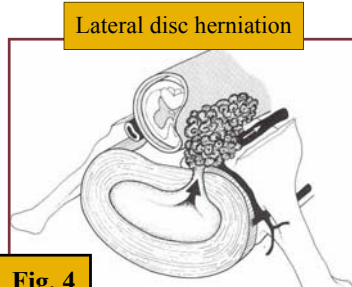
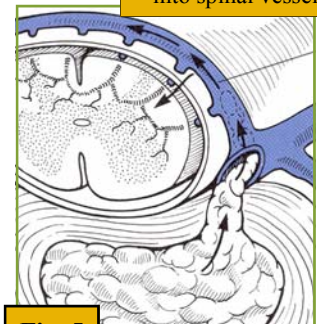


Fig. 3b



Lateral disc herniation

Fig. 4



Lateral disc herniation into spinal vessels

Fig. 5

## Diagnosis:

FCE can be challenging to diagnose but should be considered in any large breed dog with the symptoms described previously. Myelography, CT or MRI are the primary diagnostic tools used to eliminate other causes of spinal cord compression that could be causing similar symptoms. Spinal cord swelling may be seen with myelography in 27-47% of cases. Spinal fluid analysis is abnormal in 46-75% of cases.

## Treatment and Recovery:

As mentioned, the more severe the injury, the more grave the prognosis. Patients that present with extensive LMN deficits (complete paralysis of one or more limbs with diminished or absent deep pain) have a very poor prognosis for recovery. Patients with less severe initial symptoms have a much better prognosis for recovery. Due to the nature of the injury - necrosis or death of a region of the spinal cord - even patients with relatively minor injuries may be left with residual neurological deficits. Treatment consists of medical management with steroids if the patient can be treated within the first several hours of the injury. Supportive care is otherwise the primary goal of treatment including aggressive physical therapy & rehabilitation to stimulate healing and re-establishment of new neuro pathways. The most dramatic recovery typically occurs within the first several weeks following the injury; however, neurological improvement can continue for several months on a more subtle level.

## Spinal Neurosurgical Expertise:

The surgeons at WRVS have extensive experience and expertise in this field with over 30 years of combined experience in neurosurgical diagnosis and treatment of spinal cord disease in dogs and cats. Specific areas of expertise include spinal cord disc disease, lumbo-sacral instability, spinal cord trauma, spinal cord neoplasia, and congenital spinal malformations.

**Figures:** "Small Animal Spinal Disorders - Diagnosis and Surgery" NJ Sharp & SJ Wheeler, 2005; "Small Animal Surgery" TW Fossum, 2002; "Pathophysiology in Small Animal Surgery" MJ Bojarb, 1981.

### References:

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