DIAGNOSTIC APPROACH AND DIFFERENTIALS FOR CHRONIC PROGRESSIVE PARESIS

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Older dogs frequently have orthopedic diseases that affect their mobility. When faced with these cases the clinician must often decide whether the patient has neurologic disease in addition to musculoskeletal conditions. Clinical signs consistent with neurologic disease are proprioceptive ataxia, weakness (paresis), spinal pain, and delayed postural reactions (proprioceptive deficits). The main neurologic differentials causing pelvic limb paresis in older dogs are degenerative lumbosacral stenosis, intervertebral disc protrusion, degenerative myelopathy and spinal neoplasia. The main features of these diseases are summarized below.

DEGENERATIVE LUMBOSACRAL STENOSIS

This is a common disease syndrome that typically affects adult (usually middle-aged to older), large-breed dogs. Clinical signs are variable, but lumbosacral pain is an early and consistent finding. Pain may be manifested in a number of ways, such as reluctance to rise or sit, and unilateral or bilateral pelvic limb lameness. Pain and lameness may be acute or chronic and may be persistent or episodic. These clinical signs may be misinterpreted as being due to orthopedic disease, most notably hip dysplasia. If untreated, clinical signs of dysfunction may progress to proprioceptive loss in the pelvic limbs, voluntary motor weakness (in the distribution area of the sciatic nerve), and urinary/fecal incontinence, usually in that order. Importantly, paraplegia (complete loss of motor function in the pelvic limbs) is not seen with lumbosacral disease in dogs because the femoral nerve (the main extensor nerve of the pelvic limbs) emerges before the lumbosacral region.

Diagnosis of degenerative lumbosacral stenosis is based upon signalment, historical and clinical findings, and results of diagnostic imaging of the lumbosacral region. The definitive diagnosis of degenerative lumbosacral stenosis is made by imaging of the lumbosacral area and demonstrating compression of the cauda equina. One must be careful with the interpretation of imaging findings because lumbosacral compression is also frequently seen in asymptomatic dogs, thus clinical and imaging findings must be correlated for a diagnosis of lumbosacral stenosis.

Treatment of the patient with degenerative lumbosacral stenosis may be conservative or surgical. Treatment decisions are based primarily on severity of clinical signs, age of the patient and concurrent diseases; as mentioned previously, there appears to be no clear correlation between extent of cauda equina compression evident on imaging and disease severity or postoperative outcome. Conservative therapy consists of enforced rest initially for a few weeks. Additionally, anti-inflammatory medication (either nonsteroidal drugs or prednisone, not both), analgesics (such as gabapentin), and body weight reduction are recommended. In patients with neurologic deficits, or patients for whom pain is refractory to conservative management, surgery is chosen as the preferred mode of therapy. Most dogs are treated with decompressive surgery (dorsal

laminectomy), though other techniques must be considered based on imaging findings (distraction, stabilization or lateral foraminotomy).

INTERVERTEBRAL DISC PROTRUSION

There are two basic types of disk degeneration, referred to as chondroid and fibroid degeneration. These two types of degeneration typically cause two distinct types of disk disease. The one that causes progressive, chronic signs is the fibroid degeneration that involves a progressive thickening of the dorsal annulus fibrosus, which protrudes dorsally into the vertebral canal. This type of disk disease is called Hansen Type II, (Type II) disk protrusion. Hansen Type II protrusions typically occur in dogs five years of age and older. It typically causes progressive signs of paraparesis, often with some degree of thoracolumbar spinal pain detected on palpation.

Diagnosis of disk disease is based upon signalment, history, clinical signs, and results of diagnostic tests, primarily imaging of the vertebral column. Because these dogs can have multiple spinal abnormalities, MRI is the preferred imaging modality.

Type II disk disease is typically managed medically with restricted activity (but not cage confinement) and anti-inflammatory drugs. Most patients seem to improve and stabilize. When surgical intervention is indicated it requires decompression of the spinal cord and removal of disk material from the vertebral canal. This can be accomplished via hemilaminectomy, pediculectomy or corpectomy.

DEGENERATIVE MYELOPATHY

This is a degenerative disease that affects the thoracolumbar spinal cord of medium- to large-breed dogs over 5 years of age. Among the large breed dogs, the German shepherd dog and Boxers are the most commonly affected breeds. Several other breeds were reported to have histologically confirmed degenerative myelopathy (DM). A mutation in the superoxide dismutase 1 (*SOD1*) gene has been shown in some affected dogs and it is a risk factor for the development of clinical disease.

The clinical picture typically consists of a slowly progressive, nonpainful T3—L3 myelopathy in a middle-aged to older large-breed dog. Age of onset of neurologic signs is usually 5 years or older with a mean age of 9 years in large dog breeds with DM. Most dogs are at least 8 years of age at onset of clinical signs.

A tentative diagnosis is based upon signalment, clinical features, and exclusion of other spinal cord disorders. Spinal imaging (MRI, CT, myelogram) is typically normal, but some dogs may have concurrent mild Type II disk lesions that are probably clinically insignificant. A DNA test based on the *SOD1* mutation is commercially available. The dogs homozygous for the mutation are *at-risk* for developing DM and will contribute one chromosome with the mutant allele to all of their offspring. The heterozygotes are DM carriers that are unlikely to develop clinical DM but could pass on a chromosome with the mutant allele to half of their offspring.

Treatment options are limited and no medical therapy has been shown to alter the survival of these dogs. Physical therapy appears to be the only modality that alters their survival. In one retrospective study of dogs with suspected degenerative myelopathy, intensive daily controlled physiotherapy, was shown to significantly improve mean survival time (255 days), compared with dogs receiving moderate physiotherapy (130 days) or no physiotherapy (55 days).

SPINAL NEOPLASIA

There are a large number of tumors that can affect the spinal cord of dogs. Tumors can be conceptually divided into primary and secondary tumors. Primary tumors include those neoplasms that arise from spinal cord parenchyma (e.g., neurons, glial cells), or associated meningeal/ependymal tissue. Secondary tumors include primary or metastatic vertebral neoplasms, malignant nerve sheath tumors, and metastases to the extradural space or the cord parenchyma (intramedullary metastases). Primary tumors are more common than metastatic tumors. It is often clinically useful to classify spinal cord neoplasms based upon the relationship between the tumor and the meninges. Spinal cord tumors are typically classified as extradural, intradural/ extramedullary, or intramedullary.

Large-breed dogs appear to be predisposed to developing spinal neoplasia, in comparison with smaller breeds. Spinal tumors classically cause progressive signs of a myelopathy, but acute or subacute development of spinal cord dysfunction often occurs, especially with intramedullary neoplasms.

A tentative diagnosis of spinal neoplasia is typically based upon signalment, history, clinical signs, and results of spinal imaging.

Therapy for dogs and cats with spinal tumors can be divided into supportive and definitive treatments. Supportive therapies are directed against secondary sequelae of the spinal tumor (e.g., cord edema, pain), whereas definitive therapies are aimed at elimination of neoplastic tissue. Supportive therapy consists of anti-inflammatory doses of glucocorticoids (e.g., prednisone, 0.5 mg/kg, PO, q 12 hr), which can be increased or decreased as needed, with or without additional pain-relieving drugs (e.g., narcotics). Definitive therapy consists primarily of surgery and megavoltage radiation therapy. Chemotherapy is indicated for lymphosarcoma and myeloma. The long-term prognosis for most cases of vertebral neoplasia in dogs is guarded to poor. The type of spinal tumor with the longest survival is myeloma. Early diagnosis and multimodal therapy may yield long survival times.