PARALYSIS

BASICS

OVERVIEW

- Paresis—weakness of voluntary movement
- Paralysis—lack of voluntary movement
- Quadriparesis (tetraparesis)—weakness of voluntary movements in all legs
- Quadriplegia (tetraplegia)—absence of all voluntary movement in the legs
- Paraparesis—weakness of voluntary movements in the rear legs
- Paraplegia—absence of all voluntary rear leg movement
- The spine is composed of multiple bones with disks (intervertebral disks) located in between adjacent bones (vertebrae); the disks act as shock absorbers and allow movement of the spine; the vertebrae are named according to their location—cervical vertebrae are located in the neck and are numbered as cervical vertebrae one through seven or C_1-C_7; thoracic vertebrae are located from the area of the shoulders to the end of the ribs and are numbered as thoracic vertebrae one through thirteen or T_1-T_{13}; lumbar vertebrae start at the end of the ribs and continue to the pelvis and are numbered as lumbar vertebrae one through seven or L_1-L_7; the remaining vertebrae are the sacral and coccygeal (tail) vertebrae
- Degeneration of the intervertebral disks causes movement of disk material into the spinal canal; the disk material then causes spinal-cord compression (known as "myelopathy") and/or nerve-root compression (known as "radiculopathy")—so called "intervertebral disk disease"
- "Neurons" are nerve cells that join together to form nerves; "motor neurons" are nerve cells that control muscles
- Disease involving the nerve cells of the brain, brain stem and/or spinal cord that control the muscles is known as "upper motor neuron disease"
- Disease of the nerves that connect the spinal cord and muscles is known as "lower motor neuron disease"

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats

Breed Predilections

- Degenerative intervertebral disk disease—dachshunds, poodles, cocker spaniels, and beagles
- Sudden, rapidly progressive paralysis (known as "coonhound paralysis")—hunting dogs
- Spinal cord and vertebral trauma—roaming animals
- Dislocation of the joint between the first and second cervical vertebra (condition known as "atlantoaxial luxation")—toy and small breeds
- Pressure to or damage of the nerves within the spinal canal in the area of the junction between the lumbar and sacral vertebrae (known as "lumbosacral instability"); at this level of the spine, spinal nerves are located in the spinal canal (rather than spinal cord)—these spinal nerves within the spinal canal are known as the "cauda equina"—large breeds; working breeds; German shepherd dogs
- Condition in which the vertebrae in the neck are malformed, leading to narrowing of the spinal canal, or excessive mobility with resulting pressure on the spinal cord (known as "cervical vertebral malformation/stenosis/instability syndrome or wobbler syndrome)—large breeds; Doberman pinschers; Great Danes
- Condition with abnormal cavities filled with fluid within the spinal cord (known as "syringomyelia"): Cavalier King Charles spaniels, Weimaraners
- Condition in which fluid-filled sacs are located under the arachnoid membrane (one of the protective membranes around the central nervous system [brain and spinal cord]) of the spinal cord (condition known as "spinal arachnoid cysts"): rottweilers, small breeds

SIGNS/OBSERVED CHANGES in the ANIMAL

- Limb weakness—sudden (acute) or gradual onset
- Being "down," unable to move, walk, or get up (known as being "nonambulatory")
- Signs may be begin with a wobbly, incoordinated or "drunken" appearing gait (known as "ataxia") and progress to weakness and finally to paralysis
- Usually alert
- If in pain, pet may resent handling and manipulation during physical examination
- Blood clots in the aorta, the main artery of the body (known as "aortic emboli") leading to nervous tissue and muscle disease from lack of blood flow (known as "ischemic neuromyopathy")—patient may have paralysis of the rear legs (paraplegia) and lack of reflexes (known as "areflexia") or decreased reflexes (known as "hyporeflexia") on examination; femoral pulses absent; legs often cold; nail beds often blue
- If legs are paralyzed, likely that bladder is paralyzed as well; animal may not be able to urinate
- Location of problem in the spinal cord or nerves causing weakness or paralysis will determine signs observed in the pet and will aid in making a possible diagnosis

CAUSES

Generalized Paralysis of All Legs (Quadriplegia)

- Upper motor neuron (involves nerve cells of the brain, brain stem and/or spinal cord that control muscles)—cervical spinal cord disease or spinal cord disease involving multiple locations: intervertebral disk disease; bacterial or fungal infection of the intervertebral disks and adjacent bone of the spine (vertebral bodies; condition known as "diskospondylitis"); condition in which a piece of cartilage breaks off the intervertebral disk and travels in the blood vessel until it blocks blood flow to the spinal cord (known as "fibrocartilaginous embolism"); trauma; cancer; inflammation of the spinal cord (known as "myelitis") of many causes; malformations of the spine or spinal cord
- Lower motor neuron (involves nerves that connect the spinal cord and muscles)—sudden (acute) onset: coonhound paralysis; botulism; tick paralysis (paralysis that develops due to the presence of a nerve toxin that enters the body through tick bites); severe, rapidly progressive form of myasthenia gravis (a disorder of neuromuscular transmission characterized by muscular weakness and excessive fatigue); or protozoal inflammation of the muscles and nerves (known as "protozoal myoneuritis"); more gradual onset: disorders characterized by inflammation of several nerves (known as "polyneuropathies") and several muscles (known as "polymyopathies") from toxicity, infection, inflammation, hormonal disease, metabolic disease, or congenital (present at birth)/inherited disease

Paralysis of the Rear Legs (Paraplegia)

- Upper motor neuron (involves nerve cells of the brain, brain stem and/or spinal cord that control muscles)—intervertebral disk disease; bacterial or fungal infection of the intervertebral disks and adjacent bone of the spine (vertebral bodies; condition is diskospondylitis); condition in which a piece of cartilage breaks off the intervertebral disk and travels in the blood vessel until it blocks blood flow to the spinal cord (fibrocartilaginous embolism); cancer; trauma; congenital (present at birth) malformations of spine or spinal cord; disease of the spinal cord that causes progressive weakness of the rear legs (known as "degenerative myelopathy")
- Lower motor neuron (involves nerves that connect the spinal cord and muscles)— condition in which a piece of cartilage breaks off the intervertebral disk and travels in the blood vessel until it blocks blood flow to the spinal cord (fibrocartilaginous embolism); intervertebral disk disease; lumbosacral instability; bacterial or fungal infection of the intervertebral disks and adjacent bone of the spine (vertebral bodies; condition is diskospondylitis); trauma; cancer; defective development of the spine leading to exposure of the covering of the spinal cord (known as "meninges") or spinal cord (condition known as "spina bifida")

Generalized Paralysis of All Legs (Quadriplegia) with Cranial Nerve Deficits, Seizures, or Stupor

- Upper motor neuron (involves nerve cells of the brain, brain stem and/or spinal cord that control muscles)—diseases of the brain stem: inflammation of the brain (known as "encephalitis"); cancer; trauma; vascular accidents; congenital (present at birth) or inherited disorders

RISK FACTORS

- Breeds at risk for degenerative intervertebral disk disease—dachshunds, poodles, cocker spaniels, and beagles
- Hunting dogs—coonhound paralysis
- Roaming animals—spinal cord and vertebral trauma
- Toy and small breeds—atlantoaxial luxation
- Large breeds; working breeds; German shepherd dogs—lumbosacral instability
- Large breeds; Doberman pinschers; Great Danes—cervical vertebral malformation/stenosis/instability syndrome (wobbler syndrome)
- Cavalier King Charles Spaniels, Weimaraners—syringomyelia
- Rottweilers, small breeds—spinal arachnoid cysts

TREATMENT

HEALTH CARE

- Inpatient—with severe weakness or paralysis until bladder function can be determined
- Bladder—empty (via manual pressure or catheterization) three to four times a day to prevent overdistention and subsequent complications; once bladder function has returned, patient can be managed at home
- Bedding—move paralyzed patients away from soiled bedding; check and clean frequently to prevent skin lesions that develop due to contact with urine, when the hair and skin remain damp (known as "urine scald") and superficial skin infection characterized by the presence of pus (known as "superficial pyoderma"); use padded bedding or a waterbed to help prevent "bed sores" (known as "decubital ulcers")
- Turning—turn patients that are paralyzed in all legs (quadriplegia) from side to side four to eight times daily; prevent lung congestion and "bed sore" (decubital ulcer) formation

ACTIVITY

- Activity—restrict until spinal trauma and intervertebral disk disease can be ruled out
- Physical therapy—important for paralyzed patients; tones muscles and keeps joints flexible

DIET

• Hand feeding—with widespread (diffuse) lower motor neuron (involves nerves that connect the spinal cord and muscles) signs, swallowing can be affected; carefully hand feed until it is certain that the patient can swallow properly
• Feeding from an elevated platform or installation of a feeding tube—recommended for animals with enlargement of the esophagus (the tube running from the mouth to the stomach; condition known as "megaesophagus") until it resolves

SURGERY

• Surgery—for intervertebral disk disease, fracture, some tumors and some congenital (present at birth) conditions; often the quickest and most effective method of improving the nervous system status

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

• Steroid use (even in known diseases like spinal trauma or intervertebral disk disease) is somewhat controversial; current information suggests that steroids may be helpful to decrease pain associated with some spinal cord causes of paralysis, but that they do not enhance spinal cord recovery; include dexamethasone, prednisolone
• Pyridostigmine bromide—for suspected myasthenia gravis (a disorder of neuromuscular transmission characterized by muscular weakness and excessive fatigue)
• Sudden (acute) generalized lower motor neuron (involves nerves that connect the spinal cord and muscles) signs—check for ticks; treat with appropriate insecticides, if necessary
• Nonsteroidal anti-inflammatory drugs (NSAIDs) for spinal diseases that might be associated with bone discomfort or pain
• Tramadol for pain relief
• Gabapentin for pain arising from a disorder of the nervous system (known as "neuropathic pain")
• Butorphanol for pain control

FOLLOW-UP CARE

PATIENT MONITORING

• Nervous system examinations—daily to monitor status

PREVENTIONS AND AVOIDANCE

• Prevent tick infestation (control ticks in the environment and on the animal)
• Keep the pet in a safe environment (in the house, in a fenced yard, on a leash) to prevent accidents (such as being hit by a car) that may lead to spinal fractures

POSSIBLE COMPLICATIONS

• Urinary tract infection
• Flaccid bladder (known as "bladder atony"), in which the bladder muscles do not contract normally
• Skin lesions that develop due to contact with urine, when the hair and skin remain damp (urine scald) and skin infection characterized by the presence of pus (pyoderma)
• Constipation
• "Bed sores" (decubital ulcers)
• Aspiration pneumonia—with generalized lower motor neuron disease (involves nerves that connect the spinal cord and muscles) or in any patient that is paralyzed in all four legs (quadriplegia)
• Condition in which the motor neurons (nerve cells that control muscles) are destroyed, leading to progressive spinal cord disease that is not reversible (condition known as "myelomalacia")—with severe spinal cord trauma or intervertebral disk disease
• Breathing compromise or paralysis—with destruction of the motor neurons (nerve cells that control muscles) and progressive spinal cord disease (myelomalacia) or generalized lower motor neuron disease (involves nerves that connect the spinal cord and muscles)

EXPECTED COURSE AND PROGNOSIS

• Depend on cause of weakness or paralysis

KEY POINTS

• Empty (via manual pressure or catheterization) the bladder of paralyzed pets three to four times a day to prevent overdistention and subsequent complications; once bladder function has returned, patient can be managed at home
• Bedding—move paralyzed pets away from soiled bedding; check and clean frequently to prevent skin lesions that develop due to contact with urine, when the hair and skin remain damp (urine scald) and superficial skin infection characterized by the presence of pus (superficial pyoderma); use padded bedding or a waterbed to help prevent "bed sores" (decubital ulcers)
• Turning—turn patients that are paralyzed in all legs (quadriplegia) from side to side four to eight times daily; prevent lung congestion and "bed sore" (decubital ulcer) formation