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CANINE DEGENERATIVE DISK DISEASE

What is a disk, and what is its purpose?

The spinal cord is one of the most important and most sensitive organs in the body. If it is traumatized, its cells will not regenerate; injuries usually result in permanent damage. Therefore, the spinal cord is protected in a very special fashion. It goes through a bony canal within the spine; it is surrounded by protective bone everywhere except over the disks. This extreme protection reflects its importance and its fragility.

Disks are rubber-like cushions between the vertebrae. They allow the back to move up and down and sideways without allowing contact between the bones of the spinal column.

What does it mean for a disk to rupture, and how does it happen?

The disk is composed of two parts. The outer covering is much like a thick shell. It is comprised of tough fibers that protect and contain the central part. It is thinnest at the top; this thin area is located just below the spinal cord. The central part of the disk has the consistency of thick tooth paste; it is much softer than the outer part.

When the outer shell degenerates, it allows the central part of the disk to escape. This is called a disk rupture or a ruptured disk. Since the shell is thinnest near the spinal cord, disk material that escapes almost always goes upward, putting pressure on the cord. Because the spinal cord is encased within its bony canal, it cannot move away from the pressure and it becomes pinched.

Degenerative disk disease causes spontaneous degeneration of the outer part of the disk, resulting in escape of the central part. It is not related to injury, although trauma can cause disks to rupture. It is also not related to age. Most dogs with degenerative disk disease are 3-7 years old. It is just a spontaneous event that is most likely controlled by genetic factors. Certain breeds, notably the Dachshund, Poodle, Pekinese, Lhaso Apso, and Cocker Spaniel have a high incidence of disk disease. Other breeds, such as the German Shepherd and Doberman Pinscher, also have disk disease but with a lower incidence. Many breeds never have degenerative disk disease.

Most owners report that a disk rupture occurred following some traumatic event, such as a relatively small jump or fall. Although this act is frequently blamed for the disk rupture, if the disk had not already been degenerating, the rupture would not have occurred.

How does a ruptured disk affect the spinal cord?

The spinal cord is much like a telephone cable that is carrying thousands of tiny wires. When it is crushed, transmission of information through the wires is stopped. When the disk degenerates and ruptures, a similar event occurs. The central part is forced upward, putting pressure on the spinal cord and/or the nerves that leave the spinal cord over the disks (i.e., spinal nerves). Pressure on the spinal nerves results in pain; pressure on the spinal cord results in pain and/or loss of information transmission. This results in paralysis or partial paralysis.

Most disk ruptures occur in the middle to lower part of the back. However, they may also occur in the neck. The former often causes paralysis without severe pain; the latter often causes severe pain without paralysis. If paralysis affects all four legs, the disk rupture must be in the neck. Because of the way the nerve tracts are arranged in the spinal cord, disk ruptures in the neck may affect the rear legs first or even exclusively.

How fast do disks degenerate and rupture?

Disk degeneration usually occurs relatively slowly, i.e., over several days or weeks. The dog usually experiences pain and becomes reluctant to move. It may lie around for a few days allowing the body to resolve the problem, often without the owner being aware that a problem existed. However, disks may also rupture very acutely. Some dogs will go from normal walking to total paralysis in less than one hour.

How is a disk rupture diagnosed?

A presumptive diagnosis of disk disease is made based on the dog's history of neck or back pain, incoordination when walking, or paralysis when there is no history of trauma. The physical examination will indicate that the problem originates from the spinal cord, giving further evidence to disk disease. Another important factor is the breed. If the dog is one of the

high incidence breeds, the diagnosis is even more likely.

In some cases, plain radiographs (x-rays) may assist the diagnosis, but they may also be normal since neither the disk nor the spinal cord are visible. If the diagnosis is in doubt or if surgery is to be performed, a myelogram may be done. This procedure involves injecting a special dye around the spinal cord while the dog is under anesthetic. When radiographs are taken, the dye will be seen outlining the spinal cord. A break in the dye column means that there is pressure on the spinal cord.

How do you know if the pressure on the spinal cord is due to a disk or something else?

It is possible that the pressure is due to a blood clot or a tumor. Both are possible but not very common, especially when compared to disk ruptures. If the breed of dog is correct for disk disease, there has been a sudden onset, and there has been no trauma, there is about a 95% chance that a disk rupture is causing the pressure. However, the diagnosis is not definite until the time of surgery.

Are all disk ruptures treated with surgery?

Not necessarily. Treatment is based on the stage of the disease. **Stage I** disk disease produces mild pain and is usually self-correcting in a few days. **Stage II** disk disease causes moderate to severe pain in the neck or lumbar (lower back) area. **Stage III** disk disease causes partial paralysis (paresis) and results in the dog walking in staggering or uncoordinated movements. **Stage IV** disk disease causes paralysis but the ability to feel is present. **Stage V** disk disease causes paralysis and loss of feeling. These stages tend to overlap in some dogs, and dogs may move from one stage to another over a period of hours to days.

Dogs with **Stage II and III** disease are usually treated with anti-inflammatory drugs, pain relievers, and restriction from exercise. Surgery may be considered if the pain or uncoordination persists after 4-7 days of treatment or if the neurological status declines from one day to the next. It is important that the dog not receive pain medication unless total confinement to a crate or cage is enforced. If the pain sensation is taken away, the dog is more likely to progress to total rupture of the disk. The sensation of pain is important for limiting motion. The length of confinement will vary among different dogs.

Dogs with **Stage IV** disease should have surgery, although a small percentage will recover without it. Dogs with **Stage V** disease should have surgery, and the sooner that surgery is done, the better the prognosis. If at all possible, these dogs should be operated on within the first 24 hours of the onset of paralysis.

What is the purpose of surgery?

The goal of surgery is to remove pressure from the spinal cord. If the disk rupture occurs in the lower back, a window is made in the side of the vertebral bone to expose the spinal cord. This window allows removal of disk material and relieves pressure from the cord. If the disk rupture occurs in the neck, a window is made in the bone exposing the spinal cord. This may be done either from the top or the bottom, depending on the situation and the training of the surgeon.

What is the success rate for treating disk disease with and without surgery?

Stage	Recovery without Surgery	Recovery with Surgery
II: up to 1 week	80-90%	90-95%
II: past 1 week	60-70%	90-95%
III	30-40%	85-95%
IV: up to 3 days	< 25%	85-95%
IV: past 3 days	< 20%	60-70%
V: up to 24 hours	< 5%	50%
V: past 24 hours	< 5%	<20%

When will we know if the surgery is successful?

When surgery is completed, we hope to achieve two things. First, the dog should be recovering from the anesthetic. Secondly, the disk rupture should be located and the pressure relieved from the spinal cord. However, the return of walking ability and relief from pain may not occur for several days, or even weeks, so success cannot be determined immediately.

When can my dog go home?

Following surgery, your dog will be hospitalized for 3-7 days. Bladder and bowel control are often lost when the dog is paralyzed, so it is best for control of these functions to return before going home. However, it is generally best not to extend hospitalization beyond 7 days because regaining the ability to walk partly depends on exercise and motivation. Since motivation is such an important part of the recovery process, visitation is encouraged beginning the day after surgery. Please ask about scheduling your visits.

If paralysis was present before surgery, your dog may not be able to walk when it is discharged from the hospital. You will be given detailed instructions on the procedures that should be performed. Recovery is dependent on four factors: whether or not permanent damage was done before surgery, if the surgery was performed promptly, physical therapy performed at home, and the motivation of your dog. You will be instructed on ways to achieve the last two.

Is it likely that my dog will be worse after surgery than before?

Dogs that have surgery on the lower back are generally no worse after surgery unless the spinal cord damage has progressed due to the disc rupture. However, dogs that have surgery on the neck may actually have increased lameness in one or both front legs. This is a setback due to the manipulation around the spinal cord normally associated with surgery. The lameness may persist for a few days, but it should be temporary. Improvement should occur steadily until the legs return to normal.

What does it mean if surgery is not successful?

Most dogs are either greatly helped and return to normal or near normal or they do not improve at all. If walking is not regained, most dogs will also not regain control of the bladder and bowels. This means that urine and stool incontinence will accompany paralysis.

Can my dog rupture a disk again?

The answer is "yes." However, more than 95% of degenerated disks will heal without surgery. So the chance of your dog needing surgery a second time is less than 5%.

What if the myelogram is normal?

The purpose of the myelogram is to identify pressure on the spinal cord. If the myelogram is normal, there is no pressure on the spinal cord. This has several important implications. First, it means that surgery will generally not be appropriate because the purpose of surgery is to relieve the pressure from the cord. Second, it means that one of the following conditions is likely to exist.

1. **Spinal Shock.** This is a temporary loss of spinal function that is generally associated with trauma. It occurs suddenly and is somewhat like a concussion of the brain. It may leave permanent damage, or full recovery may occur. Recovery from spinal shock generally occurs within a few hours to a few days.

2. **Fibrocartilagenous Infarct or Embolism.** In this condition, a small amount of disk material ruptures and gets into one of the blood vessels leading to the spinal cord. As the vessel narrows, the disk material obstructs it, depriving a certain segment of the spinal cord of its blood supply. Without proper blood supply, that segment of the spinal cord quits working, resulting in paralysis. Surgery will not help these dogs because there is no pressure on the spinal cord. Often, paralysis involves only one rear leg, or one rear leg is more severely affected than the other. Complete recovery may occur in a few days to weeks, or there may be permanent damage to a portion of the spinal cord.

Diagnosis of fibrocartilagenous infarct/embolism is based on the correct clinical signs and a normal myelogram. Confirmation requires a biopsy of the spinal cord so the diagnosis is confirmed only with an autopsy.

3. **Degenerative Myelopathy.** This condition means that the spinal cord is slowly dying. It results in progressive paralysis that begins with the dog dragging its rear feet as it walks. This is called "knuckling over" and results in the toe nails of the rear feet being worn because they drag the ground with each step. It progresses to weakness of the rear legs, then paralysis. It generally takes several weeks before paralysis occurs, and it generally occurs in large breeds of dogs, especially German Shepherds. Because there is no successful treatment and paralysis includes loss of urine and bowel control, euthanasia is generally recommended.

Diagnosis of degenerative myelopathy is based on the correct clinical signs, especially in a large breed of dog, and a normal myelogram. Confirmation requires a biopsy of the spinal cord so the diagnosis is confirmed only with an autopsy.

A normal myelogram in a dog with slowly progressive paralysis is very frustrating because the two most likely diseases (numbers 2 and 3) cannot be confirmed without an autopsy.