



Veterinary Specialists of Alaska, P.C. Client Information Sheet: Intervertebral Disc Disease (IVDD)

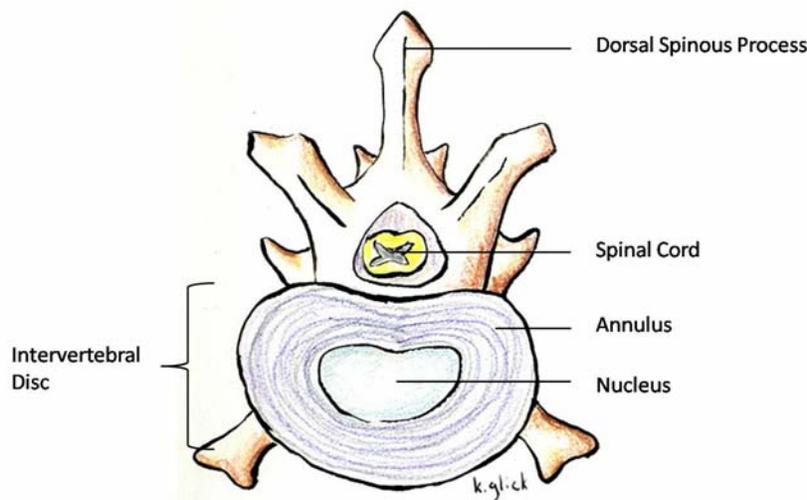
Intervertebral Disc Disease (IVDD)

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Intervertebral disc disease (IVDD) is a term used to describe herniation or rupture of one or more of the discs that act as cushions between vertebral bodies. Rupture of one of these discs results in symptoms ranging from neck or back pain to paralysis. This condition is most common in chondrodystrophic breeds (breeds with short legs and long backs) such as Dachshunds and Basset Hounds but can occur in almost any breed.

The vertebral column (spine or backbone) is made up of 27 bones called vertebrae that are linked together by intervertebral discs. Each vertebra has a hollow top portion called the vertebral foramen and a solid bottom portion called the vertebral body. The series of adjacent vertebral foramina concur to form a canal known as the vertebral or spinal canal. The spinal cord is housed in the spinal canal. The spinal cord allows communication between the brain and the rest of the body.

The intervertebral discs fill the spaces between the bony vertebral bodies and lie directly beneath the spinal cord. Each disc has two components: an outer ring of fibrous material called the annulus fibrosus (AF) and a gelatinous center called the nucleus pulposus (NP). The discs link the vertebrae together, allow movement between the vertebrae and act as shock absorbers. The three main sections of the vertebral column are the cervical vertebral column (neck), thoracic vertebral column (where the ribs attach) and the lumbar vertebral column (lower back).



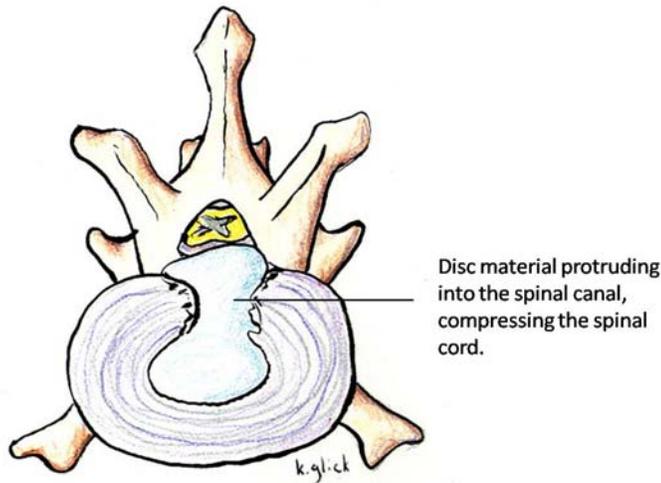
Cross section of a vertebral body, intervertebral disc, spinal cord

Intervertebral disc disease (IVDD) is a condition in which the intervertebral disc is abnormal and becomes incapable of withstanding normal forces. This disorder is also referred to as a slipped disc or herniated disc. There are two basic Types of intervertebral disk disease.



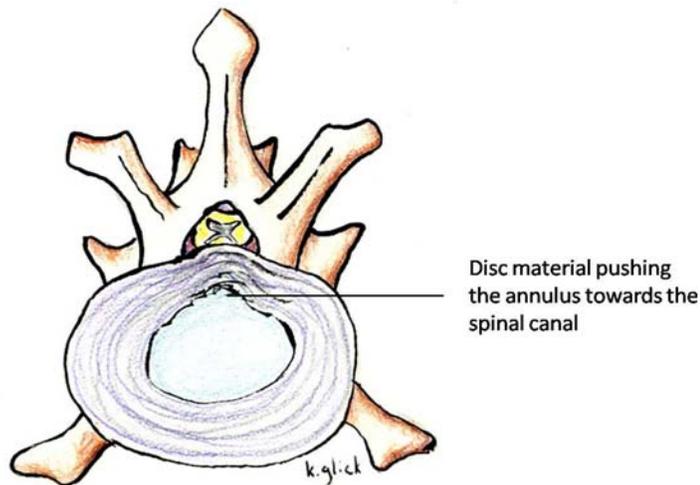
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Type I IVDD is a sudden extrusion of the nucleus pulposus through the annulus fibrosus into the vertebral canal. This occurs because the nucleus becomes dehydrated and changes consistency from that of gelatin to that of gritty cottage cheese. Dehydrated discs are less compliant and are prone to rupture when exposed to movements that increase pressure on the vertebral column. When the disc ruptures, material from the nucleus will abruptly pass through the annulus and will strike the spinal cord, often with significant force. This adversely affects the spinal cord in two ways. First, the impact of the herniated disc material on the spinal cord will lead to swelling and inflammation. Second, the presence of the herniated material within the vertebral canal will put pressure on the spinal cord. A Type-I disc herniation is akin to the spinal cord being hit by a snowball, but the snowball doesn't go away.



Line drawing of Type I disc disease

Type II IVDD refers to a disc that is bulging or protruding into the vertebral canal. These discs change slowly over a long period of time. The more the disk protrudes, the more the spinal cord will be displaced or compressed. The slower this process occurs, the longer it will take for clinical signs to develop. The worst part of this is that by the time clinical signs are recognized, there is often extreme spinal cord compression.



Line drawing of Type II disc disease



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Incidence:

Type I IVDD: This Type of disc disease is most often associated with the chondrodystrophic breeds (short, stubby legs and long backs) such as the Dachshund, Lhasa Apso and Pekingese. Other breeds frequently afflicted by Type-I IVDD are Beagles, Poodles and Cocker Spaniels. Dogs with Type -I IVDD are generally young to middle-aged. Males and females are affected at about the same frequency.



Photo of a paralyzed dog with Type I IVDD

Type II IVDD: The breeds most commonly associated with this Type of disk disease are the German Shepherd, Labrador Retriever, Doberman Pinscher, and Rottweiler. These dogs are generally middle-aged to older and males and females are equally affected.



Typical appearance of a dog with Type II IVDD or other spinal cord trauma. The hind legs are stretched forward. The dog cannot move his hind legs.



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Clinical Signs:

Type-I IVDD: The clinical signs of Type-I IVDD typically develop suddenly. In cases of cervical (neck) IVDD, symptoms can be as mild as neck pain or as severe as paralysis of all 4 limbs. Dogs with cervical intervertebral disc disease often are reluctant to lower their head to the food bowl or water bowl. They may vocalize in pain when they shake their head or when they receive a friendly pat on the head. In more severe cases, there may be abnormal function of forelimbs, hind limbs, or all 4 limbs. The most severe example is complete paralysis of all 4 limbs.

Patients suffering from thoracolumbar IVDD often appear to have a painful or tender abdomen. This is due to compression of the nerve roots serving the abdominal wall. In more severe cases, there is evidence of back pain. These patients often vocalize in pain when they are picked up. These dogs often are reluctant to move from a comfortable, sheltered location. With increasing severity, these patients will exhibit abnormal function of the hind legs. Some can walk, although they drag their toes and sway from side to side. More severe cases result in paralysis of the hind legs. If the problem is in the thoracolumbar vertebral column front leg function will remain normal.

Type-II IVDD: The symptoms associated with Type II intervertebral disk disease are similar to those associated with Type I IVDD however they typically progress more slowly.

Diagnosis:

The diagnosis of IVDD is made based upon the history, clinical signs and the findings of a complete neurologic evaluation performed by a trained veterinarian. The surgeons at Veterinary Specialists of Alaska all have extensive experience in the diagnosis and treatment of this disorder. Your surgeon will thoroughly examine your dog in an attempt to confirm the diagnosis of IVDD. During the physical examination, we will evaluate your dog's ability to walk and degree of painfulness. We will assess the neurologic function of each leg by assessing sensation (pain perception) in the toes, conscious proprioception (ability to place the paw correctly on the floor), and reflexes. We will also assess function of the cranial nerves in an attempt to rule out brain disorders. Your surgeon will perform a thorough evaluation of the vertebral column in an attempt to identify the painful region. We will ask questions such as: when did the problem start, did it develop suddenly, have the symptoms worsened, was there a traumatic incident, etc. The physical examination findings, combined with the answers to the above questions, will help us to make recommendations for further diagnostics and treatment for your pet.

If the examination findings are consistent with IVDD, your surgeon may recommend further diagnostics to confirm this diagnosis and to identify which disc is affected. Plain radiographs (x-rays) can demonstrate abnormal discs if they are calcified or collapsed (narrowed). However, calcification of a disc or narrowing of the disc space alone do not necessarily mean that particular disc is causing the spinal cord compression.



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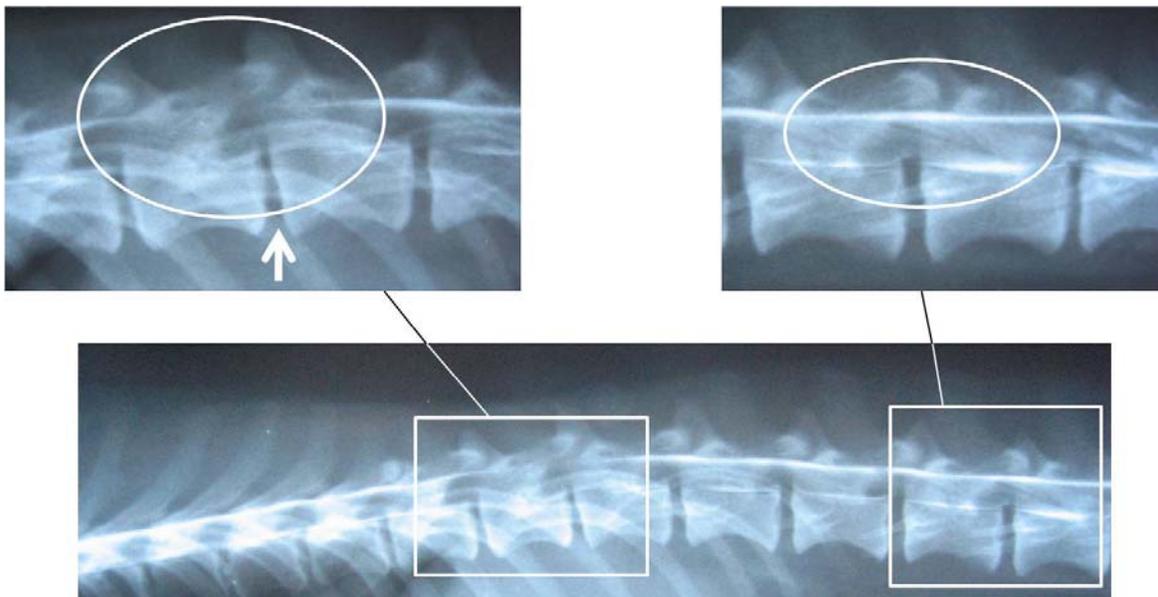


Radiograph of the thoraco-lumbar junction that appears normal.



Radiograph of the lumbar spine with a calcified disc (ellipse).

The spinal cord cannot be seen on plain radiographs. Therefore, advanced imaging is required to determine exactly which disc is causing the problem. Advanced imaging techniques that can be used to definitively diagnose IVDD include myelography, CT (computerized tomography) scan, and MRI (magnetic resonance imaging). A myelogram is a study in which a liquid contrast agent (substance that can be seen on a radiograph) is injected into the space surrounding the spinal cord. Once the injection is completed, radiographs are taken of the vertebral column. The contrast agent outlines the spinal cord and can reveal areas of compression, indicating which disc is causing the clinical signs. Myelography is an essential step in diagnosing IVDD. However, it is an invasive procedure and is not without risks. It should be performed only by surgeons with adequate training and experience. The CT scan and MRI are not widely available for pets in Alaska at this time.



Myelogram (contrast study) of a dog with IVDD. The right insert shows the uninterrupted flow of contrast material. The left insert shows the lesion (white arrow points towards the affected disc space – note the tapering appearance of the disc space and the loss of contrast column dorsal to the cord).



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Treatment:

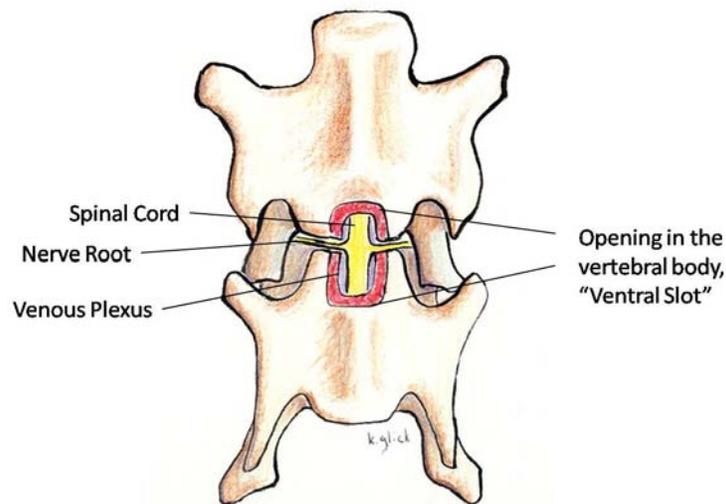
Fortunately, there is a range of treatment options available. The ideal treatment varies depending on a variety of factors. Your surgeon will make recommendations for your pet, based on careful consideration of all factors.

Conservative treatment

Patients exhibiting pain alone, or very subtle weakness, may be adequately treated with conservative care. Conservative treatment consists of strict confinement for an extended period of time (generally six to eight weeks) and the possible administration of pain medications and anti-inflammatory medications (steroids) to make your pet as comfortable as possible while recovering. "Strict confinement" means restriction to a kennel or very small room except for being carried or helped outside for urination and defecation. If the patient is responding to this treatment, it is important to continue confinement for the full 6-8 weeks because that is how long it takes for the ruptured disc to heal. If the patient is returned to full activity prematurely, neurologic abnormalities can recur and may be worse than they were originally. Conservative treatment does not always work but it is worth trying if the clinical signs of IVDD are mild (weakness and mild pain) and not progressive.

Surgical treatment

If your pet is unable to walk or if pain is severe and intractable then surgical therapy may be recommended. The goal of surgical treatment is to remove the extruded or protruding intervertebral disc from the vertebral canal thus eliminating compression of the cord and restoring its normal blood flow. This is done by making a window into the vertebral canal with a high-speed burr. In the cervical vertebral column, the window is made by drilling a hole through the bottom of the vertebrae adjacent to the herniated disc. This procedure is called a ventral slot.

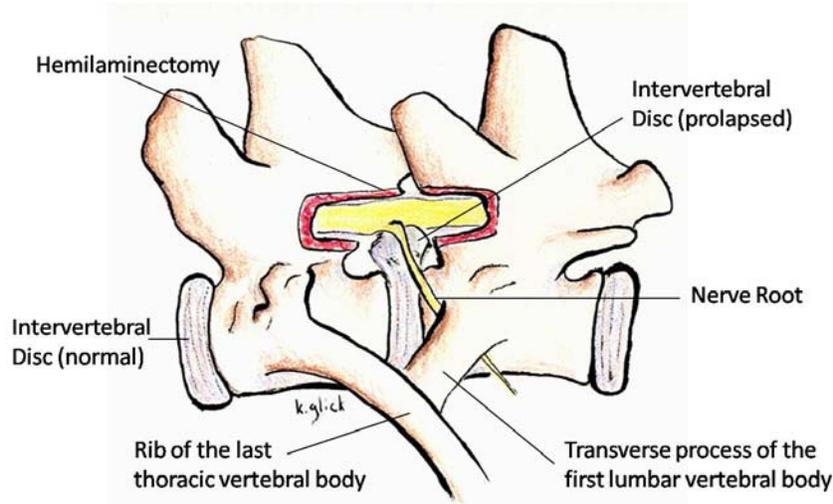


Line drawing of a ventral slot to treat IVDD in the cervical spine



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In the remainder of the vertebral column, the window is made by removing the bony covering over the side of the spinal cord. This procedure is called a hemilaminectomy.



Line drawing of a hemilaminectomy to treat IVDD in the thoraco-lumbar spine

Once the window is completed, the offending disc material can be carefully removed from the vertebral canal. This is a delicate procedure and demands a high level of training and expertise for the optimal outcome.

Physical rehabilitation

Although it is most commonly utilized for postoperative treatment of IVDD patients, physical rehabilitation can be helpful as a primary treatment modality for some patients. For some paralyzed dogs, especially those with long standing disease or loss of deep pain perception, or dogs for which surgery simply is not an option, physical rehabilitation may provide the best treatment option. With appropriate physical rehabilitation, some patients are able to regain the ability to walk. In some cases, this recovery is the result of retraining the muscle groups and recovery of the damaged spinal cord. In other cases, the ability to walk is the result of coordinated spinal reflexes resulting in a form of ambulation known as “spinal walking” or reflexive walking.

Potential Complications:

The diagnosis and treatment of IVDD is challenging and technically demanding. The surgeons at Veterinary Specialists of Alaska are well trained and highly experienced in the treatment of this disease. However, complications can occur and they vary depending upon many factors. The potential complications as they pertain to your pet will be discussed in detail by your surgeon.



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Post-operative Care:

Appropriate postoperative care plays a large role in determining the final outcome of patients with IVDD. The level of care warranted in these patients varies greatly depending upon their neurologic status. If the patient is unable to walk, the intensity of nursing care and physical rehabilitation are much greater. Additionally, the size of the patient influences how they are managed. Larger patients are simply more challenging to treat. We are fortunate to have a well trained physical rehabilitation staff to manage these patients (learn more about this service on our website under “Services” – “Physical rehabilitation”).

During the immediate postoperative period, pain control is the primary goal. We utilize a combination of opioid (morphine-like) and non-opioid pain relievers for medical management of pain. Transcutaneous electrical nerve stimulation (TENS) and low level laser treatment are also used to manage pain in these patients.

One of the major factors in caring for patients suffering from spinal cord compression due to IVDD is urinary bladder management. These patients often exhibit urinary incontinence as a result of their spinal cord injury. In some cases, the sphincter mechanism, which is responsible for keeping urine in the bladder, is paralyzed and remains open. This results in constant dribbling of urine. In other cases the sphincter mechanism is reflexively closed, preventing the patient from effectively emptying the bladder. In these patients, the muscle that is within the wall of the bladder also is paralyzed, preventing active contraction of the bladder wall. This combination of paralyzed bladder wall and closed sphincter results in a large distended bladder and urine retention. Urinary tract infections are common in these patients as a result of sphincter incompetence and urine retention. Eventually, the bladder becomes so full that urine leaks past the closed sphincter. At this stage there is a constant dribbling of urine. Proper hygiene is necessary in these patients in order to prevent urine scalding, a severe skin irritation which results from constant contact with urine.

It is important to manually empty the urinary bladder in these patients every 6-8 hours. This is accomplished by applying firm steady pressure to the abdomen on either side of the urinary bladder, effectively compressing the urinary bladder. This maneuver empties the urinary bladder and prevents urine retention and urine dribbling. This minimizes urine scalding and the risk of urinary tract infections. Keeping the bladder empty also helps to maintain function of the muscle present in the bladder wall.

Physical rehabilitation plays a large role in the recovery of our patients following spinal surgery. Our physical rehabilitation team takes over the care of these patients immediately following surgery. The goal of rehabilitation is to minimize further physiologic deterioration of the musculoskeletal system while the neuromuscular system recovers. During the early phases of recovery, pain, urinary function, and sensory response are assessed daily. Passive range of motion exercises are instituted, stationary standing is encouraged. Stationary standing is facilitated through the use of physiotherapy balls or wheeled carts. Physical rehabilitation is most intense during the first week or two after surgery. During this period, most patients remain in our hospital and are treated several times daily. The frequency and intensity of treatment is tailored according to your pet’s progress. Typically, treatment is reduced to 2-3 days per week after the first couple of weeks.



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While the exact treatment plan varies widely from one patient to the next, the following exercises are utilized for most of our patients:

Assisted Standing; The patient is placed in a standing, weight-bearing position using a variety of devices appropriate to size and ability.



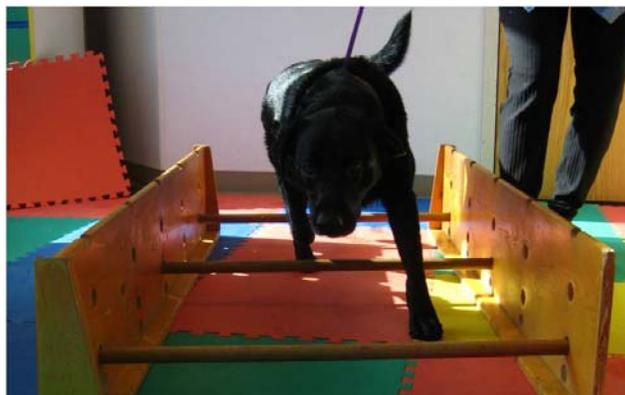
A dog after surgery on a physio-ball for support and to learn how to regain fine motor skills and balance.

Passive Range of Motion (PROM): Passive range of motion exercises are performed to help maintain flexibility in the muscles and joints while the nervous function is recovering.

Tactile Stimulation: During this exercise, the foot pads are brushed against the floor and other Types of surfaces. This helps to stimulate the neurohormonal and neuromuscular feedback system and facilitates recovery of the nervous system.

Balance Board: Exercise on the balance board helps to regain fine motor control and strength through stimulation of the neuromuscular feedback system.

Cavaletti Rails: Exercise on Cavaletti rails helps our patients to regain the ability to sense where their feet are in relation to other objects, a crucial component to efficient ambulation.



A dog going over Cavaletti rails



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Wheeled Cart; A wheeled cart may be utilized as a temporary aid in recovery or as a full time means of assisted walking for patients who fail to regain adequate ambulatory status. Strengthening bands are sometimes used in conjunction with carts to aid the legs and feet in physical and neurologic retraining.

Hydrotherapy; Exercise in our underwater treadmill has proven to be our greatest asset in helping these patients regain their mobility. For some patients, swimming stimulates limb movement. For others, the movement of the treadmill belt stimulates their journey to recovery. The buoyancy of the water provides lift and balance while the treadmill helps to retrain the muscle-nerve-neuron connection in the art of walking.



Dogs in the underwater treadmill during the recovery process after intervertebral disc disease

While there is no “typical” neurologic patient, we can generally track their return to function from simple limb movements to one-legged “lifts”, to taking several steps – similar to a toddler learning to walk.

It is important to realize that recovery from spinal cord injury is frequently a prolonged process. Some patients improve for as long as a year while others recover in just a couple of weeks. It is also important to realize that some patients do not improve.

Prognosis:

The prognosis for patients undergoing spinal surgery is dependent upon their pre-operative status and whether they are suffering from Type-I or Type-II IVDD.

Type-I: If the patient has good sensory perception prior to surgery, there is an 80-90% chance that he or she will experience a return to normal or near-normal function. If sensory perception is lost for less than 24 hours, there is a 50% chance of returning to normal or near-normal function. If sensory perception is lost for more than 24 hours, the patient will likely remain paralyzed even with surgical intervention.

Type-II: In approximately one-third of these patients, neurologic function will improve after surgery. In some cases, neurologic function returns to normal. Approximately one-third of these patients will remain neurologically the same after surgery. However, in many instances where neurologic status remains the same, surgery is considered a success because neurologic status had been deteriorating prior to surgery.



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In other words, halting progression of disease is considered a surgical success in many cases. Approximately one-third will be worse, and remain worse, following surgery. There is frequently extreme spinal cord compression in conjunction with a Type-II disc. Any manipulation of the spinal cord can cause irreparable damage. Additionally, even if the protruding disc material is removed atraumatically, the subsequent natural restoration of the shape of the spinal cord can lead to swelling within the spinal cord that can cause irreparable damage.

It is important to note that symptoms often are more pronounced immediately after surgery. This is due to irritation of the spinal cord during removal of the disc material. In most instances, this set back is temporary and neurologic function improves subsequently.

As mentioned above, recovery from spinal cord injury is typically a prolonged process. In some cases, recovery is incomplete. With surgery and rehabilitation, most of these patients regain the ability to walk and are able to resume a high quality of life.



Recovered patients

