

# Ventral Decompression of the Cervical Spinal Cord in the Dog

by  
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## Summary

Cervical intervertebral disc herniation (CIDH) occurs most commonly in the chondrodystrophic breeds of dogs. It is usually associated with degeneration of the disc and calcification of the nucleus pulposus which allows this disc material to herniate. Clinical signs such as pain, ataxia, careful placement of feet when walking, and sometimes paralysis are seen. In cases of partial or complete paralysis three surgical treatments are available: ventral fenestration, dorsal laminectomy, ventral decompression. Ventral decompression provides good surgical exposure and relieves pressure on the cervical spinal cord.

## Introduction

Cervical intervertebral disc herniation (CIDH) in the dog is occasionally seen in practice. Fortunately this condition can, in most cases, be effectively treated.

Cervical intervertebral disc herniation occurs primarily in the chondrodystrophic breeds of dogs, but can also occur in other breeds. Dachshunds, pekinese, beagles, cocker spaniels, miniature poodles, and French bulldogs have the highest frequency of cervical intervertebral disc herniation. There appears to be no sex difference, but the highest incidence occurs after two years of age (7).

It is thought that chondrodystrophy is the predisposing factor in this condition. The intervertebral disc material is about 88% water at birth and acts as an effective shock absorber. With age, the disc dehydrates,

the nucleus pulposus calcifies and the annulus fibrosis weakens. This process occurs in all dogs normally, with resulting lesions forming between five and seven years of age. In the aforementioned breeds, the condition progresses at a faster rate and lesions are present at three to six years of age.

The most common area for intervertebral disc herniation is between the ninth thoracic vertebra and the first lumbar vertebra (52.7% of the cases). The second most frequent area is between the first lumbar vertebra and the first sacral vertebra (34.7% of the cases). The cervical vertebrae have been found to be the least stressed area of the vertebral column, and constituted only 12.6% of all disc herniations. Thoracic vertebrae rarely are the site of clinical cases because the intercapitulum ligaments prevent dorsal herniation (2). Herniation can occur in a lateral, ventral, or dorsal direction, but clinical signs are usually seen only with dorsal herniation.

The clinical signs appear rapidly, and without apparent cause. In cases of slight herniation, pain is the primary clinical sign. The head is held in the most favorable position for relief of pain. There are no voluntary extension, flexion, or lateral movements. When movement is forced, extreme pain is usually indicated. When the dog walks, its head is lowered and extended and its neck is contracted. Short and choppy steps produce minimal pain, and climbing up or down is avoided.

If the disc herniates further, ataxia and proprioceptive deficits are seen. Sometimes the disc will completely leave the intervertebral space and cause marked compression of the spinal cord with resultant paralysis. It should be noted that

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the clinical signs and the size of the lesion are not always related. Each animal varies in its pain threshold. A slight herniation in one dog may cause only discomfort, while in another dog it may cause complete ataxia.

The condition is diagnosed by evaluation of clinical signs, history and radiographic observation. The dog must be anesthetized for proper radiographic studies in the lateral and ventro-dorsal planes. Manipulation of the neck is required for proper positioning which is essential for correct analysis of the radiographs.

Presence of calcified material in the intervertebral spaces with the appropriate clinical signs is highly suggestive of this disease. Calcified material seen in the disc space with clinical signs of paralysis indicates that complete herniation of the calcified nucleus pulposus has occurred. Myelography can be of great value but should be limited in its use because of the risks involved (3).

Prognosis in all cases should be guarded because of the risk of further herniation of the affected disc or subsequent herniation of another disc. In cases of paralysis, the absence of pain response to the hind legs, lack of anal tone, and bladder control constitute a grave prognosis.

Treatment of CIDH in its various forms can be accomplished by several means depending on the form, age of the animal, duration of clinical signs, and the preference of the veterinarian and the client.

The most conservative approach is medical. Medical treatment may be used in cases where clinical signs are limited to pain or to slight proprioceptive deficits, or as a preliminary treatment in cases of paralysis. Medical treatment consists of strict confinement, hydrotherapy, and anti-inflammatory and analgesic drugs such as dexamethazone and butazolidone. In many cases, clinical improvement does result from medical treatment alone. Recurrence is more frequent with this approach.

Surgical ventral fenestration is of benefit in those cases where complete herniation of the disc is not observed radiographically. The vertebrae are approached from the ventral side, the intervertebral spaces are entered, and material is removed with a

tartar scraper. The value of this treatment is the immediate relief of some of the pressure on the spinal cord. The other vertebrae in the cervical region can also be fenestrated at the time of surgery to prevent future problems. Spaces C<sub>2</sub> to C<sub>6</sub> are routinely fenestrated.

In cases of complete disc herniation resulting in paralysis or when ventral fenestration does not relieve the clinical signs, there are two additional surgical procedures. The older technique is the dorsal laminectomy, which requires that muscles of the dorsal aspect of the neck be dissected to expose the vertebral lamina. The lamina is then removed to relieve pressure and the herniated disc material is also removed. The surgical approach to the dorsal cervical area is technically difficult and time consuming. Swelling and pain, with slow recovery are common with this technique.

A procedure that has recently been developed is ventral decompression. This procedure was successfully used in man in 1956 and published in 1958 (3). Since that time it has been adapted for use in the dog (2,9,10,12,13).

In ventral decompression, an incision is made on the ventral aspect of the neck and part of the bodies of the two vertebra adjacent to the herniated disc are removed. The bone may be removed via air drill or trephine (Figures 1 and 2). The disc material can then be removed and decompression accomplished (Figure 3). This procedure allows easy access to the ventral vertebrae. Relief is immediate and trauma to the area is minimized. Clinical case studies indicate that this procedure is highly effective (9).

In all the aforementioned treatments of CIDH a minimum of six weeks postinjury or postsurgery is necessary before final evaluation of the patient can be made.

### ***Case Report***

On August 28, 1976, a 9 kg., three-year-old male dachshund was admitted to the ISU Veterinary Teaching Hospital. This dorsal cervical area is technically difficult and time consuming. Swelling and pain, with slow recovery are common with this technique. treated the dog medically with anti-inflammatory drugs and complete cage

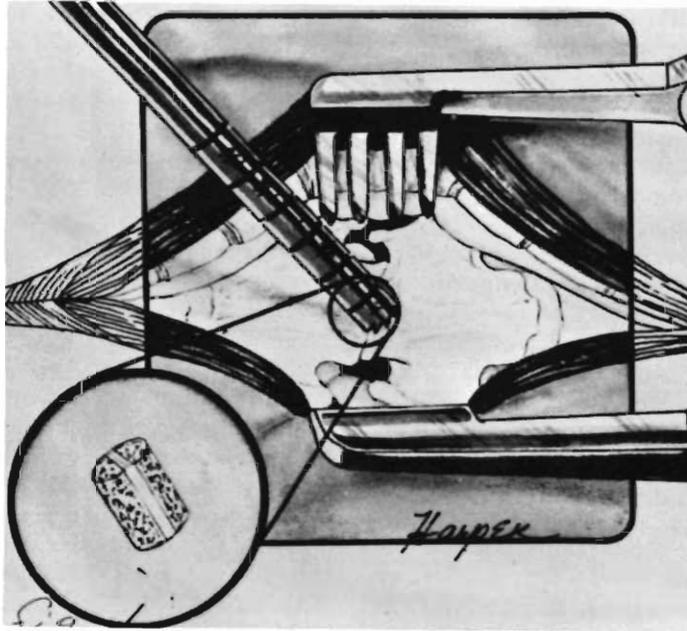


Figure 1.

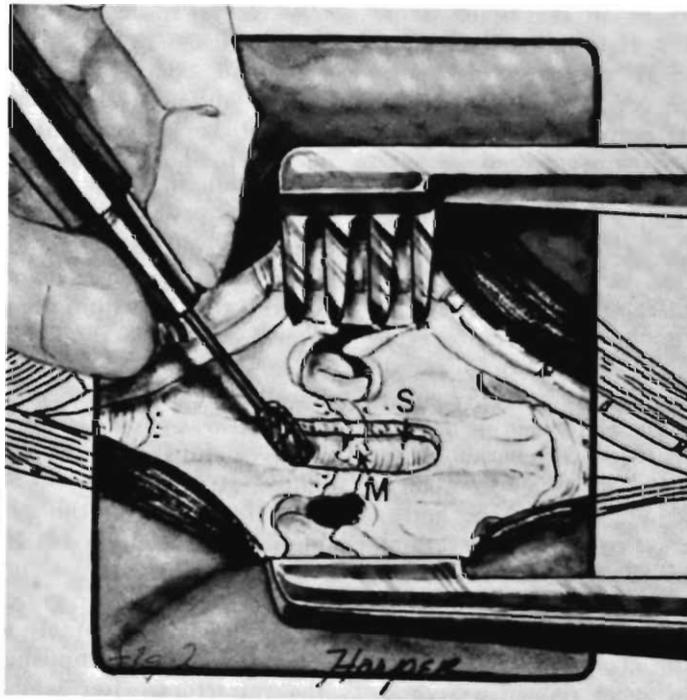


Figure 2.

confinement. Following one week of medical treatment, with minimal response, the patient was referred to Iowa State University.

On initial examination, the dog was alert and aware of his surroundings. He lay on his left side and made no attempt to rise. When placed upon his right side, he became very anxious and tried to roll back to his left side. Attempts to manipulate his head produced pain. A depression was observed on the dorsal aspect of the neck just caudal to the wings of the atlas. Some minor skin lesions were seen on the ventral side of the neck and a bruise was noticed on the right side of the head. Pain response was elicited from pinching the toes on all four legs. When the dog was placed upright, the front legs became rigid and in an extended position. A small amount of hemorrhage was noticed in the sclera of the right eye.

From this examination and case history, it was concluded that the dog had received a severe blow to the right side of the head and neck. The blow had caused some edema or hemorrhage in the brain stem which impaired his righting reflex. Furthermore, there was evidence of some compression in the cervical spinal region.

Preliminary radiographs, taken without anesthesia, revealed many calcified discs in the cervical and thoracolumbar region. A lesion appearing to be a herniated disc was observed in the C<sub>2</sub>-C<sub>3</sub> region.

Blood chemistries were performed; all were in the normal range. Dexamethazone at 1mg/pound and penicillin-streptomycin at 1cc/20 pounds B.I.D. were administered and the patient was observed for 48 hours. His condition remained stable.

On August 30, 1975, the patient was anesthetized and radiographs were taken revealing a radiopaque mass in the horse's head (an area dorsal to the intervertebral space bordered by the two adjacent vertebrae resembling the shape of a horse's head). This mass was determined to be the herniated disc material of the intervertebral space C<sub>2</sub>-C<sub>3</sub>. To avoid risk of a second anesthesia, surgery was performed immediately.

The dog was positioned in dorsal recumbency and the ventral neck region was clipped and scrubbed. A sandbag was

placed under the neck for support. The head was pulled forward and secured with tape across the mandible. Lactated Ringers solution was administered I.V. throughout the surgery.

A ventral midline incision was made and the sternohyoideus and sternothyroideus were separated and retracted. The trachea, esophagus, and carotid sheath were retracted laterally to expose the longus colli muscle. Care was taken in retraction to avoid damage to the vagosympathetic trunk.

The ventral spinous process was used to identify the intervertebral space, which was located immediately caudal to this palpable process. In some small dogs this process may not be palpable, but the transverse processes can be felt laterally and will provide proper identification of the regional anatomy (8).

Using the prominent transverse processes of the sixth cervical vertebra as a landmark, moving medially to find the ventral spinous processes of C<sub>5</sub> and then counting forward, the C<sub>2</sub>-C<sub>3</sub> intervertebral space was located. The longus colli muscle was dissected away from the area and bone rongeurs were used to remove the ventral spinous process.

A Stricker® pneumatic drill was used to remove the portions of the bodies of the two adjacent vertebrae. The portion removed was about two-thirds the width of the vertebra and about one-fourth its length. Care was taken not to involve the vertebral arteries that lie within the spinal canal and lateral to the piece of bone removed.

Once the piece of bone was removed, the dura mater could be seen. All visible disc material was carefully removed. The other intervertebral spaces were then fenestrated with a tartar scraper.

In the original technique developed for humans and later used in dogs, a bone graft was placed in this slot. It has since been found that the bone graft is unnecessary and now is not routinely used (5).

Closure was accomplished by removal of the retractors, after which all structures resumed their normal position. The sternohyoideus and sternothyroideus muscles were sutured with a simple continuous 2-0 chromic catgut suture. The subcuticular tissue was closed with a running right-

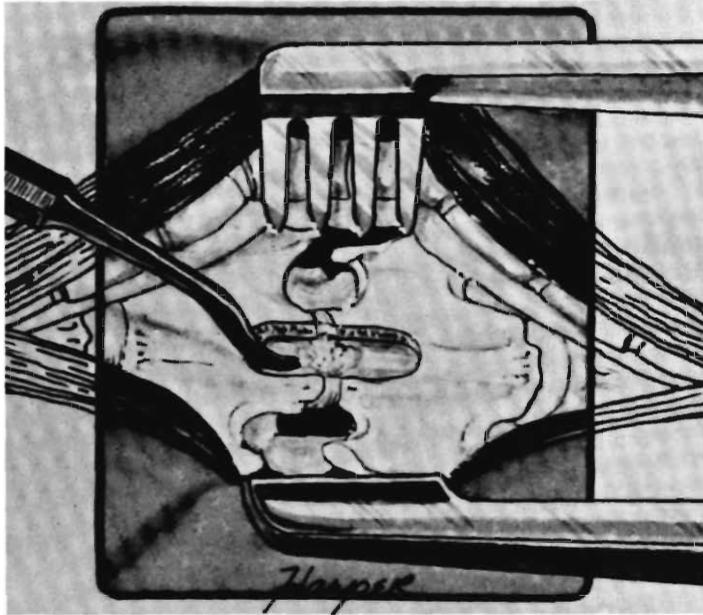


Figure 3.

angle Cushing suture of 3-0 chromic catgut. The skin was closed with simple interrupted sutures of 4-0 stainless steel.

The medical treatment was continued for the first five days postoperative and slowly reduced over an additional five days. On September 8, 1976, the patient was released.

On September 30, 1976, the owners reported the dog to be much improved. He was able to get around the house with only slight lameness in the right front leg.

### Conclusion

Cervical intervertebral disc herniation is a common problem that can be handled by the practicing veterinarian. The success of treatment varies with the severity of the lesion and the type of treatment provided. In cases of severe disc herniation resulting in paralysis, ventral decompression is a valuable, effective procedure.

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### REFERENCES

1. Archibald, J.: *Canine Surgery II*. American Veterinary Publications, Santa Barbara, Calif. (1974):883-890.
2. Bojrab, M. J.: *Current Techniques in Small Animal Surgery I*. Lea and Febiger., Philadelphia, Pa. (1975):385-391.
3. Cloward, R. B.: The Anterior Approach for Removal of Ruptured Cervical Discs. *Journal of Neurosurgery*. (1958):15:602-617.
4. Gage, E. D.: Spinal Surgery in the Dog. Part 1: Cervical Disc Fenestration. *Southwestern Veterinarian*. (1971):25:21-30.
5. Gilpin, G. N.: Evaluation of Three Techniques of Ventral Decompression of the Cervical Spinal Cord in the Dog. *J.A.V.M.A* (1976):168:325-328.
6. Hurov, L. I.: Cervical Disc Disease-Diagnosis and Surgical Treatment. *Southwestern Veterinarian*. (1965):19:37-40.
7. Kirk, R. W.: *Current Veterinary Therapy* V.W.B. Sanders Co., Philadelphia, Pa. (1974):105-109.
8. Parker, A. J.: Clinical Signs of Cervical Disc Disease and Cervical Vertebral Instability in the Dog. *J.A.V.M.A* (1974):731-732.
9. Prata, R. G., Stoll, S. G.: Ventral Decompression and Fusion for the Treatment of Cervical Disc Disease in the Dog. *J.A.A.H.A* (1973):9:462-472.
10. Popovic, N. A., VanderArk G., and Kempe, L.: Ventral Approach for Surgical Treatment of Cervical Disc Disease in the Dog. *A.J.V.R.* (1971):32:1155-1161.
11. Russell, S. W., and Griffins, R. C.: Recurrence of Cervical Disc Syndrome in Surgically and Conservatively Treated Dogs. *J.A.V.M.A* (1968):153:1412-1417.
12. Swain, S. F.: Ventral Decompression of the Cervical Spinal Cord in the Dog. *J.A.V.M.A* (1973):162:276-277.
13. Swain, S. F.: Ventral Decompression of the Cervical Spinal Cord in the Dog. *J.A.V.M.A* (1974):164:491-495.
14. Wilson, J. W., Bahr, R. J., Leipold, H. W., Guffy, M. M.: Acute Leptomenigeal Reaction to the Subarachnoid Injection of Ethyl Iodophenylundecylate in the Dog. *J.A.V.M.A* (1976):169:415-418.