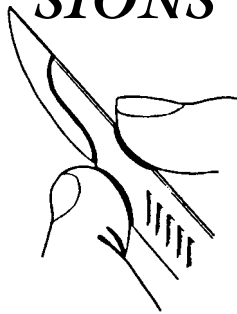


DIMENSIONS IN SURGERY



by SCOTT ANDERSON, DVM, Diplomate of the American College of Veterinary Surgeons, Diplomate of the American College of Veterinary Emergency and Critical Care, Diplomate of the American Board of Veterinary Practitioners
PHIL GILL, DVM, Diplomate of the American College of Veterinary Surgeons
LARRY LIPPINCOTT, DVM, Diplomate of the American College of Veterinary Surgeons
MARY SOMERVILLE, DVM, Staff Surgeon
SHARON SHIELDS, DVM, Staff Surgeon
RAVIV J. BALFOUR, DVM, Diplomate of the American College of Veterinary Surgeons
ERIN WILSON, DVM, Staff Surgeon

*Dimensions in Surgery
is now in its 17th year!*

Surgical Case Report:

Hemilaminectomy

EMPHASIS:

Thoracolumbar intervertebral disc disease is currently treated by several means: medical management, acupuncture, and decompressive surgery. There is general agreement that, for severely affected patients, surgery is the recommended treatment.

The prognosis depends on the severity of neurological impairment preoperatively. For patients with pain only, ataxia, or posterior paresis with positive deep pain perception, success rates of up to 96% have been reported.

For patients where it is deep pain perception is absent preoperatively, many authors have given a much more guarded prognosis. However, a retrospective study of our results with 32 such patients, 8 years ago, revealed a success rate of over 70%. Our results since that time, with more than 60 additional cases, have been similar.

In this paper, we will discuss the current surgical technique for hemilaminectomy.

PREOPERATIVE DIAGNOSTICS:

1. Complete physical examination and neurological examination.

AXIOM: *An accurate and well-documented neurological examination is necessary, not only to offer a proper diagnosis and prognosis, but in addition, it will serve as a benchmark to evaluate the patient's progress at future rechecks.*

AXIOM: *Deep pain is the most important prognostic indicator. We use a forceps to pinch the toes, seeing if the patient responds to this noxious stimulus by crying out, turning, biting, or showing pupillary dilation. All digits on both hind limbs should be evaluated. If no response is seen, test the digits of the front legs to see if the dog is merely stoic.*

DANGER:

Be sure to question the owner whether the patient has been sedated by another veterinarian prior to your examination!

DANGER:

Do not be deceived by the withdrawal reflex: this spinal reflex will cause the leg to be withdrawn when the toe is pinched, but it is not indicative of deep pain perception, and can be seen even in a patient with a severed spinal cord.

AXIOM: *At the academic level, there is some dispute as to whether the toe pinch is a completely reliable indicator of deep pain. It is possible that a patient with no response to the forceps toe pinch may still have some small degree of deep pain perception. When compared to electrodiagnostic studies (a more definitive way to show the absence of neurological function in the spinal cord), the toe pinch has a high correlation - approximately 95%, and we feel it is a satisfactory indicator.*

This dispute is somewhat academic: the test used in virtually every veterinary practice in the country for deep pain is the toe

pinch, and the results of this test are what almost all veterinarians (including ourselves) use in discussing the prognosis with the client. The terms "deep pain negative" and "nonresponsive to forceps toe pinch" are considered synonymous for the purpose of prognostication by almost all practitioners, and so it is in this report.

AXIOM: *If the patient has already been treated with corticosteroids, the severity of clinical signs may be obscured.*

AXIOM: *A patient suffering from their first episode of mild pain may be a candidate for conservative medical management and confinement. Patients with severe pain, recurrent episodes of pain, or any degree of paresis should be considered surgical candidates.*

2. Minimum data base: CBC, serum chemistry profile and urinalysis.
3. Spinal survey radiographs.
4. Advanced imaging: myelogram or MRI.

AXIOM: *With myelography, lateral and ventrodorsal views should always be obtained; oblique views may also be helpful if the lesion is lateralized.*

PREOPERATIVE CARE:

1. Indwelling cephalic catheter.
2. Intravenous anesthetic induction protocol.

continued on page 14

DIMENSIONS IN SURGERY

continued from page 13

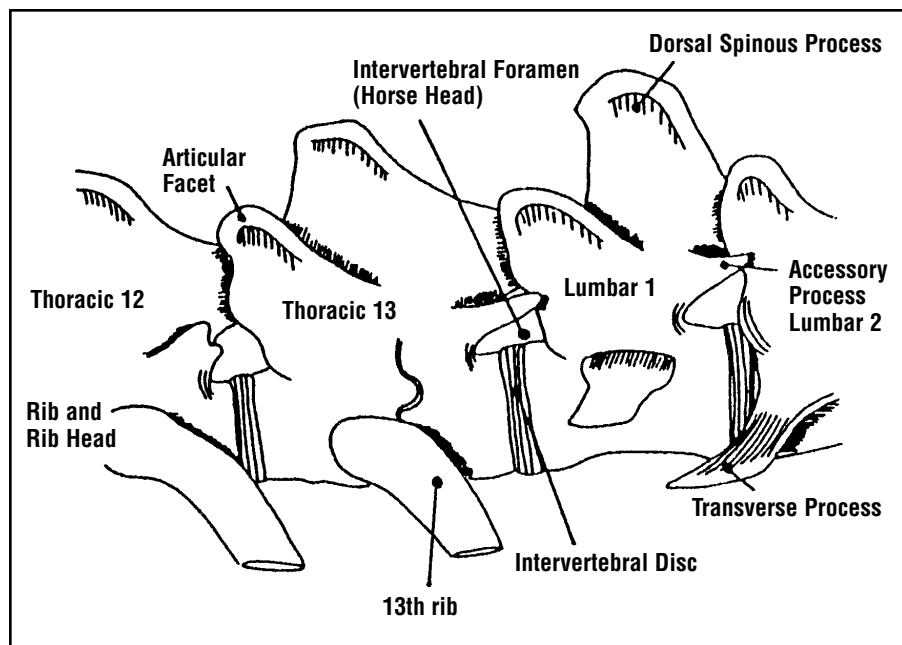


Figure 1: This schematic drawing depicts a left lateral view of the normal relationship of the 13th rib to the 1st lumbar vertebra and surrounding structures.

3. Endotracheal intubation and inflate cuff.
4. Isoflurane inhalant anesthesia to effect.
5. Lead II ECG, and pulse oximetry monitoring during prep and surgery.
6. Clip and prepare the dorsal thoracolumbar region for aseptic surgery.
7. Cefazolin 20 mg/kg I.V. immediately preoperatively.
8. Methylprednisolone sodium succinate 30 mg/kg IV (then QID 15 mg/kg IV for next 24 hours.)
4. Cimetidine 10 mg/kg IM (continue TID).

SURGICAL TECHNIQUE:

AXIOM: The hemilaminectomy should, of course, be done on whichever side the myelogram has shown the greater amount of disc material to be.

1. Dorsal midline incision, extending approximately 2 cm. cranial and caudal to the length of spinal cord impingement demonstrated by the myelogram.
2. "Drape in" the incision, using

Michel wound clips or by suturing the drapes to the margins of the incision.

3. Expose the lumbodorsal fascia by incising the subcutaneous fat.
4. Incise the fascia at its attachment to the supraspinous ligament, along the dorsal spinous processes.
5. Elevate the multifidus muscles from

the dorsal processes; cut the small tendinous attachment along the cranial edge of the process with scissors.

6. Continue to elevate the muscles laterally to expose the articular processes.

AXIOM: Before proceeding, identify the target vertebrae. A digit can be bluntly passed through the musculature, to identify the 13th rib, which is the most reliable landmark. (See Figure 1)

DANGER:

Be certain that the dog has a normal number of ribs: many dogs have transitional vertebrae, so take a second look at the radiographs to avoid an error in identifying the proper site for the hemilaminectomy.

7. With scissors, cut the tendinous insertions on the cranialateral aspect of each of the articular processes to be removed during the hemilaminectomy; and, for improved exposure, to the next articular process caudal as well. (See Figure 2)
8. Elevate the musculature laterally from the articular processes to fully

continued on page 15

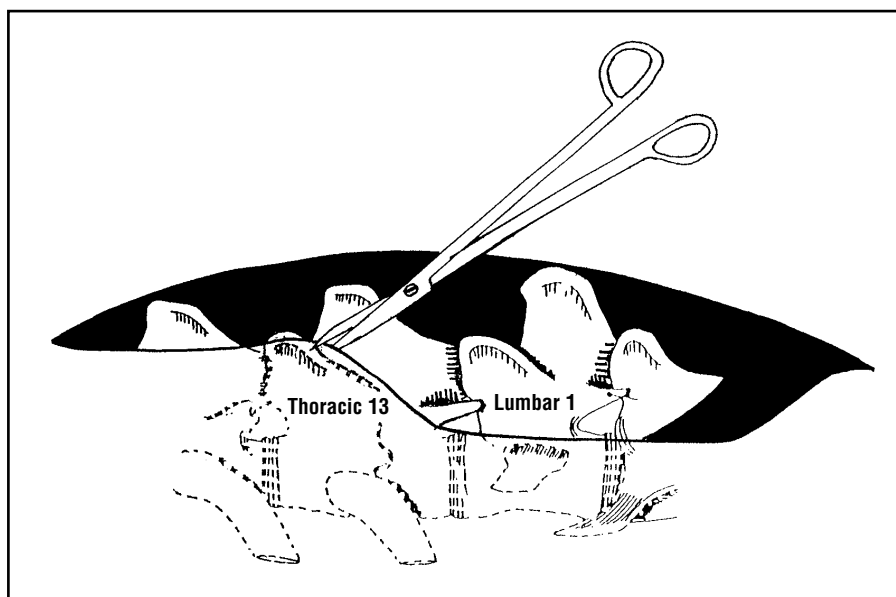


Figure 2: This schematic drawing depicts scissors cutting the tendinous insertion from the cranialateral aspect of the articular process.

DIMENSIONS IN SURGERY

continued from page 14

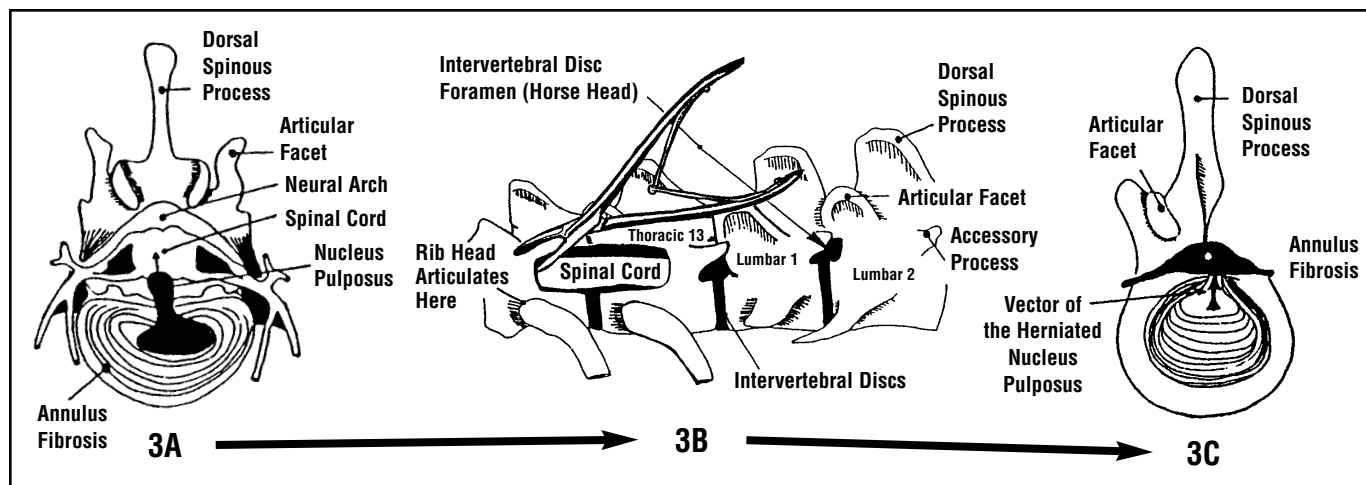


Figure 3: This schematic drawing depicts: **3A)** This transverse view of T13-L1 space shows that the nucleus pulposus has herniated through the annulus fibrosis and is pushing into the spinal cord causing neurological deficits. **3B)** This left lateral schematic drawing shows a lempert rongeur enlarging the hemilaminectomy fenestra. **3C)** This transverse view of T13-L1 space shows the hemilaminectomy decompression of the spinal cord.

expose them; maintain retraction with Gelpi self-retaining retractors.

9. Small pieces of muscle tissue still adherent to the exposed vertebrae can be excised with scissors, or pulled off using a small rongeur.
10. Use bipolar cautery as needed, rather than unipolar cautery, to minimize the risk of thermal injury to the adjacent nerve tissue.
11. With a rongeur, remove the articular processes to the level of the lamina bone.
12. Remove the lamina bone, using a high speed nitrogen drill, with gentle "paint-brush" movements.

AXIOM: Liberal intermittent flushing with saline solution is advised, to clear away the bone debris, which your drill has created. Suction is extremely helpful during this process.

DANGER:

Always have two hands on the high-speed drill, with your hands or wrists braced on the animal, so that an unexpected movement by the patient (or an assistant jostling the table) will not plunge the drill burr into the cord, or the adjacent musculature.

DANGER:

Minimal inward pressure on the drill is advised, to avoid forcing the drill

through a thin area of bone into the spinal canal.

13. In this fashion, remove the outer cortex and medullary bone, leaving the thin inner cortical bone intact.
14. Remove this bony layer with a Lempert rongeur, beginning at an articular process and extending this exposure cranially and caudally. (See Figure 3)

AXIOM: Try to maintain the maximum width of exposure, directing the rongeur dorsally and ventrally to remove the cortical bone; this will give the best exposure to the canal for extracting disc material.

15. Extract the disc material gently, using suction, a ball-end probe, a curette, or a dural wire loop.

AXIOM: We have found that a malleable wire loop, made of 30 gauge wire suture material, often allows safe extraction of the nucleus pulposus material from the canal beneath the cord. It is flexible enough to minimize the risk of inadvertent cord trauma, but firm enough to lift disc material out. (See Figure 4)

16. If necessary, use a small curette to remove protruding components of the annulus fibrosus from beneath the cord.
17. If the cord appears hemorrhagic or otherwise abnormal, a durotomy can be performed to evaluate for

myelomalacia. Bend the tip of a 26 or 27 gauge needle in a right angle, and grasp the hub of the needle with a straight mosquito forceps; the tip of the needle can be used to incise the dura, and the incision extended with an angled scissors.

AXIOM: If myelomalacia is present, the prognosis is very poor, although return to function of a cat with focal myelomalacia has been reported.

18. A fat graft is placed over the exposed cord.
19. The dorsal fascia is closed to the supraspinous ligament with 2-0 polydioxanone in a continuous pattern.
20. Routine subcutaneous and skin closure.

POSTOPERATIVE CARE:

1. Cephalexin 20 mg/kg PO TID for 5 days.
2. Pain management using oral, injectable or transdermal analgesics.
3. Physical therapy (range of motion exercises) performed by client TID until patient is ambulatory.
4. Bladder expression performed QID by client.
5. Suture removal two weeks postoperatively.

continued on page 16

DIMENSIONS IN SURGERY

continued from page 15

PROGNOSIS:

We define a successful case as one in which the patient regained sufficient neurologic function to be a suitable house pet: pain-free, ambulatory, with bowel and bladder control.

For patients with deep pain perception present preoperatively, up to a 96% success rate is seen.

In our original publication regarding 32 deep-pain-negative cases, a 76% success rate was seen. Nine dogs were ambulatory at the 2 week recheck; 12 more reached that level of recovery at 3 to 10 weeks; 4 dogs required 16 to 24 weeks to achieve recovery.

Of the 23 patients that were successful, 10 were considered by the owners as completely normal, 8 were judged to have minimal ataxia, and 5 had obvious incoordination but were ambulatory and could lead, in the owners' opinions, a good quality of life.

Our feeling, therefore, is that these patients are surgical candidates. Although the prognosis is not as good as with deep-pain-positive cases, the odds are good enough to warrant surgery, given the near-zero prognosis without surgery. Our results since the time of the original study have been similar. These findings have also been corroborated by a subsequent similar study by Dr. George Siemering of Virginia, who reports a 79% success rate with a similar number of patients.

AXIOM: *This does not mean that surgery can be delayed with impunity! It is still, in our opinion, a surgical emergency and these cases should be operated on as soon as possible to maximize the chance of success.*

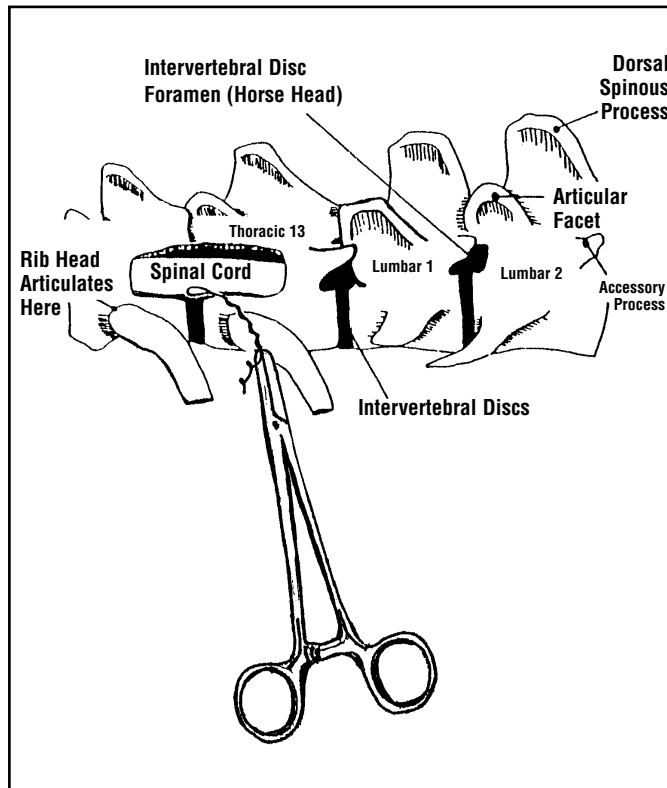


Figure 4: This schematic drawing depicts a malleable 30 G. wire loop being used to extricate nucleus pulposus from the canal beneath the cord.

A Free Continuing Education Service Available:

- To obtain a free bound book containing recent "DIMENSIONS IN SURGERY" articles, merely mail your business card to us, and on the back write: "YEARLY SUMMARIES."
- Mail Your Card To:
 Larry Lippincott, Scott Anderson, and Phil Gill
 1736 South Sepulveda Blvd., Suite A
 Los Angeles, California 90025.
- We will send you a binder containing the "DIMENSIONS IN SURGERY" articles from the past two years, indexed and ready for quick office reference.
- Please be patient with the mailing of your articles.
- All first time "YEARLY SUMMARIES" requests received after January 2002 will receive the last two years' articles in one bound book.
- 24 of the most requested articles from the first three years of publication are still available and are contained in the *Practical Guide For Small Animal Surgery* book which can be obtained from the SCVMA office.
- The SCVMA now publishes *Dimensions In Surgery* articles and drawings on the Internet. Please visit us at: www.DVMPulse.com

AUTHOR'S NOTE

If you have any questions concerning this paper, additional references, surgical supplies or sources of products mentioned or used in this protocol, please FAX us at 1-310-479-8976. We will answer your questions promptly.

Coming Attractions

Mandibular fracture repairs can be challenging. Often there is osteomyelitis and osteoporosis due to chronic dental disease; the fractures are typically open and contaminated; bilateral involvement and communication are frequently present. Despite these difficulties, success can usually be achieved with proper surgical technique.

Next month, we shall present our surgical protocol for stabilization of mandibular fractures.

See you then!