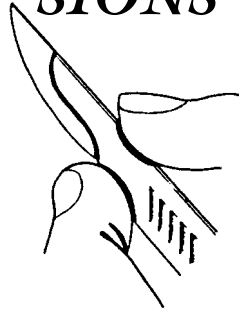


DIMENSIONS IN SURGERY



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Surgical Case Report:

Cervical Ventral Distraction and Fusion

EMPHASIS:

Currently, intervertebral disc disease is the most common neurologic disease condition seen in the cervical region. Neck pain, tetraparesis, or tetraplegia may be seen. Cervical ventral slot decompression is highly effective in resolving these clinical signs. However, in cases of cervical vertebral instability (CVI, or “Wobbler’s syndrome”), the slot alone may not be sufficient, since it does not firmly stabilize the vertebrae. These cases may warrant distraction and fusion, in addition to the decompressive slot. In this paper, we will present a technique for cervical vertebral distraction and fusion.

PREOPERATIVE DIAGNOSTICS:

1. Complete physical examination and neurologic examination.

AXIOM: Be certain to check the entire vertebral column for areas of hyperpathia. Patients with cervical disc disease may also have thoracolumbar lesions, or chronic lumbosacral disease. Pain at these sites may affect the long term prognosis for that individual, and the owner should be made aware of these possible concurrent problems.

AXIOM: An accurate and well-documented neurologic 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: 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 cervical 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.

DANGER:

Flexed and extended views, and traction views, may be indicated to confirm whether a lesion is static or dynamic. Very gentle flexion or extension is advised, rather than a hyperflexed or hyperextended view which could compress and traumatize the cord.

PREOPERATIVE CARE:

1. Indwelling cephalic catheter.

2. Intravenous anesthetic induction protocol (Ketamine/Valium, Propofol, etc.).
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 ventral cervical region for aseptic surgery.
7. Cephalexin 10 mg/lb I.V. immediately preoperatively.

SURGICAL PROCEDURE:

1. Ventral midline incision extending from cranial aspect of larynx to xiphoid.
2. Drape in the incision, using Michel wound clips, or by suturing the drapes to the margins of the incision.
3. Expose the sternohyoideus and sternomastoideus muscles and separate them along the midline.

AXIOM: Be certain that the endotracheal tube has been placed far enough down into the trachea that it extends past the area of the surgery. This will prevent the tracheal lumen from being compromised due to pressure from retractors intraoperatively.

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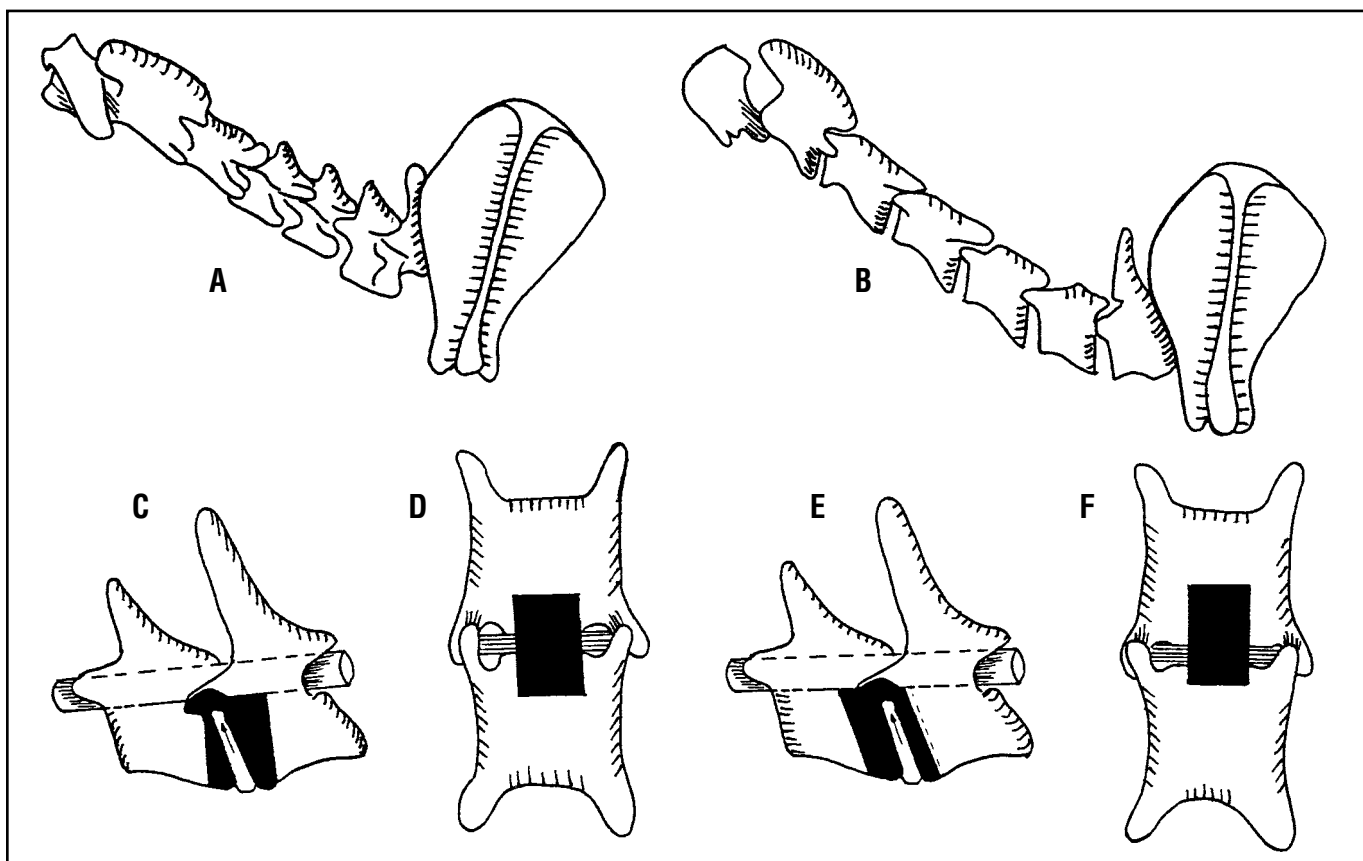


Figure One: This schematic drawing depicts: **A)** Normal lateral anatomical view of cervical vertebrae. **B)** Normal schematic radiographic view of cervical vertebrae and the disc spaces. **C)** Lateral view of the disk space with an incorrect slot that started over the disc space and missed the offending disc. The arrow is the vector of the nucleus pulposus. **D)** This is a ventral view of the slot that was incorrectly centered over the disc space. **E)** This is a lateral view of a correctly placed and angled slot that started rostral to the disc. **F)** This is a ventral view of a properly placed slot that started rostrally from view (D).

4. Gently retract the trachea to the left.

DANGER:

Do not inadvertently traumatize the esophagus with your retractors.

DANGER:

The carotid sheath is easily identified on the right; avoid traumatizing it with your retractors.

5. Palpate the ventral processes of the vertebrae to identify the proper disc space.

AXIOM: The wide transverse processes of C6 are a reliable landmark, as is the ventral tubercle on the caudoventral aspect of C1. The first ribs can also be palpated as a landmark.

6. Using blunt and sharp dissection, separate the paired longus colli muscles over the vertebral body

cranial and caudal to the involved disc space, placing Gelpi retractors to maintain exposure.

7. Using a high speed nitrogen drill, create the initial defect in the ventral aspect of the vertebrae and disc space.

AXIOM: The defect should be approximately one-third of the width of the vertebral body and its total length should be one-half of one vertebral body length.

DANGER:

Do not center this initial defect over the disc space. The disc space angles forward as the exposure is deepened. So, the initial slot should be centered cranial to the disc space (see Figure 1) which will result in the slot being properly centered over the disc space when the spinal canal is reached.

8. With the nitrogen drill, continue to deepen the slot, widening it to slightly over 50% of the vertebral body width as you approach the level of the spinal canal.

AXIOM: Frequent lavage and suctioning of debris is necessary to maintain visualization.

9. Continue this process until the cortical bone of the ventral aspect of the spinal canal is exposed cranial and caudal to the disc space.
10. Using a rongeur, extract as much of the annulus fibrosis and disc material as possible at this stage.

AXIOM: By using the rongeur to remove the annulus at this stage, rather than after the remaining bone has been drilled away, the risk of hemorrhage is minimized.

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11. Resume drilling, to remove the remaining areas of cortical bone.

AXIOM: A sharp small bone curette can also be used to remove bone at the edges of the exposure.

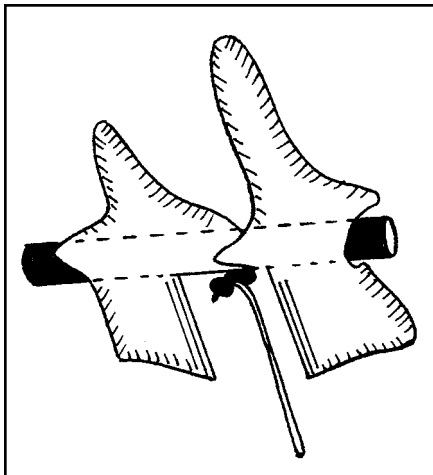


Figure Two: This schematic drawing depicts the use of a dural hook, or a 26 gauge needle with and 90 degree bend to the tip being used to remove disc material from the neural arch.

12. Using a dental hook, ball-end probe, or a flexible wire loop, gently probe within the spinal canal to extract fragments of disc material. (See Figure 2).
13. Using a 26-gauge needle with the tip bent at a 90 degree angle, incise the ventral longitudinal ligament. The ligament can then be cut further with an angled scissors.
14. Remove any disc material which may be entrapped beneath the ligament.
15. If hemorrhage occurs, small fragments of Gelfoam can be gently placed adjacent to the cord to provide hemostasis.

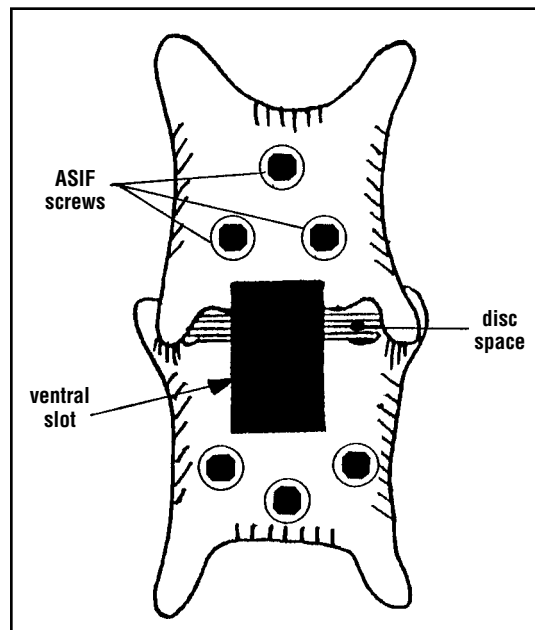


Figure Three: This schematic drawing is a ventral view of the cervical slot. Note that 6 ASIF cortical stainless steel screws have been placed into the vertebrae. These screws are left protruding slightly above the bony surface to facilitate the methylmethacrylate fixation.

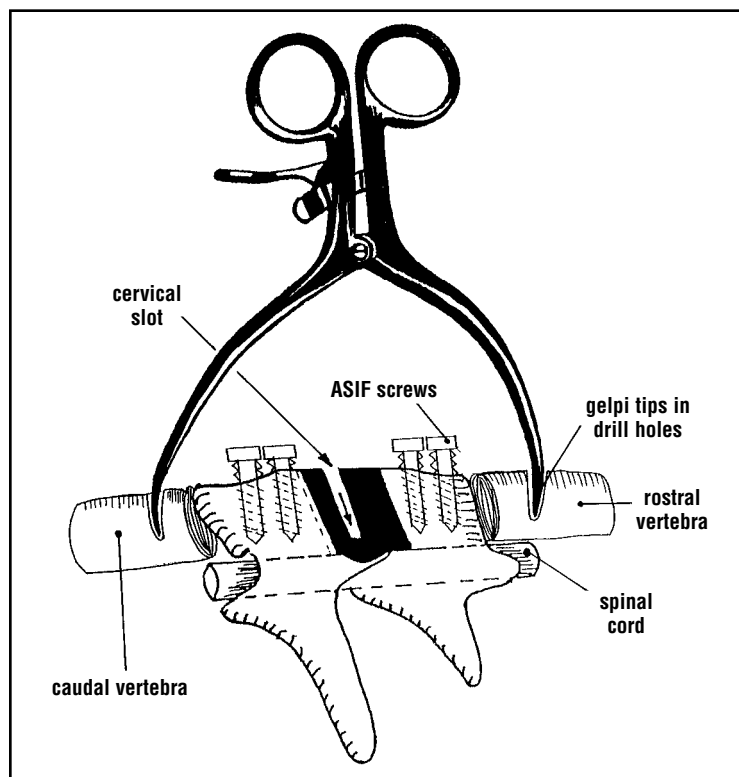


Figure Four: This schematic drawing shows a lateral view of the ventral cervical slot. The tips of the gelpi are rigidly held into drill holes in the vertebrae. The gelpi are strongly opened and held open causing distraction of the vertebrae to be fused. The ASIF cortical screws are left protruding to allow the methylmethacrylate to flow around the screws locking them rigidly in place.

16. Gelfoam or a fat graft can be placed in the bone defect to protect the spinal cord during the subsequent portions of the procedure.
17. Place three ASIF screws in each of the involved vertebrae (See Figure 3) being careful to drill only through the ventral cortex.
18. Using a high speed drill with a 2mm burr, drill a hole through the ventral cortex of the vertebrae cranial and caudal to the two that will be fused. The tips of a modified Gelpi self-retaining retractor can now be placed in these holes, enabling distraction of the vertebrae to be fused. (See Figure 4).
19. Flush the surgical site to remove debris prior to the placement of the methylmethacrylate.
20. Evaluate the position of the retractors, so they will not be incorporated in the methacrylate.
21. Mix the methacrylate, let it partially solidify, and place it into the surgical site surrounding all the screws. (See Figure 5).

AXIOM: Since the methacrylate will generate heat during its polymerization, make sure it is not entering the exposure into the spinal canal. In addition, the methacrylate should be irrigated with sterile isotonic solution during this period, to dissipate the heat generated.

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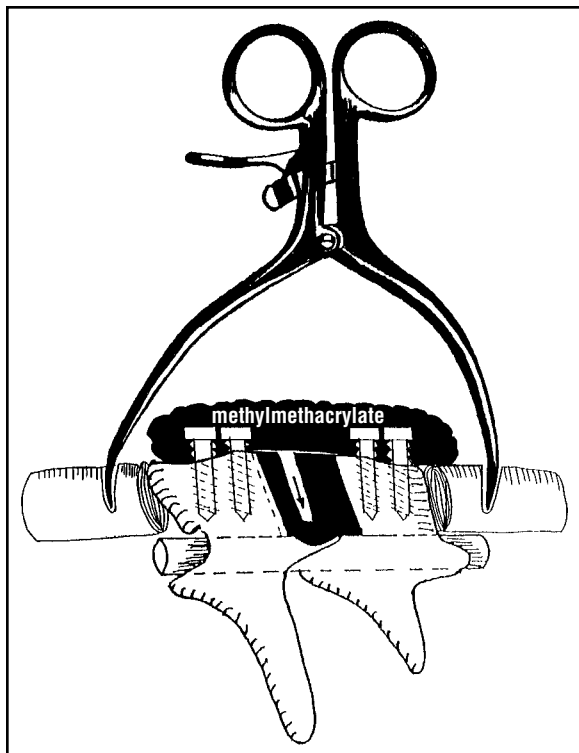


Figure Five: This schematic drawing depicts the methylmethacrylate rigidly locking the vertebrae together. The methylmethacrylate acts as a plate screwed to the distracted vertebrae.

22. Once the methacrylate has polymerized, the retractors can be removed.
23. Simple continuous closure of longus colli muscles using absorbable suture material; often it will not be possible to appose the muscles over the methacrylate.
24. Routine closure of muscular layers, subcutaneous layer, and skin.

POSTOPERATIVE CARE:

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

PROGNOSIS:

1. For patients with neck pain and no paresis, the prognosis is excellent, with rapid relief in almost all cases.
2. For patients with tetraparesis or tetraplegia, the recovery is gradual, over 4 to 12 weeks. The prognosis is good, with the majority regaining good ambulatory function, although not necessarily returning to 100% normal.

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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

Luxation of the superficial digital flexor tendon is an uncommon injury usually seen in the Sheltie, but it can occur in any breed. The superficial digital flexor tendon is the caudal-most component of the calcaneal or Achilles tendon, and its retinaculum holds it on to the caudal aspect of the tuber calcaneus. When this retinaculum tears, usually due to exercise related trauma, the tendon can luxate medially or laterally.

Next month, we shall present our surgical protocol for repair of this tendon luxation.

See you then!