

# CUTTING EDGE

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**T**he Dallas Veterinary Surgery Center (DVSC) was initially founded in 1986, principally as a neurosurgical referral practice, with greater than 50% of the total case load being neurosurgical. Throughout the years we have always strived to be on the "cutting edge" of neurosurgical techniques and diagnostic procedures. Our surgeons have been involved with the development and advancement of several neurosurgical techniques currently in use by other surgeons across the country.

The most common neurosurgical diseases seen at the DVSC are cervical and thoracolumbar disc herniation, lumbosacral compression, spinal fracture/luxations, cervical vertebral instability (Wobblers disease) and atlanto-axial subluxation. Following is a continuation of our previous newsletter describing commonly performed procedures at the DVSC.

present for what appears to be an intermittent to continual lameness. Symptoms can result from one of several possible abnormalities which include: rupture of the LS disc space, instability of L7 in relationship to the sacrum, soft tissue or bony proliferation in the L7 - S1 foramen causing nerve root pain.

Diagnosis of LS disease often requires MRI imaging and/or a CT scan. **The DVSC currently recommends a dynamic MRI study (an MRI performed in both a neutral as well as in a flexed position)** to identify if the patient has a disc rupture, compression of a nerve root or instability. **In our opinion, there are different forms of LS disease and each one requires a different treatment and surgical technique.**

Surgical options to manage LS disease include: 1) dorsal laminectomy to remove a herniated disc, 2) foramenotomy or facetectomy to relieve an entrapped L7 nerve root, or 3) distraction and fusion of the LS region using a combination of a dorsal laminectomy, bone graft, facet screws and possibly a spinal arch or external fixator.

**There is more evidence and agreement amongst surgeons that LS instability may play a large role in the pathogenesis of LS disease requiring fusion of the LS disc space to eliminate pain.**

Intraoperative fluoroscopy allows accurate and safe placement of orthopedic implants into

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## 20 YEARS OF NEUROSURGERY AT THE DVSC

### Lumbosacral (LS) Disease

Patients suffering from LS disease generally present with either intense lower back pain or pain/lameness involving one rear leg (root signature sign). These patients often show moderate to severe pain upon attempting to stand from a laying position or lying down from a standing position. Compression over the LS region (lordosis test) or extension of the hips or lower back will also cause discomfort. Some dogs can

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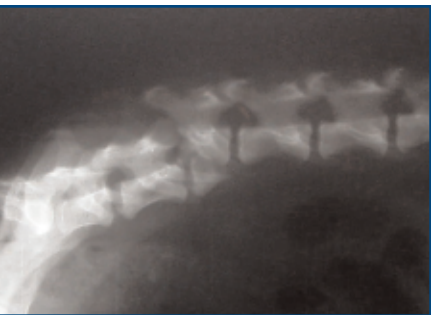


Figure 1

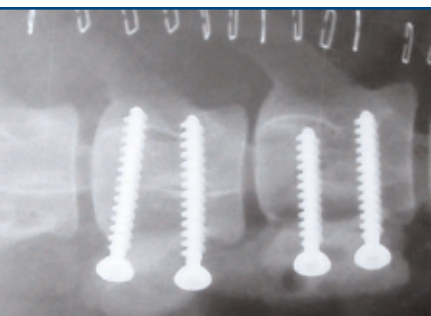


Figure 2

## LS Disease

Surgical options to manage LS disease include:

- ✓ dorsal laminectomy to remove a herniated disc,
- ✓ foramenotomy or facetectomy to relieve an entrapped L7 nerve root, or
- ✓ distraction and fusion of the LS region using a combination of a dorsal laminectomy, bone graft, facet screws and possibly a spinal arch or external fixator.

the L7 - S1 facet and vertebral bodies. Generally the prognosis after surgery is favorable. However, these patients will require a "quieter life style" for the remainder of their lives.

### Spinal Fractures And Subluxations

Spinal fracture/luxations (Figure 1) of the cervical and thoracolumbar spine are commonly managed at the DVSC. Cervical fractures generally are not amendable to plate stabilization. Therefore, fracture/luxation in the C-spine is typically stabilized by inserting screws or threaded pins into two adjacent vertebral bodies (Figure 2).

Polymethylmethacrylate (PMMA) is then placed over the screw heads or the pins to create a "custom bone plate." Fracture/luxations involving the thoracic and upper lumbar spine are very amendable to bone plate application (Figure 3). Lower lumbar trauma is generally stabilized using either a spinal arch and threaded pins; or pins/screws and PMMA. Fluoroscopy is often used to help reduce spinal fractures accurately as well as place orthopedic implants safely into the vertebral bodies. Limited approaches and even closed reductions are possible with the use of intraoperative fluoroscopy.

### Wobblers Disease

Wobblers typically occurs in mid to older, large breed dogs and results from instability between several caudal adjacent cervical vertebrae. However, the DVSC has diagnosed numerous small breed dogs with clinical symptoms and radiographic

evidence of cervical instability. Wobblers can be seen in juvenile patients which are often giant breeds such as Great Danes. Juvenile patients generally have congenital vertebral canal malformation necessitating a dorsal laminectomy to decompress the spinal cord. The juvenile form of wobblers carries a very guarded prognosis.

The cervical vertebral instability form of wobblers, typically seen in middle aged to older pets, regardless of body size, generally presents as either recurring neck pain and/or progressive ataxia to the rear legs. Plain film radiographs often show either a narrow disc space or degenerative changes in several lower cervical vertebral body endplates due to chronic instability. Definitive diagnosis is made by performing a "dynamic myelogram or CT scan" (Figure 4). Typically the instability involves the C4 - C7 spine which results in hypertrophy of the dorsal longitudinal ligament (which lies on the floor of the spinal canal) resulting in ventral spinal cord compression. A myelogram or CT will identify the ventral cord compression. When traction is placed on the cervical spine, and the myelogram/CT is repeated ("dynamic" myelogram/CT), the unstable vertebra will distract causing the

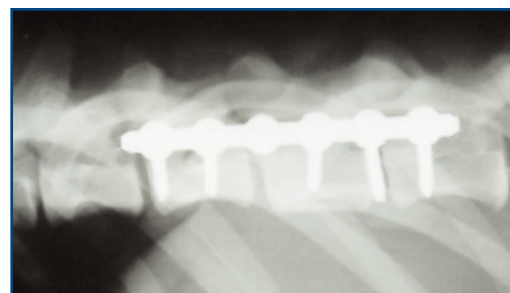


Figure 3

Surgical stabilization for Wobblers Disease has been performed in hundreds of patients at the DVSC in the past 20 years with very predictable and positive results

dorsal longitudinal ligament to flatten. The myelogram/CT in the distracted position will then appear normal.

Surgical stabilization is the treatment of choice for the instability form of wobblers and generally carries a good to excellent prognosis. A partial ventral slot is performed in the central aspect of the two involved vertebrae and filled with cancellous bone. Intraoperative fluoroscopy is used to place 4 to 6 bone screws into the vertebral bodies. The screw heads are left protruding 1 - 1.5 cm ventral to the vertebra. Traction is applied across the affected vertebra resulting in flattening of the dorsal longitudinal ligament thereby relieving spinal cord compression. PMMA (bone cement) is placed so that it spans the two vertebrae and screw heads (Figure 5). This maintains the vertebrae in distracted position. The cancellous bone graft in the slot eventually causes the two vertebral bodies to fuse.

This procedure has been performed in hundreds of patients at the DVSC in the past 20 years with very predictable and positive results. We feel the use of intraoperative fluoroscopy greatly reduces the risks associated with surgery as well as improves the postoperative outcome.

### Atlanto-Axial Instability

Atlanto-axial (A-A) instability is generally

seen in juvenile toy breeds due to congenital malformation or abscess of the disc and/or associated ligamentous structures. A-A instability is occasionally seen in other breeds due to trauma. Patients will often present with anterior cervical neck pain, tetraparesis and occasionally tetraparalysis. Surgical stabilization of the A-A articulation is the treatment of choice. A temporary neck bandage/brace will alleviate clinical signs, and can be used until surgery is scheduled. Either a dorsal, ventral, or combined dorsal and ventral technique can be used to stabilize the vertebra. Dorsal stabilization is achieved by placing a non-absorbable monofilament suture between the dorsal lamina of C1 - C2. The monofilament suture can pull through the thin bone resulting in recurrence of instability and neurological dysfunction. Ventral stabilization involves removing the articular cartilage of the C1-2 articulation and placing a cancellous bone graft into the joint space. Small threaded pins or screws are placed using PMMA over the heads of the pins/screws to further augment the arthrodesis (Figure 6). Eventually the C1-2 articulation is fused with the ventral technique resulting in a mechanically superior outcome. If substantial displacement of the C1 and C2 vertebral bodies is present, the

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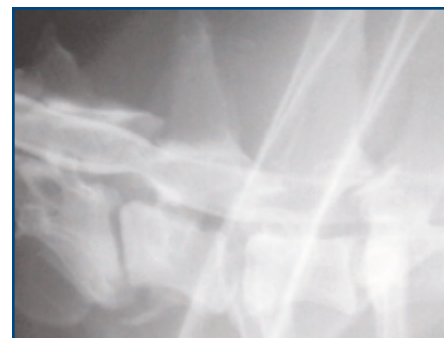


Figure 4



Figure 5

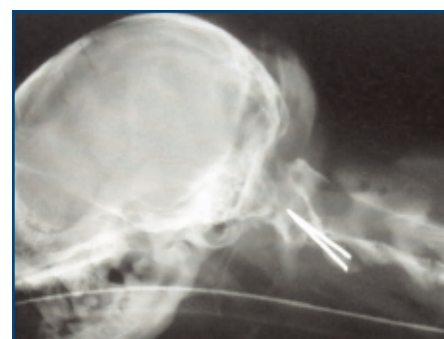


Figure 6

## Our Doctors

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dorsal procedure is initially done to realign the vertebra, followed by a ventral fusion.

Overall the prognosis for an A-A instability is favorable. The dorsal technique is safer and technically easier to perform but also has a higher failure rate. The DVSC recommends performing a ventral fusion for a more permanent repair. We generally use fluoroscopy for safe placement of pins and screws across the C1-2 articulation.

## Neurosurgical Postoperative Physical Therapy

Many patients with medically and surgically managed neurological disorders greatly benefit by postoperative rehabilitation and physical therapy. **The DVSC is associated with a team of dedicated physical therapists trained in the human field that can develop a tailored physical therapy program for each pet to aid in the rehabilitation process.** Techniques such as swimming, static/dynamic standing exercises, and walking on the underwater treadmill are used with impressive clinical results to facilitate strengthening and coordination as well as improve range of motion.

## Conclusion

Years of "past clinical experience" are often relied upon to formulate a treatment plan, determine an anticipated clinical outcome, prognosis and necessary recovery time. The DVSC was founded as principally a neurosurgical referral center with our surgeons having over 20 years of experience from which to draw from when consulting you and your clients. We have always, and will continue to offer the latest options in diagnostic procedures and therapeutic treatments. Most importantly, we will always offer realistic prognosis and help your client decide if neurosurgery is the best option based on their circumstances and expectations!

## Welcome Dr. Douglas Lange

Douglas Lange originated from west Texas and obtained his DVM from the Texas A&M in 1989. He then completed a private practice rotating internship with the Sacramento Animal Medical Group. He enjoyed California and an additional year in private practice as a research assistant before moving to Ames, Iowa for his small animal surgery residency. There he received advanced training in orthopedic and soft tissue procedures as well as neurosurgery, and completed his residency in 1994. He then accepted an assistant professor position at Oklahoma State University where he taught small animal surgery and became a board-certified member of the American College of Veterinary Surgeons.

In September 2000, Dr. Lange moved to Phoenix, AZ to join the Southwest Veterinary Surgical Service which became part of the Arizona Veterinary Specialists group. This experience gave him the opportunity to work closely with all the specialties and to engage in many interesting techniques including epicardial release for coccidioidomycosis-induced restrictive pericarditis, circular external skeletal fixation for fractures and angular limb deformity and limb lengthening corrections, arthroscopy, and oncologic procedures including limb spares. He then decided to move closer to his family and join the DVSC in June of this year.

In addition to surgery, Dr. Lange enjoys learning, gardening, woodworking, mountain-biking, and has a strong appreciation for the great outdoors and his friends and family. Feel free to call or come by to discuss your surgical cases with Dr. Lange.



# DVSC

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