

Orthopedic Conditions of the Canine Thoracic and Pelvic Limbs

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Common Orthopedic Conditions of the Canine Thoracic Limb

- Medial shoulder instability
- Humeral Osteochondrosis Dissecans
- Fractured medial coronoid process (FCP)
- Ununited anconeal process (UAP)
- Osteochondrosis dissecans (OCD)
- Humeral, radial and ulnar fractures
- Carpal hyperextension injuries

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Shoulder Medial Shoulder Instability

Cause – Usually, full abduction of the thoracic limb causing injury to the medial muscles/tendons/ligaments

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Shoulder

Medial Shoulder Instability

- **Assessment**
 - Reduced weight bearing in the injured limb
 - Increased abduction beyond 20 degrees and/or compare ROM bilaterally
 - Tender to palpation at the point of the shoulder
 - Reduced ROM/pain with hyperextension of the shoulder
- **Treatment**
 - Veterinary
 - Imbrication/surgical stabilization
 - Physical Therapy
 - Hobbles
 - Therapeutic exercise
 - Aquatic therapy
 - Low level laser therapy

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Hobbles



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Shoulder

Osteochondritis Dissecans of the Shoulder (OCD)

Cause – Trauma induces “kissing” injury of the cartilage of either the humeral head or the glenoid fossa or both

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Shoulder

OCD of the shoulder



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Shoulder

Osteochondritis Dissecans of the Shoulder (OCD)

- **Assessment**
 - Decreased weight bearing in the injured limb, often slow onset but worsens with time and activity
 - Radiographs
 - Discomfort with full ROM
- **Treatment**
 - **Veterinary**
 - Surgical fibrillation
 - Platelet injections
 - Stem cell injections
 - Synvisk injections
 - **Physical Therapy**
 - Therapeutic exercise
 - Aquatic therapy
 - Low level laser therapy

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Elbow

Elbow Dysplasia

- Fractured medial coronoid process (FCP)
- Ununited anconeal process (UAP)
- Osteochondrosis dissecans (OCD)

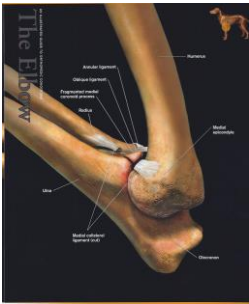
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Elbow Fractured Medial Coronoid Process (FCP)

Cause – Trauma, usually in young dogs whose growth plates haven't closed. Fracture of the growth plate of the ulna in the medial trochlear notch

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Fractured Medial Coronoid Process (FCP)



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Fractured Medial Coronoid Process (FCP)



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Fractured Medial Coronoid Process

- **Assessment**
 - Reduced weight bearing and lameness in a thoracic limb
 - Palpation pressure to the medial elbow compartment elicits a painful response
 - Swelling and heat in the medial elbow compartment
 - Radiographs
- **Treatment**
 - **Veterinary**
 - Surgical removal of the bony fragment
 - **Physical Therapy**
 - Therapeutic exercise
 - Aquatic therapy
 - Low level laser therapy

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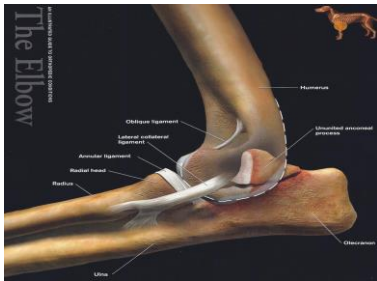
Elbow

Ununited Anconeal Process (UAP)

Cause – Trauma, usually in young dogs whose growth plates haven't closed. Fracture of the growth plate of the ulna at the proximal end of the ulna, the anconeal process

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Ununited Anconeal Process (UAP)



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Ununited Anconeal Process (UAP)



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Ununited Anconeal Process (UAP)

- **Assessment**
 - Reduced weight bearing and lameness in a thoracic limb
 - Palpation pressure to the caudal elbow elicits a painful response
 - Swelling and heat in the caudal elbow
 - Radiographs
- **Treatment**
 - **Veterinary**
 - Surgical fixation of the bony fragment
 - **Physical Therapy**
 - Therapeutic exercise
 - Aquatic therapy
 - Low level laser therapy

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Ununited Anconeal Process (UAP)



FIG. 85-11 (A) Lateral radiograph of the elbow of a 6-month-old German shepherd with ununited anconeal process. (B) Immediately postoperatively after lag screw fixation. (C) Ten weeks postoperatively.

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Elbow Osteochondrosis Dissecans (OCD) of the elbow

Cause – Trauma inducing a “kissing”
injury to the cartilage of the
epicondyles of the humerus

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OCD of the Elbow



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OCD of the Elbow

- **Assessment**
 - Reduced weight bearing and lameness in the thoracic limb often slow onset but worsens with time and activity
 - Radiographs
 - Pain with ROM of the elbow
- **Treatment**
 - **Veterinary**
 - Fibrillation of the damaged cartilage/Removal of the fragment
 - Platelet injections
 - Synvisk injections
 - **Physical Therapy**
 - Therapeutic exercise
 - Aquatic therapy
 - Low level laser therapy

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Humeral, Radial and Ulnar Fractures

Cause – almost always trauma of some sort

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Humeral Fracture and Repair

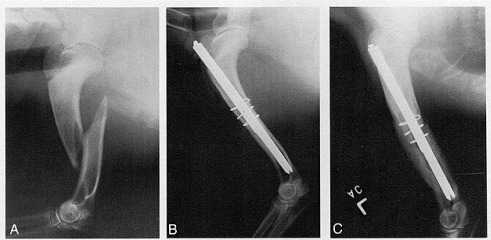


FIG. 22-4 An oblique fracture of a canine humeral diaphysis (A) stabilized with stacked pins and full cerclage wires (B). Radiographs taken 10 weeks following surgery (C).

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Nasty Humeral Fracture and Repair



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Radial Fractures, Distal and Proximal



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Radial/Ulnar Fracture and Repair



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Humeral, Radial and Ulnar Fractures

- **Assessment**
 - Palpation, inflammation, effusion, pain
 - Non-weight bearing
 - Radiographs
- **Veterinary treatment – surgical**
 - Plates
 - Pins
 - External Fixators
 - Cerclage wire
- **Veterinary treatment – non-surgical**
 - Casting
 - Bracing
- **Physical Therapy**
 - Aquatic therapy
 - Therapeutic exercise
 - Low level laser therapy
 - Joint mobilization
 - Bracing/supports

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Carpal Hyperextension Injuries

- Usually caused by trauma of some sort
- Sometimes seen in older, obese dogs

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Carpal Hyperextension Injuries



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Carpal Hyperextension Injuries



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Common Orthopedic Conditions of the Canine Pelvic Limb

- Hip dysplasia
- Hip luxation
- Hip fractures
- Cranial cruciate (ACL) ligament disease
- Iliopsoas strain (hip flexor)
- Medially luxating patella (MPL)
- OCD of the stifle (knee)
- Common calcaneal tendon injuries

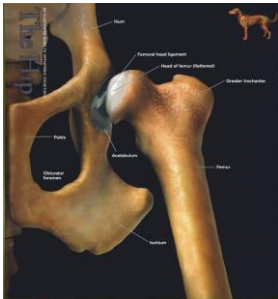
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Hip Dysplasia

- Cause – Polygenic trait. Using a Penn hip radiograph and Ortelani positioning 70% or greater displacement of the coxofemoral joint.

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Hip Dysplasia



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Hip Dysplasia

• **Assessment**

- Usually seen in large breed dogs
 - St Bernard
 - German Shepards
 - Labrador Retrievers
 - Golden Retrievers
- Weakness in the pelvic limbs, usually worse after exercise
- Unwillingness to jump, run, climb stairs
- Exercise intolerance
- Pain elicited with palpation
- Difficulty with transfers from sitting or lying down to standing
- Unexplained aggressiveness

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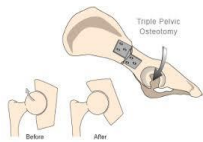
Hip Dysplasia

• **Treatment**

- Veterinary - surgical
 - Triple pelvic osteotomy (TPO)
 - Femoral head and neck ostectomy (FHO)
 - Total Hip Replacement (THA)
- Physical Therapy
 - Therapeutic exercise
 - Aquatic therapy
 - PROM, stretching
 - Low level laser therapy

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Hip Dysplasia Triple Pelvic Osteotomy



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Hip Dysplasia Femoral Head and Neck Osteotomy



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Hip Dysplasia Total Hip Replacement



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Hip Luxation

Cause – usually traumatic, 95.5% are craniodorsal and caused by trauma secondary to being hit by a car (HBC)

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Hip Luxation

- Assessment
 - Non-weight bearing
 - Radiographs
 - Observation
 - Palpation of the femoral head with flexion

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Hip Luxation

- Veterinary surgical treatments
 - Toggle reduction
 - Femoral head and neck osteotomy
 - Total hip replacement
- Physical Therapy
 - Aquatic therapy
 - Therapeutic exercise
 - PROM, Stretching
 - Low level laser therapy

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Hip Luxation Toggle Reduction



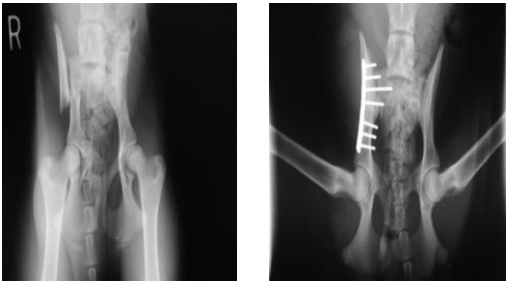
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Pelvic Fractures

Cause – trauma often Hit By Car

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Pelvic Fractures



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Hip Injuries Strained iliopsoas

Cause – compensation to injuries in the hip and stifle causing decreased hip extension and strain or adaptive shortening of the iliopsoas

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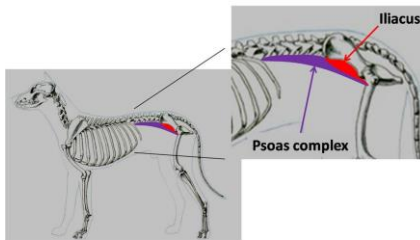
Hip Injuries Strained Iliopsoas



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Iliopsoas Muscle

Iliopsoas anatomy



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Hip Injuries Strained Iliopsoas

- Assessment
 - Decreased weight bearing in affected limb
 - Decreased hip extension
 - Often painful on palpation at origin, muscle body or insertion
- Posture
 - Kyphotic lumbar spine
 - Forward weight shift
 - Straight hock and stifle
 - Internally rotated thoracic limbs

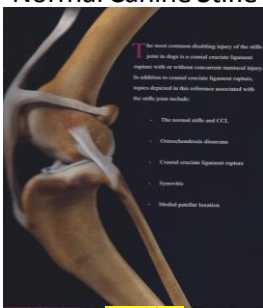
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Hip Injuries Strained Iliopsoas

- Treatment
 - Strain counter strain technique
 - Aquatic therapy
 - Reduced/modified therapeutic exercise
 - Stretching
 - Low level laser therapy
 - Icing
 - Teach techniques to owner

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Stifle Injuries Normal Canine Stifle



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Stifle Injuries

- Cranial cruciate ligament disease (ACL/CrCL)
- Medially luxating patella (MPL)

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Stifle Injuries CrCl disease/tear

- Assessment
 - Varying degrees of weight bearing loss
 - Often with a complete tear, non-weight bearing, and concurrent tear of the meniscus
 - Decreased muscle mass in the injured thigh
 - Decreased function
 - Often tripods
 - Won't jump, run, play, climb stairs
 - Positive cranial drawer and tibial compression tests
 - Effusion and medial buttress formation
 - Often tightness in the iliopsoas (Hip flexor)

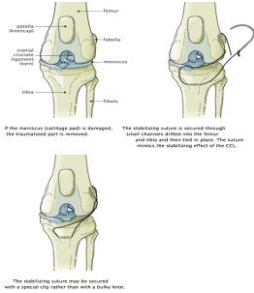
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Cranial Cruciate Ligament Injuries

- Veterinary surgical treatment
 - Lateral suture
 - Tightrope
 - Tibial tuberosity advancement
 - Tibial plateau leveling osteotomy
- PT treatments – usually post operative
 - Therapeutic exercises
 - Aquatic therapy
 - Progressing home program

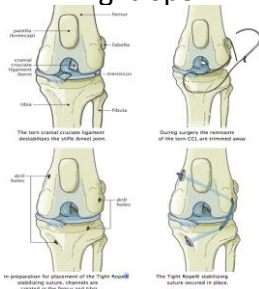
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Stifle Injuries Lateral Suture



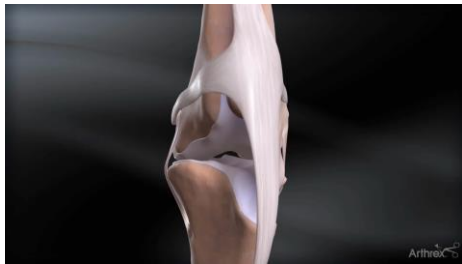
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Stifle Injuries Tightrope



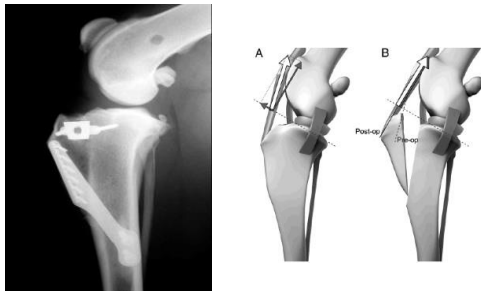
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Tightrope Procedure



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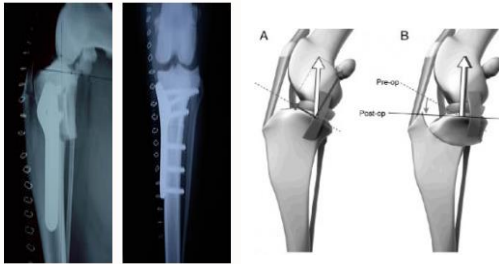
Stifle Injury Tibial Tuberosity Advancement



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Stifle Injury

Tibial Plateau Leveling Osteotomy



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Medially Luxating Patella

Cause – genetic predisposition, generally seen in small breed dogs

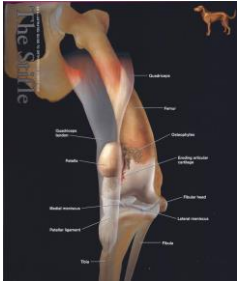
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Medially Luxating Patella

- Assessment
 - Decrease in muscle mass and weight bearing in the affected limb
 - Grade I – Slight movement with palpation
 - Grade II – Displace with flexion and medially directed pressure, reseats with extension
 - Grade III – Usually luxated, but can reseat patella in groove with pressure
 - Grade IV – Permanent luxation, patella rides on the side of the femur
 - Patient will luxate often but can reduce with extension of the hip and stifle

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Stifle Injuries – Medially Luxating Patella Surgical Treatment



Post surgical radiograph with pins in the tibial tuberosity.

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Common Calcaneal Tendon Injuries

Cause – Trauma – laceration, blunt force trauma, severe stretching or pulling.
Atraumatic – chronic and degenerative in nature

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Common Calcaneal Tendon Injuries

- Assessment
 - Partial tear
 - Lameness and swelling
 - Decreased weight bearing
 - “Dropped hocks”
 - Full tear
 - Walk “flat footed” or plantigrade
 - Deceased weight bearing
 - Flexed toes
 - All components of the tendon are injured except the superficial digital flexors

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Common Calcaneal Tendon Injuries

- Treatment
 - External support
 - Bracing
 - Casting
 - Surgical
 - Reattaching the loose ends
 - Suture
 - Mesh
 - Grafts
 - Physical Therapy
 - 6-12 weeks of restricted activity
 - Gentle and restricted PROM
 - Aquatic therapy
 - Carefully progressed increase in activity

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Resources

- chazevansk9pt@gmail.com
- University of Tennessee – ccrp.utvetce.com
- Canine Rehabilitation Institute – www.caninerehabinstitute.com
- Guide to the Dissection of the Dog; Evans,H. deLahunta,A;WB Saunders Co.
- An Illutrated Guide to Orthopedic Conditions; Novartis;Visible Productions;Fort Collins,CO.
- Dog Anatomy, A Coloring Atlas;Kainer,R. McCracken,T;Teton Newmedia

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Common Neurological Conditions

Lisa Bedenbaugh, PT, CCRP
 Director of Rehabilitation Services
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Fibrocartilaginous Emboli (FCE)

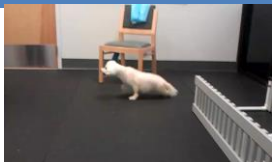
- A small piece of fibrocartilage (thought to be from one of the discs) breaks off and becomes trapped in the vascular supply of the spinal cord, resulting in neurological symptoms caudal to the lesion.
- Onset is usually sudden and acute; there is usually pain initially, but within 2-3 days, dogs are non-painful. Return of function is usually relatively fast, and most have good recovery, but there may be some residual deficits.
- Generally seen in larger breeds, but Shetland Sheepdogs and miniature Schnauzers are also at risk.

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Fibrocartilaginous Emboli

- Treatment :
 - No surgical corrections available, as it is not a compressive lesion.
 - Supportive care (positioning, skin care, PROM) in early stages
 - Acupuncture, laser
 - Sensory stimulation (toe tickles, pinches)
 - Assistive devices
 - Transitional activities, UWTM with manual assistance for gait training.

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Caudal Cervical Spondylomyelopathy (Wobbler's Syndrome)

- Results from a combination of vertebral malformation and instability in the caudal cervical area of middle to older large breed dogs, most often in Doberman Pinschers.
- The degenerative changes start to cause compression on the spinal cord, causing lowered head carriage, ataxia and weakness, thus the "wobbler's" designation.
- Proprioceptive deficits are usually worse in the pelvic limbs than in the thoracic limbs, and there is usually some degree of neck pain and limited ROM present.

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Caudal Cervical Spondylomyelopathy (Wobbler's Syndrome)

- Treatment:
 - Surgical stabilization/decompression (ventral slot or dorsal laminectomy)- outcomes vary
 - Conservative treatment:
 - Neck bracing
 - Laser/Acupuncture/PEMF for pain/inflammation relief
 - Therapeutic exercises/UWTM
 - Assistive devices (harness/slings)

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Degenerative Myelopathy

- A progressive degeneration of the myelin and axons in the spinal cord, caused by a defect in the SOD-1 gene. This same defect causes Amyotrophic Lateral Sclerosis (Lou Gehrig's disease) in humans.
- Begins in the lumbar spine, and progresses cranially. Early signs include scuffing of the nails in the pelvic limbs and knuckling/proprioceptive deficits, then progresses to increased weakness, first in pelvic limbs, then moves up the trunk to the thoracic limbs.
- Mostly seen in Boxers, German Shepherds and Corgis, but several other breeds can be affected.

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Degenerative Myelopathy

- **Diagnosis:** Generally a "rule-out" diagnosis (myelogram/CT/MRI shows no neoplasia or compressive lesion). There is a DNA test which will show if the dog has 0, 1 or 2 copies of the defective gene.
- **Treatment:** There is no cure and no surgical options. Primary focus is on educating the owner, maintaining mobility and helping with assistive devices. Kathman, *et al* (2006), showed physiotherapy extended the survival time over those animals not receiving any therapy (mean average 255 days vs. 55 days).

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Lumbosacral Disease (Cauda Equina Syndrome)

- Caused by degenerative changes occurring at the L7-S1 level, resulting in stenosis or instability. Can also be caused by disc swelling/protrusion at this level.
- The dog's spinal cord terminates at L6-7, so generally won't see motor changes in the pelvic limbs, rather present with caudal lumbar pain, resistance to lumbar/hip extension and lifting/extending the tail.
- Functionally, they may have trouble ascending stairs, jumping up onto bed/into vehicle and transitioning from sit to stand.
- Usually seen in middle to older aged large breed dogs.

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Lumbosacral Disease (Cauda Equina Syndrome)

- Diagnosis: Radiographs/CT/MRI
- Treatment:
 - **Surgical:** Decompression or stabilization
 - **Non-surgical:**
 - Modalities for pain/inflammation relief
 - Therapeutic exercises, with a focus on core strengthening
 - Underwater treadmill
 - Anti-inflammatories/analgesics

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Brachial Plexus/Other Peripheral Nerve Injuries

- Generally traumatic in nature, either due to hit by car or fall out of vehicle.
- Presentation varies, dependent upon how far up the limb the damage is, and how severe, but often involves the radial nerve, resulting in a "drop paw".



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Brachial Plexus/Peripheral Nerve Injuries

- Diagnosis: Radiographs, CT, MRI, EMG/NCV testing
- Treatment:
 - Electrical stimulation
 - PROM
 - Boots/slings for skin protection
 - UWTM with manual assistance for gait training
 - Splinting/custom orthotics

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