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

Shoulder

Medial Shoulder Instability

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

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
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

Elbow

Elbow Dysplasia

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

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

Ununited Anconeal Process (UAP)
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
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

Humeral Fracture and Repair

Nasty Humeral Fracture and Repair
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
Carpal Hyperextension Injuries

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

Hip Dysplasia

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

• 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
Femoral Head and Neck Ostectomy

Hip Dysplasia
Total Hip Replacement

Hip Luxation

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

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

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

Hip Luxation Toggle Reduction
Pelvic Fractures

Cause – trauma often Hit By Car

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
Hip Injuries
Strained Iliopsoas

Assessment
- Deceased 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

Iliopsoas Muscle

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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

Stifle Injuries
Normal Canine Stifle

• Cranial cruciate ligament disease (ACL/CrCL)
• Medially luxating patella (MPL)
**Stifle Injuries**

**Cranial Cruciate Ligament (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 iliopectineus (Hip flexor)

**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
Stifle Injury
Tibial Plateau Leveling Osteotomy

Medially Luxating Patella

Cause – genetic predisposition, generally seen in small breed dogs

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
Stifle Injuries – Medially Luxating Patella
Surgical Treatment

Common Calcaneal Tendon Injuries

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

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
Common Neurological Conditions

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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 Illustrated Guide to Orthopedic Conditions; Novartis; Visible Productions; Fort Collins, CO.
- Dog Anatomy, A Coloring Atlas; Kainer, R. McCracken, T; Teton Newmedia
Intervertebral Disc Disease (IVDD)

- Generally classified as a Hansen’s Type I or Type II disc
  - Type I: Seen more often in the chondrodystrophic (“dwarfed”) breeds (e.g., Corgis, Dachshund). Usually a sudden onset, with a partial to full herniation of the disc, causing pain and often weakness to paralysis.
  - Type II: Involves a more gradual bulging of the disc into the spinal canal. Dogs often present with gradually increasing back/neck pain and weakness, rather than acute paresis/paralysis.

Intervertebral Disc Disease

- Presentation
  - C1-C5 lesions: Generally present with decreased/absent CP reflexes in all limbs and normal/increased biceps/patellar reflexes (UMN signs)
  - C6-T2 lesions: Present with decreased/absent CP reflexes and decreased reflexes (LMN signs) in thoracic limbs.
  - T3-L3 lesions: Present with normal CP’s in thoracic limbs, decreased/absent CP’s in pelvic limbs. Will have normal reflexes in thoracic limbs, UMN signs in pelvic limbs
  - L4-S1 lesions: Present more often with back pain, possibly LMN signs in pelvic limbs, often have droopy tail. (Cauda equina syndrome)
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.

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.
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.

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)

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/proprionate deficits, then progresses to increased weakness, first in pelvic limbs, then moves up the trunk to the thoracic limbs.
- Mostly seen in Boxers, German Sheperds and Corgis, but several other breeds can be affected.
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).

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.
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

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”.

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
References