Cranial Cruciate Ligament Disease

Extended Version

**Classic case:** Overweight rottweiler with pelvic limb lameness that worsens with exercise. Holds up affected limb when standing.

**Presentation:**
- Torn cranial cruciate ligament **common in dogs**, uncommon in cats
- **Acute or progressive** onset
- **Large breed dogs**, particularly: Rottweilers, Labrador retrievers, Newfoundlands, Staffordshire terriers.
- Genetic predisposition in Newfoundlands and boxers
- Risk factors: hyperadrenocorticism, autoimmune disease, cutaneous asthenia, overweight
- Clinical signs
  - Variable pelvic limb lameness, unilateral or bilateral
    - Holds up affected limb or non-weightbearing
    - Stifle externally rotated, increased flexion when walking
  - Improvement with rest, worsening with exercise
  - **Joint effusion** and thickening of joint capsule – most pronounced over medial aspect of proximal tibia (medial buttress formation)
  - Asymmetry while sitting – affected stifle abducted
  - ± Cranial drawer sign: manual cranial displacement of proximal tibia relative to distal femur
  - ± Cranial tibial thrust: cranial movement of tibial tuberosity as hock is manually flexed and gastrocnemius contracts
  - ± Meniscal click

**DDX:** Patella luxation, lumbosacral disease, hip dysplasia, iliopsoas strain, bone neoplasia, osteochondrosis, infection (bacterial, rickettsial, or fungal), immune-mediated arthritis, caudal cruciate or collateral ligament injury, long digital extensor tendon avulsion, isolated meniscal injury (almost exclusively in boxers)

**Test of choice:**
- **Physical exam**—Characteristic lameness
  - Palpable stifle effusion
  - ± Cranial drawer sign;
  - ± Cranial tibial thrust (these may require sedation to elicit)
  - Always compare to contralateral limb if questionable findings

- **Radiography** – lateral and craniocaudal stifle
  - Fat pad compression in cranial joint
  - **Effusion in nearly all patients** – Extension, caudal joint capsule
  - DJD in chronic cases (longer than a few weeks)
    - Trochlear ridge
    - Caudal surface of tibial plateau
    - Distal pole of patella
  - Static drawer (cranial displacement of the tibia relative to the femur)
  - Tibial plateau slope angle (for planning surgery) - the angle between a line perpendicular to the long axis of the tibia and a line parallel to the tibial plateau

- **Arthroscopy**

- **MRI** – probably not necessary in the majority of cases
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**Rx of choice:**
- Medical treatment (with or without surgical stabilization)
  - Physical rehabilitation: leash walks, swimming, water treadmill, sit-to-stand exercises
  - **NSAIDs** (Carprofen, Meloxicam, etc)
  - Disease-modifying osteoarthritis agents
    - Polysulfated glycosaminoglycan
    - Pentosan polysulfate
    - Glucosamine, chondroitin sulfate

- **Surgical stabilization** - multiple options, depends on patient, surgeon
  - Intracapsular fascia lata or patellar tendon autogenous graft – limits internal rotation and cranial motion of tibia
    - Over-the-top technique
    - Mimics normal function of cranial cruciate ligament but is invasive and graft may stretch or fail
  - Extracapsular suture stabilization
    - Femoral condyle or fabella to tibia
    - Limits drawer movement and rotation
  - Fibular head transposition
    - Advances insertion of lateral collateral ligament to reduce drawer and internal rotation
    - May be used alone or in combination with other techniques
  - Tibial plateau leveling osteotomy (TPLO)
    - Changes tibial plateau angle from 20°-26° to 5°-10° neutralizing cranial tibial thrust.
    - Often preferred in larger, active dogs
  - Tibial tuberectomy advancement (TTA)
    - Pull of patellar tendon becomes perpendicular to the tibial plateau during weight bearing
  - Triple tibial osteotomy (TTO) – combination of TPLO and TTA

- Complete or partial medial meniscotomy — medial meniscus should always be inspected

**Prognosis:**
- Conservative management only
  - **Dogs and cats under 10 kg:** 50% will do well
  - Dogs over 10 kg: 20% will do well
- Surgical management:
  - 85% all sizes will do well regardless of chronicity before surgery
  - Injury of contralateral ligament occurs in 40% of patients.
  - This increases to 60% if radiographic changes evident in uninjured leg.
Prevention:
- Avoid obesity

Pearls:
- Cranial cruciate ligament is divided into 2 bands
  - Craniomedial band – taut during all phases of flexion and extension – it is the primary check against drawer motion
  - Caudolateral band – taut only in extension
- Rupture is usually due to degeneration in dogs
- Traumatic rupture
  - Hyperextension and internal rotation of the leg (foot caught in hole or fence)
  - Jumping with excessive cranial tibial thrust
- Stifle instability leads to
  - Synovitis
  - Articular cartilage degeneration
  - Periarticular osteophyte development
  - Capsular fibrosis
  - ± medial meniscal injury
  - ** Progressive arthritis will occur regardless of treatment method
- Bilateral cruciate rupture is often mistaken for neurologic disease


My Notes: