Cranial Cruciate Ligament Disease

History
- Non/partial weight bearing
- Waxing/waning lameness
- Morning stiffness, lameness exacerbated with exercise
- Difficulty rising/jumping, reluctance to walk/play
- Change of sitting position
- Traumatic event (during play, auto-motive trauma, surface slip)
- Response to rest/medication (NSAID)
- Other illnesses (endocrinopathies, immune-mediated)
- Current medications/preventives (glucocorticoid)
- Acute or chronic

Complete examination
- Evaluate all body systems
- Other problems may take priority
- Identify diagnostic differentials (eg, canine hip dysplasia, trauma, neuropathy, myopathy)

Neurologic examination
- Mentation, cranial nerve evaluation
- Conscious proprioception
- Withdrawal reflexes
- Spinal hyperesthesia (especially lumbosacral region)
- Cervical ROM

Orthopedic examination
- Standing evaluation
- Symmetry
- Loss of muscle mass
- ROM
- "Sit" test (limb out to side)
- Gait: evaluate walk/trot (stride length, stance time, stifle ROM)
- Pain/apprehension in joint manipulation (especially extension)
- Stifle effusion
- Medial fibrosis of proximal tibial tissues (buttress formation)
- Contralateral limb for comparison (muscle atrophy, effusion)

Other diagnostics of affected joint(s)
- Thorough palpatation
  - Neuromuscular blocks (acepromazine + hydromorphone or dexmedetomidine + butorphanol)
  - Laxity
    - Cranial drawer test (anatomic landmarks, excessive cranial translation of tibia relative to stationary femur, absence of abrupt stop point)
    - Tibial compression test (anatomic landmarks, stifle/hock at weight-bearing angle, excessive cranial displacement of proximal tibia with hock flexion)
    - Internal rotation
    - Crepitus/clicking sensations
      - Stifle => suspect concurrent medial meniscal injury
  - Repeat palpation and ROM
  - Compare all assessments with contralateral limb

Normal

Abnormal

No additional testing

CCLD SIGNALMENT
Age: More prevalent in young to middle-aged dogs; peak incidence around 7 yr; dogs >4 yr more likely to develop CCLD.

Gender: Either can be affected; neuter status correlated with CCLD (neutered>intact); early neuter may ↑ risk for greater TPA, which may ↑ CCLD likelihood.

Genetics: Heredity, anatomic features (conformation, concurrent angular limb deformities).

Breed: Any breed; more common in medium-sized to large breeds; commonly affected are the Rottweiler, Newfoundland, Labrador retriever, and boxer.

Nutrition: Weight/body condition score; obesity can exacerbate disease process.

OUTCOMES & COMPLICATIONS
Extraarticular stabilization
- Success rate of 64%–95%; can address abnormal internal rotation, relative technical ease, small equipment requirement/low costs.
- Complication rate of 9%–50%; risk for premature failure of stabilizing materials, infection, peroneal nerve damage, pain, tissue reaction, subsequent meniscal tears.

Osteotomy techniques
- Success rate of 75%–90%; technically more difficult, able to address excessive TPA, can correct concurrent patellar luxation, more surgical equipment needed.
- Complication rate of 18%–60%, TPLO 18%–28%, TTA 20%–60%; risk for hemorrhage, incisional complications, patellar tendonopathy, fracture, implant failure, subsequent meniscal tears, medial patellar luxation, infection.
CCLD (unilateral or bilateral)

Radiography
- Neuroleptanalgesia
- Stifle
  - Orthogonal views ⇒ evidence of secondary OA
  - Special views (for surgical planning) ⇒ stifle and hock each at 90° (determine TPA, assess cranial translocation of tibia), TTA view (mediolateral radiograph with stifle near full extension, −135°)
- Thorax: Routine in patients >8 yr, indicated with cardiac/respiratory abnormalities

Inconclusive findings
- Arthrocentesis: rule out immune-mediated disease, infection
- Additional imaging (ultrasonography, MRI, nuclear scintigraphy)
- Arthroscopy
- Response to nonsurgical management

Findings conclusive for CCLD
- Communicate with client
  - Patient occupation/owner expectations
  - Unilateral/bilateral
  - Chronicity/degree of instability
  - Concurrent angular deformity/malalignment
  - Postoperative confinement
  - Expense

Nonsurgical management
- Cage confinement ≥6 wk
- Weight reduction/body conditioning
- Physical rehabilitation
- NSAIDs
- Nutraceuticals
- Intraarticular hyaluronic acid injections

Surgical management
- Joint assessment/treatment (arthrotomy, arthroscopy)
- Evaluate for medial meniscal pathology (meniscal release, partial meniscectomy)

Osteotomy techniques
- Preoperative planning required: goal to neutralize cranial tibial thrust
- TPLO
- Cranial tibial wedge osteotomy
- TTA

Extraarticular stabilization
- TightRope procedure (arthrex.com)
- Lateral fabellotibial suture
- Fibular head transposition
- Modified retinacular imbrication
- Lateral suture anchors
- Techniques rely on periarticular fibrosis for long-term stability

Postoperative management
- Confinement/controlled leash activity
- Reevaluation at 2 and 8–12 wk postoperatively
- Radiographic evaluation of implants/healing
- Physical rehabilitation
  - Passive ROM, exercises for ↑ thigh musculature
- OA management
  - Weight control
  - NSAIDs
  - Other analgesics (eg, tramadol, gabapentin)
  - Chondromodulating agents (eg, hyaluronic acid, PSG)
  - Nutritional supplements (eg, glucosamine–chondroitin sulfate, omega-3 fatty acids)

CCLD = cranial cruciate ligament disease, OA = osteoarthritis, PSG = polysulfated glycosaminoglycan, ROM = range of motion, TPA = tibial plateau angle, TPLO = tibial plateau-leveling osteotomy, TTA = tibial tuberosity advancement

See Aids & Resources, back page, for references & suggested reading.