DISEASES OF THE HINDLIMB

Hindlimb lameness

- Congenital
- Developmental
- Traumatic
- Metabolic

History (breed), physical examination, X-ray

Hindlimb lameness (skel tally immature dogs)

Stifle region:
- OCD
- Patellar luxation
- Avulsion of origin of long digital extensor muscle
- Avulsion of CL
- Valgus/varus deformity due to premature physeal closure

Tarsal region:
- Valgus/varus deformity
- OCD
- Achilles-diseases

Hindlimb lameness (skel tally mature dogs)

Large breeds
General/multiply:
- Trauma, fracture, luxation, muscle and nerve injuries,
- Spinal chord lesion, CEC
- Bone, cartilage, synovial tumor
- Hypertrophic osteoarthropathy

Hip region:
- DJD, dysplasia
- Luxation

Stifle region:
- DJD (primary/secondary)
- CCL rupture
- Patellar luxation
- Long digital extensor rupture

Tarsal region:
- Ligament instability/hipperextension
- Avulsion of gastrocnemius tendon
- Luxation of the tendon os superficial digital flexor muscle
- Sever-disease
- DJD

Hindlimb lameness (skel tally mature dogs)

Small breeds
General/multiply:
- Trauma, fracture, luxation

Hip region:
- Legg-Calvé-Perthes disease

Stifle region:
- Patellar luxation

Tarsal region:
- Valgus/varus deformity due to premature physeal closure

Hindlimb lameness (skel tally mature dogs)

Small breeds
General/multiply:
- Trauma, fracture, luxation, muscle and nerve injuries,
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Hip region:
- DJD (primary/secondary)

Stifle region:
- DJD (primary/secondary)
- CCL rupture
- Patellar luxation
- Long digital extensor rupture

Tarsal region:
- Ligament instability/hipperextension
- Luxation of the tendon os superficial digital flexor muscle
- DJD
- Inflammatory joint disease
Diseases of the pelvis and the sacrum

Sacrum
- Fractures
- Ileosacral separation

Combinated with pelvic fractures, lumbosacral nerve trunk injury

Pelvis
- At least 25% of all fractures in small animals
- Result of major trauma, such as automobile accidents
- Commonly have combinations of 1 or both sacroiliac joints luxated, an associated sacral fracture or fractures
- At least 2 fractures
- Acetabular fractures

History
Because of the major trauma associated with pelvic fractures, other injuries are the rule rather than the exception.
- Thoracic trauma of some sort will occur in 50% of all patients with pelvic fractures
- 39% will have trauma to their urinary tract
- 11% will have peripheral nerve damage.

First aid
Stabilization of the patient may take several days
- Analgesia is a priority!
- Hypovolemia
- Other injuries

Diagnosis
- Can begin at the time of physical examination
- Digital rectal examination
- Neurological examination → deep pain
- X-ray: DV, LL

Spinal injuries!!!!!
Surgical repair

- Acetabular fractures
- Greater than 1/3 narrowing of the pelvic canal diameter by fracture fragments
- Fractures cranially to acetabulum
- Multiple fractures, resulting in an unstable hip joint
- Contralateral orthopedic injuries requiring early weight-bearing on the pelvic fracture side

Fractures of the ilium

Acetabular fractures

Central hip luxation

- Acetabular fractures comprise 12% of pelvic fractures in dogs and 7% in cats
- Main indications for surgical repair
- Significant degenerative joint disease has been noted in acetabular fractures that have been treated conservatively

Surgical treatment

- Femoral head and neck ostectomy
- Surgical repair
Post operative care of pelvic fracture

- Keep the animal comfortable, clean, and in good condition
- Restricting the animal's movements to a confined area for at least the first 2 wk
- Combined with massage and passive range of motion exercises involving the hind limbs
- After 4 wk of severely restricted movement

Diseases of the hip joint

- Luxation (trauma)
- Fractura (central hip luxation)
- Legg-Calve-Perthes-disease
- Hip dysplasia
- Arthritis (acute, chronic)

Hip luxation (trauma)

- all breeds
- high energy trauma (car accid., dogfights, ...)
  other injuries!
- IV.gr. lameness
- physical exam. pain, crepitation, asymmetry
  ![X-ray!](dv.)

Phisical examination

- Cranial dorsal iliac spine
- Ischiatic tuberosity

Conservative treatment

- No fracture
- No hip dysplasia
- Not chronic
- No reluxation

- 95 % cranio-dorsal
- closed reduction (if no addit. disorders, ... dysplasia)
- If the conservative treatment is not possible- surgery if necessary
Surgical therapy

- Extracapsular fixation
- Intracapsular fixation
- Femoral head resection
- THR

Extracapsular fixation

- Greater trochanter ↔ body of ilium
- If the craniodorsal part of the joint is not so traumatized
- 6 metric Vycril

Intracapsular technique

- Teres ligament replacement
- Cave! Sciatic nerve!
Legg-Calvé-Perthes disease
(aseptic/avascular femoral head necrosis)

Aseptic bone necrosis

Unknown etiology- hereditary?

- Synovitis
- Joint effusion
- Cartilage hypertrophy
- Trauma
- Congenital vascular hypertropy
- Coagulation defect
- Steroids

The terminal arteries are closed, the bone resorbs, the cartilage cracks

- Small breeds (espec. toy breeds), 4-11 months of age
- Gradually worsening lameness (IV. gr.)
- 15% bilateral
- Physical exam., X-ray (dv., if negative repeat in 2 weeks)
- No conservative treatment!
- Surgery, good prognosis

Femoral head and neck resection

- Right position
- Trohanter minor/tertius
Rehabilitation: 1-2 months
Hip dysplasia

- Mainly large breed dogs (but!)
- Hereditary (polygenic), congenital problem, environmental factors can worsen the development (fast growth, food, etc.)
- I-II.gr. lameness, gener. on both hindlimbs
- Physical exam., X-ray (vd., event. "frog pos.", Penn-hip)
- (medical), surgery, fair-good progn.

Physical examination

Growing:
- Poorly developed hindlimb muscles
- Pain
- Unstable, subluxated joint (Ortolani sign)

Mature:
- Atrophic muscles
- Pain, crepitation
- Restricted range of motion

Ortolani sign

Essential test to detect hip instability or dislocation
Palpable & audible clunk as hip reduces
Result of functional laxity:
DJD
Diagnosis

- Clinical signs
- Radiology: Standard DV position
- Femurs → side by side
- Patella → in the midst of patellar groove
- Pelvic bone → symmetrical

The severity of the clinical and X-ray signs are not correlated. Only the patients with clear clinical signs should be operated.

Diff. diag. (pl. panostitis, CEC, cranial cruciate lig. rupt., etc.)

Hip dysplasia Conservative therapy

- Pain killers (NSAID)
- Physiotherapy
- Weight control
- Glucosamine

How is hip dysplasia treated surgically?

Surgical therapy → only patients with clinical signs!

- Juvenile Pubic Symphysiodesis
- Triple/double Pelvic Osteotomy (TPO/DPO)
- Total Hip Replacement
- Femoral Head and Neck Excision

Juvenile Pubic Symphysiodesis

- Before age 5 months
- As a preventive procedure
- Subluxation
- NO clinical sign!
Triple pelvic osteotomy/ double pelvic osteotomy

TPO vs. DPO
- Triple pelvic osteotomy
- Double pelvic osteotomy
- (age 6-10 months) dogs with dysplasia but without degenerative arthritis changes.
- Well formed hip joint, but subluxated

THR Total hip replacement

Highly invasive procedure obviously and infection must be avoided

When complications occur they have potential to be disastrous

Cemented replacement implants
Evolution

Cemented

Cementless

Helica

Complications

Complications have about a 10% incidence

Break

Diseases of the stifte joint

• Cruciate ligament rupture (cranial)
• Patellar luxation
• OCD
• Collateral ligament rupture (mainly medial)
• Arthritis/arthrosis (acute, chronic)

Cruciate ligament rupture

• One of the important functions of the ligament is to prevent forward and backward sliding of the femur on the tibia bone (drawer motion).

Partial→Total

• Single traumatic injury
• Predisposing factors:
  • Age-related ligament degeneration
  • Pre-existing inflammation
  • Anatomical abnormalities
  • Increased tibial plateau angle
Cranial cruciate ligament rupture
- Any breeds (rare in cats)
- Mild trauma can be enough (during playing)
- Suddenly severe (III-IV. gr) lameness, which gradually improves
- The stifle painful on extension, “cranial drawer motion”,
- X-ray (tibial plateau, artrosis)
- Surgery, good prog. (if there is no meniscal injury)

- No surgical technique consistently stops the development or progression of DJD!!!!
- Less DJD develops as a result of surgical stabilization than if no surgery is performed!!!
- 85-90% clinical „success rate after surgery, even after dogs have been lame for months!
- Surgery before meniscal injury → less DJD

Treatment
Conservative: (cats sometimes).
- Pain killers (NSAID)
- Physiotherapy
- Weight control
- Glucosamine

Surgical treatment
- Cleaning up
  - Stabilization
  - Extracapsular
  - Intracapsular
  - Bone corrections

Surgical therapy
Correction osteotomies:
- TPLO (Tibial Plateau Leveling Osteotomy)
- TTA (Tibial Tuberosity Advancement)
- TTO (Triple Tibial Osteotomy)
- CWTO (Closed-wedge tibial osteotomy)

Extracapsular techniques:
- TightRope
- Lateral suture

Intracapsular technique:
(humans)

Extracapsular technique
- Lateral suture technique:
  - It’s a relatively quick procedure
  - Results are comparable with other techniques
  - Postoperative strength of the repair is immediate and good
  - Risk to intra articular structures are minimal
Effects of Attachment Sites and Joint Angle at the Time of Lateral Suture Fixation on Tension in the Suture for Stabilization of the Cranial Cruciate Ligament Deficient Stifle in Dogs

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Most isometric point
- Find the most isometric position
- Decrease complication rate
- Decrease costs

Illustrations demonstrating appearance of stifle after TightRope CCL technique

Forces in the knee joint
- There are opposing forces that affect the stability of the knee

TPLO surgery (tibial plateau leveling osteotomy)
- Making a curved cut in the top of the tibia bone (ostectomy) to include the tibial plateau.
- Rotated along the curved osteotomy in order to level the slope
- plate and screws are used to hold the tibial plateau in place
Collateral ligament injuries

- Overstress
- Partial rupture
- Total rupture
- Avulsion fracture
- Luxation of the stifle joint

Medial is more common

Surgical treatment I.

Ligament suture

Avulsion fracture treatment

Overstress

Tibial Tuberosity Advancement (TTA)

TTO Triple tibial osteotomy

TNR Total knee replacement

Avulsion fracture treatment
Surgical treatment II.
- Ligament repair

Luxaton of the knee
- More ligament injured in the same time
- Cats appear to have a higher incidence
- Significant oedema, pain, instability
- (Robert Jones bandage for 2 days before surgery)
- Afretcare: 2 weeks bandage, phisiotherapy
- Transarticular pin 3-3.5-mm for 1 moths
- Tibia area intercondylaris—Femur fossa intercondylaris
- Fixateur externae
- Arthrodesis

Rupture of patellar ligament
- Rare
- „Patella alta”
- Patella rides at the top of the trochlea
- Suture with non absorbable suture material
- Supporting figure-of-8 wire

Patellar fracture
Avulsion of the tibial tuberosity

- Young animals 4-8 m.
- Tuberosity is a separate growing center
- K-wire
- Cerclage wire

Patellar luxation

- **Congenital**
  - typical in small breeds (espec. toy breeds), no history of trauma (cats rare)
  - developmental problem, the m.rectus fem., the patellar groove and the crista tibiae is not laying in a straight line
  - 95% medial, often bilateral
  - not always causing clinical signs, the signs are typical: intermittent lameness

- **Traumatic**
  - Any breed and age
  - cause: trauma
  - gen. the stabilising structures (joint capsule) of the patella may be ruptured
  - III.-IV. gr. lameness, swollen, painfull stifle joint
  - physical exam. diagn., X-ray?? (dv.-hip)
  - surgery, good progn.

Congenital patellar luxation is commonly associated with other disorders

- Cranial cruciate deficiency
- Hip dysplasia
- Abnormal conformation (angulation) of the upper (proximal) portion of the tibia
- Abnormal conformation (angulation and torsion) of the femur, either congenital or subsequent to a fracture
- Tightness of the quadriceps muscle
- Elongated patellar ligament

Examination

Anatomical axis
Medial-lateral

Grade I-IV

Grade I. Conservative treatment
Grade II. Conservative/surgical treatment
Grade III. Surgical treatment
Grade IV. Surgical treatment

Usually small breeds
Mostly large breeds

Surgical therapy

- Reconstruction of soft tissues surrounding the knee cap to loosen the side toward which the patella is riding and tighten the opposite side.
- Deepening of the femoral groove so that the knee cap can seat deeply in its normal position
- Transposing the tibial crest
- (Correction of abnormally shaped femurs)

Deepening of the femoral groove
**Transposing the tibial crest**

**Large breeds**

**OCD of the stifle**
- Large breed, growing dogs (5-8 months)
- Gradually worsening, I.-III. gr. lameness, (temporarily effective medical therapy)
- Painful hyperextension of the stifle
- X-ray (2x),
- Typical locus.: lat. femoral condyle (5-10 mm diam., deep defect)
- Surgery, fair-good prognosis, if no severe arthrosis or too deep defect present.

**Osteochondritis dissecans**

**Disease of the hockjoint**

**Sever’s-disease Calcaneal Apophysitis**
- 5-8m. dobberman and rottweiler
- Achilles tendon attaches to the heel becomes inflamed and the bone starts to crumble
- No trauma
- Unknown etiology (fast grow, too much weight bearing?)
- Mild pain
- Physical examination
- Surgery, prognosis?
Achilles tendon rupture

- any breed
- high energy trauma or something sharp
- pain is mild or absent, bunny like gait
- physical exam, (X-ray)
- the tendon or the tendon-muscle junction injured
- surgery, good progn.

Partial/total rupture

**Partial/total rupture**

- Normal
- Gastroc tear only
- All tendons torn
Diseases of the tarsal joint
- tarso-crural luxation
- intertarsal and tarso-metatarsal instabilities
- shearing injury
- arthritis (acute, chronic)
- OCD
- Achilles tendon rupture

Tarso-crural luxation
- any breed (common at cats)
- high energy trauma
- IV.gr lameness
- physical exam., X-ray (2x; often assoc. with fracture)
- may happen in any direction
- surgery, good progn.

Hock luxation
- Every breeds, ages
- Major trauma (car accident, biting, falling down)
- IV. grade lamness
- Physical examination (X-ray)
- Combinated with fractures
- syugery

Intertarsal or tarso-metatarsal instability
- any breed
- typical „fence“ injury
- III-IV.gr lameness
- physical exam., X-ray (2x, stress view; gener. hyperextension)
- may hapen in any direction
- surgery, good progn.
Shearing-injury

- any breed
- car accident (**the limb got under the tires**)
- IV.gr lameness
- physical exam., X-ray (**2x**)
- most often medial; severe, deep soft tissue and bone injury, contaminated wound

⇒ intensive wound management
- surgery, prog. varies

Last finger/nail

- Chronic inflammation
- Squamous cell carcinoma,
- Melanoma,
- Osteosarcoma,
- Hemangiopericytoma,
- benign soft tissue tumors,
- malign soft tissue tumors.
Acropachia

- Tarsal/carpal bones
- Mostly bilateral
- Reason?
- Tumor/abscess
- Abdominal-thoracic

Thank you for your attention!