Orthopedics in field conditions
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What can be done?
• Cast for MTC, MTT fractures
• Joint lavage and arthrotomy for septic arthritis
• Joint resection/digit amputation and other foot surgeries
• Tenotomy for flexural deformities

Fracture in field situation?
• 'Easy' to reduce and immobilize
  — Distal phalanx, MTC or MTT in young animals
  — Non displaced humeral fracture (stall rest)
• Possible but challenging
  — MTC & MTT in mature animals
  — Radius and tibial fracture with Thomas splint
• Hospitalization
  — Femoral fracture, ALD, open fracture

Can be done but more difficult
• Pin cast for long bone fractures
• Thomas splinting for radial and tibial fractures
• Distal limb amputation
• Mandibular fracture in calves
• Sequestrum resection
• Dorsal coxofemoral luxation reduction

Myopathy and fracture
Difficult reduction needs appropriate sedation
Basic sedation and analgesia/anesthesia

- Sedation: xylazine + ketamine
- Lidocaine
  - "ring block"
  - IV under tourniquet
- Brachial block
- Epidural anesthesia

Ket stun

x xylazine + \(\frac{1}{2}\) butorphanol + 2X ketamine

- Mix in the same syringe
- IM, SC, IV
- 30-40 minutes
- Sedation and analgesia according to your need
- Based on the dose of xylazine you would give:
  - E.g. standing surgery:
    - 20mg xylazine + 10mg butorphanol + 40 mg ketamine

Epidural anesthesia

- Paralyse and analgesia
  - New bottle of 2% lidocaine
  - 0,15 ml/kg of lidocaine for Hind limb anesthesia
  - Coccygeal injection (surgical prep)
- Analgesia alone (15 min before procedure)
  - 0,05 mg/kg xylazine in 5-15 ml of sterile saline
  - 0,1 mg/kg of morphine

IV anesthesia

- Triple drip
  - Guiafanesin 5% 2ml/kg
    - (Glyceryl guaiacolate= GG or G-colate)
  - Ketamine 2.2 mg/kg
  - Xylazine 0.05 mg/kg
- To effect
  - Bolus follow by slow drip
- DO NOT administer more than 2ml/kg of GG

Brachial block

Ultrasound guided brachial block

Ring block

IV block under tourniquet

Fibreglass cast

- General principles
  - Protection at the pressure point
  - Digits must be included in the cast
  - Adjacent joints should be immobilized
  - Balance between lightness and stiffness

Fibreglass cast

- General principles
  - 50% overlapping between bands
  - Fiberglass is resistant in tension therefore it will fail at compression point
    - Splint can be applied at strategic point to avoid cast failure
      - Splint: aluminum bar, folded layers of cast material
      - Caudal aspect of the carpus
      - Cranial aspect of the tarsus
### Full limb cast

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Number of rolls</th>
<th>width</th>
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<tbody>
<tr>
<td>&lt; 70</td>
<td>3-4</td>
<td>3-4 in</td>
</tr>
<tr>
<td>70-225</td>
<td>6-7</td>
<td>4-5</td>
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<tr>
<td>225-460</td>
<td>8-9</td>
<td>4-5</td>
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<tr>
<td>460-675</td>
<td>10-11</td>
<td>5</td>
</tr>
<tr>
<td>&gt;675</td>
<td>12-16</td>
<td>5</td>
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</table>
2 layers of stockinette
MTC and MTT fractures

MTC physeal fracture
Fracture in Canada at -20C

Dystocia injuries

- Metacarpal bones
- Inadequate positioning of the chains or ropes
- Swelling of the distal limb
- Non weight bearing
- Complete physical exam for other trauma (ribs, mtc, femur, humerus, vertebrae)

2 weeks post casting
Obstetrical fracture

Courtesy of Dr David Anderson
Conclusion

- MTC & MTT are easily treated with a full limb cast
- Distal physeal fracture is the most common fracture configuration
- Prognosis for obstetrical MTC fractures is 60-70%
- Distal limb amputation should be considered in beef calves.

Diagnostic of septic arthritis

- Complete physical examination
- Calf = look for a primary site of infection until proven otherwise
  - Navel
  - Lungs
  - Diarrhea
- From the digits to proximal

Classification of septic arthritis in Cattle

- Primary
  - Direct trauma to the joint (laceration, foreign bodies)
- Secondary
  - Infection adjacent to a joint
- Tertiary
  - Systemic infection (pneumonia, diarrhea, omphalitis, endocarditis)

Non union after 3 weeks of immobilization

Amputation to salvage a calf
Synovial fluid analysis

<table>
<thead>
<tr>
<th></th>
<th>Nucleated cells (G/μl)</th>
<th>Proteins g/l</th>
<th>Neutro</th>
<th>Mono</th>
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</thead>
<tbody>
<tr>
<td>Non infectious arthritis</td>
<td>900 (34-97000)</td>
<td>30 (0.3-6.1)</td>
<td>6 (8-99)</td>
<td>77 (2-98)</td>
</tr>
<tr>
<td>Infectious arthritis</td>
<td>63000 (1250-385000)</td>
<td>56 (0.2-9.0)</td>
<td>94 (1-80)</td>
<td>5 (0.5-57)</td>
</tr>
</tbody>
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Rohde et al Vet Surg 2000

Conclusion:
Septic arthritis = NCC>25000, PMN>80%, TP>45

Alternative Administration route

• IV under tourniquet
  — High local concentration of ATB
  — ↓ treatment cost
  — 1/3 of systemic dose
  — Difficult to keep a catheter
  — Limited to distal limb

Treatment plan

• Duration of clinical signs
• Severity of the lesions
  — Number of joints involved
    • >2 = poor prognosis
  — Clinical exam
  — Radiographs (not a good prognosis indicator)
• Cost of treatment
• Prognosis
  — Return to previous production

Example

• Young calf with history of pneumonia
  — tetracyline, spectinomycin, Micotil, Draxin.
• Young calf with history of navel infection or sepsis
  — Ceftiofur (2mg/kg bid), ampicillin
• Adult with type 1 septic arthritis (laceration)
  — Pen G, ceftiofur, TMS, ampicillin Na
• Chronic fibrinous arthritis
  — Pen G, Euthanasia

Alternative Administration route

• Intraarticular antibiotics
  — Easy to use
  — High concentration of antibiotics for 24 hrs
  — Synovitis with certain antibiotics
  — Injection at the end of articular lavage
  — 1/3 of the systemic dose
Techniques for joint lavage

- Sedation and restrain (xylazine or Ket stunt)
- Preop NSAIDs
- Surgical preparation of the site (hair removal and scrubbing)
- Joint tap. Sample submitted for analysis (cytology and bacteriology).
- Needle size (16 to 14 G) or 4-5 mm trocar-cannula unit
- Joint distension with fluids
- Insertion of a second needle
- Lavage until the fluid is clear without fibrine (500 to 2000 ml)

Joints communication

- Carpus
  - Middle and carpometacarpal joints always communicate
  - Radiocarpal joint communicates with middle carpal in 13%
- Stifle
  - MFT and FP always communicate
  - LFT communicate with FP in 40%
- Tarsus:
  - Tibiotarsal and prox intertarsal always communicate
- Fetlock
  - Medial and lateral pouches always communicate
Joint lavage

- Repeated once a day for 2 days
  - If fibrin present after the second lavage
    - Third lavage
    - Arthrotomy
  - Joint lavage is cancelled if:
    - Clinical improvement
    - ↓ WBC in synovial fluids

Arthrotomy

- Indications
  - Failure of the medical treatment (ATB and lavage)
  - Large amount of fibrin plugging up the needles
  - Thick pus in the joint
Technique for Arthrotomy

- Sedation and restrain
  - Hind limb affected: epidural possible
  - Forelimb: Plexus brachial block
- Standard surgical preparation
- 3 cm skin incision at the usual joint tap locations.
  At least 2 incisions are required
- Joint distension with fluids
- Debridement of the joint
  - Fibrin removal without damaging the cartilage
Postop care of arthrotomies

- Rapid improvement of clinical signs because of joint decompression
- Keep a bandage for a few days until the skin incisions are well closed (3 to 5 days)
- Lavage is repeated as needed

Arthrodesis

- Surgical fusion of a joint by cartilage resection and immobilization of the joint with a cast or implants
- Last resort
- Biomechanical consequences on the gait especially if arthrodesis is performed on a joint proximal to the fetlock
  - Carpus
  - Tarsus
Septic arthritis of the DIJ

X-rays
In field situation
Postoperative treatments

- Incisions left opened
- Antibiotics
  - I.M Pen G, I.V. Ampicillin
  - 7-14 days
  - Intravenous antibiotics under tourniquet
- NSAIDs
  - 2 to 3 days,
- Bandage
  - Changed 24 hours post-op
  - Kept and changed as needed
- Joint flushed as needed
  - Diluted iodine solution
Septic arthritis P1-P2

Pedal osteitis

• Kofler 1999
  – 53 animals (78 digits)
  – Cause
    • Inadequate trimming (buffer) (49%)
    • Laminitis (30.2%)
    • Trauma (11.3%)

Conclusion

• Complete physical examination
• Joint lavage important part of the treatment
• Antibiotics locally and 2-3 weeks syst. If possible
• Arthrotomy if thick pus or fibrin plugging the needle
• Arthrodesis: foot and carpus.

Pedal osteitis

• Causes
  – Penetrating wound
  – Severe abrasion of the sole (apical)
  – Excessive trimming (buffer)
  – Laminitis
  – Adjacent infection

Pedal osteitis

• Treatment
  – Débridement, curetage
  – Wooden block on sound digit
  – Antibiotics
  – Antibiotics IV under tourniquet
• Prognosis
  – Good
  • 20/23 success (Kofler 1990)
Pedal osteitis

Conclusion

• Pedal osteitis is treated with partial distal phalanges amputation
• Evaluate the DJ for septic arthritis before selecting a surgical approach
• Up to 2/3 of the phalanx can be removed and still have a functional claw

Thank you
Questions?