Magnetic Resonance Imaging of Equine Tarsal Disorders

– 34 Clinical Cases –

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Introduction

• **Equine tarsal diseases are common**
  – Complex anatomy – bone and soft tissue pathology
  – Many ligamentous structures ....

• **Diagnostic modalities**
  – Intraarticular anesthesia
  – Radiography¹, Sonography¹, Szintigraphy¹, CT²
  – Explorative arthro-/teno-/bursoscopy/¹
Introduction – Clinical presentation
Introduction – Diagnostic challenges

• Problem
  – Frequently localized/confirmed by clinical examination +/- intra-articular anesthesia\(^1\)
  – But negative on traditional imaging techniques

• Current solution
  – Arthrosopic exploration as „Gold Standard“

Tarsus – Diagnostic challenges

• Problem
  – ... A-Copy is fruitless ... – so what next?
  – No diagnosis – No treatment – What prognosis?

• Solution – Better imaging modality pre-OP
  – Human medicine = MRI routinely performed
  – Equine surgery = mainly arthroscopy

  – Equine Hospital Aschheim = MRI routinely performed

Purpose

• Describe a routine MRI-scanning technique for equine tarsi

• Report typical findings of horses that underwent MRI-Scanning

• Compare MRI-Findings to traditional imaging techniques and clinical exams retrospectively
Hypotheses – Tarsus MRI

• Can be routinely & savely performed on all horses independent on breed, age and gender
• Portrays all soft tissue & bone structures completely/simultaneously
• Can delineate abnormal/diseased structures thoroughly
• Can assist in managing tarsal lameness & in pre-OP planning
Materials and Methods

• Medical records – inclusion criteria
  – Lameness was localized to the tarsus
  – Negative/inconclusive on rads, sono, szinti, CT and/or A-Copy
  – Tarsus MRI performed

• Parameters
  – Age, breed, gender
  – Clinical findings → limb effected, degree/duration of lameness
  – Total anaesthesia time and MRI-findings
Materials and Methods

Custom-built table and rotating MRI-Scanner
Materials and Methods

General anesthesia, lateral recumbency, flexible extremity coil
Materials and Methods

• MRI – Sequences „Equine Hospital Aschheim“
  – T1 (1mm) = Cartilage, subchondral bone
  – T2 (4mm) = Ligaments, tendons
  – PD (4mm) = Ligaments, tendons, cartilage
  – SHARC (1,3mm) = Cartilage
  – STIR (4mm) = Bone
  – X-Bone (4mm) = Subchondral bone

• 3 planes
  – Frontal, sagittal und axial; T1 / SHARC 3D-Reconstruction
Materials and Methods

• **MRI-Scans were**
  - Reviewed by Diplomate ACVR and/or
  - Diplomate ACVS

• **Post-MRI arthroscopies were performed**
  - If lesions were deemed accessible based on MRI
  - In a separate anesthetic episode
Materials and Methods

• **Post-MRI re-evaluation of rads, szinti and/or CT**
  – Bone pathology identifiable retrospectively?
  – Concurrent pathology?

• **Post-MRI re-evaluation of sono, and/or A-Copy**
  – Was soft tissue pathology identifiable retrospectively?
  – Concurrent pathology?
Results

- **Number of horses**
  - 34 horses met inclusion criteria
  - All MRI-scans were completed successfully (100%)
  - Total anesthesia time 92min

- **Age, breed, gender**
  - 10,7 years (3-28)
  - WB=13, Hafl=3, STB=3, QH=2, PRE=1, Pony=1, Trakehn=1
  - 12 mares, 9 geldings, 3 stallions (50% : 50%)
Results

• Clinical findings
  – Duration of lameness = 26 weeks (1-104)
  – R Tarsus=13; L Tarsus=11 (54% : 46%)
  – Degree of lameness = Grad 2,8/5 (1-5)
  – Positive flexion test = 65%
  – Positive i.a. anesthesia = 40%

• MRI-scans
  – All successfully and savely completed
  – Bone and soft tissue pathology throughly portrayed
Results – Pathology

• Typical lesions

– Bone edema, bone cysts
– Physitis, fissures
– Chondropathy/osteoarthritis
– Synovitis/arthritis/tenovaginitis with adhesions
– Tendinitis, collateral ligament desmitis
– Foreign body and fistula
Results – Normal anatomy

T1 - Dorsal

PD - Axial

T1 - Sagittal
Results – Bone edema
Results – *Tibia cysts*
Results – *Calcaneus/Talus cysts*
Results – *Fissures and physitis*
Results – *Cartilage defects*

Dorsal

Dorsal
Results – Synovitis, arthritis, adhesions
Results – *Tendovaginitis*
Results – **DDF-Tendinitis/-tears**

- **Dorsal**
- **Axial**
- **Sagittal**
Results – *Collateral ligament desmitis*
Results – *Coll. Desmitis & Bone edema*

Dorsal  Axial  Sagittal
Results – *Foreign body and fistula*
Results – **MRI vs. Rads and Sono**

- **Retrospective re-evaluation of pre-MRI rads**
  - Failed to identify bone lesions in 43%

- **Retrospective re-evaluation of pre-MRI sono**
  - Failed to identify soft tissue lesions in 20%
  - 85% failure for concurrent, multiple pathology
Results – *Post-MRI A-Copies*

- **Post-MRI A-Copies**
  - Performed in 8 cases (23.5%)

- **Technique**
  - All superficial MRI-lesions were confirmed
  - But extent of desmo-, tendo- & chondropathies was underestimated
  - However, useful to explore & treat superficial pathology
Discussion – *MRI-Technique*

- **In contrast to previous reports**
  - Straight forward and save protocol
  - Can be routinely performed on all horses independent on age, breed and gender

- **Soft tissue and bone structures**
  - *Complete tarsus was scanned*
  - Bone and soft tissue thoroughly portrayed
Discussion – *Pathology*

- **Wide variety of lesions**
  - Bone = intraosseous
    - Bone edema >>> Cysts + edema (+/- joint communication)
    - Physitis, fissures
  - Soft tisse = multiple lesions
    - Frequently secondary and chronic
    - Synovitis/Tendinitis/Tenovaginitis and adhesions – chronic
    - Chondropathies – chronic
    - Collateral ligament desmitis = acute and/or chronic
Discussion – *Bone pathology*

- **Bone edema**
  - Observed in acute *and* chronic cases
  - Mostly trauma-related

- **Cysts**
  - Presence + extension underestimated on radiographs
  - Joint communication easily confirmed on MRI
  - Frequently encircled by bone edema
  - *Bone health and structure underestimated* ...?
Discussion – *Soft tissue pathology*

- **Tendon and ligaments**
  - Frequently multiple + extra-synovial lesions
  - *Intralesional pathology associated with adhesions*

- **Consequences?**
  - Diagnostic anesthesia = negative ...
  - Sonographie failed in 20%
  - Soft tissue edges „retract“ after injury ...
  - Open wounds, contour of the hock, gas ...
Discussion – *Multiple pathology*

- **Bone + soft tissue pathology = simultaneously**
  - Common and frequently trauma-related, e.g. bone edema and adhesions
  - Require different/several Tx/management ...

- **Several lesions only detected on MRI ...**
  - *May explain long duration of lameness & frustrating therapy success ...*
  - *Important for rehabilitation and prognosis*
Discussion – MRI and clinics ...

• Duration = 6 months
  – Quite long symptoms
  – Other diagnostics less specific ...?

• Flexion test = 60% positive
  – Low sensitivity ... ?
  – Indication for multiple + extra-articular lesions ... ?

• Intra-articular anesthesia = 37% positiv ...
  – 100% cases of tarsitis
  – Extra-articular lesions ... ? Tib. Fib. anesthesia better ...?
Discussion – *MRI vs. Rads and Sono*

**Radiographs**
- (+) Fast screening tool
- (-) Only 57% sensitivity for bone pathology
  - Bone edema, cysts and fissures etc. .. ?

**Sonography**
- (+) 80% of soft tissue lesions confirmed
- (-) Only 15% sensitivity for concurrent pathology
- Uneven contour of tarsal region ...?
Discussion – MRI vs. A-Copy

• MRI – Technique (+)
  – Non-invasive – more global view
  – Identifies pathology more clearly as compared to traditional techniques = more prognostic value
  – May prevent unnecessary Sx for inaccessible lesions

• Tarsus Arthroscopy (+)
  – Great for superficial lesions and probing
  – Important for intervention = therapeutic value
  – May remain „Gold Standard“ for most hospitals
Conclusion – *Tarsus MRI*

- Can be routinely and safely performed on all horses independent on breed, age and gender
- Portrays all abnormal/diseased soft tissue and bone structures completely
- Appears advantageous identifying singular or concurrent pathology
- Can assist in managing tarsal lameness and in pre-OP planning
Conclusion – *Tarsus MRI*

- **Is indicated if:**
  - Inconclusive and long-lasting tarsal lameness
  - Negative on traditional diagnostics

- **MRI and Tx ...?**
  - „New findings“, e.g. painful bone edema, expansile cysts
  - Multiple lesions require multiple Tx-strategies
  - Prognostic value
Any Questions and/or Suggestions?