Reading and understanding MRI

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This workshop will cover basic MRI anatomy of the musculoskeletal system followed by examples of common sports related injuries.
Musculoskeletal MRI
Knee MRI

- Knee pain of undetermined etiology
- Suspected internal derangement
- Meniscal tear, discoid meniscus
- Bone contusion, occult fracture
- Cruciate and collateral ligament injury
- Chondromalacia, patellar tracking disorder
- Popliteal cyst, mass
- Post-op
- Bursitis
MENISCAL TEAR
Bone Infarct
Stress fracture
Shoulder MRI

- Shoulder pain of undetermined etiology
- Rotator cuff tendinosis, tear
- Labral tear, instability
- Biceps tendon tear, slap lesion
- Nerve impingement
- Bursitis
- Fracture
- Impingement syndrome
Rotator Cuff Tear
Hip MRI

- AVN
- CDH
- Transient osteoporosis
- Occult fracture
- Stress fracture
- Transient osteoporosis
- Infection
- bursitis
Regional Migratory Osteoporosis
Avascular Necrosis
Foot and ankle MRI

• Ankle and foot pain of undetermined etiology
• Tendon and ligament injuries
• Sinus tarsi syndrome
• Tarsal tunnel syndrome
• Plantar fasciitis
• Neuroma
• Diabetic foot
• Infection
• Foreign body
Achilles tendon tear

[Images of MRI scans showing an Achilles tendon tear]
Osteomyelitis
Stress fracture
TMJ MRI

- Internal derangement
- Closed lock
- Clicking
Left closed lock

Right reduced
ACUTE LOW BACK PAIN
ACUTE LOW BACK PAIN

• DURATION LESS THAN 3 MONTHS
• MOST COMMON CAUSE OF DISABILITY FOR PERSONS UNDER AGE 45
• UNCOMPLICATED ACUTE LOW BACK PAIN IS A BENIGN, SELF-LIMITED CONDITION WHICH DOES NOT WARRANT ANY IMAGING STUDIES (ACR APPROPRIATENESS CRITERIA 2000)
LOW BACK PAIN CHALLENGE

- DISTINGUISH SMALL SEGMENT WITHIN LARGE POPULATION WHICH SHOULD BE EVALUATED FURTHER
- Relationship between degenerative disc disease and low back pain not firmly established
- Presence of disc abnormalities in asymptomatic population well known
• 1956: McRae performed post mortem studies on entire spine in pts presumed free of symptoms. 40% had HNP at autopsy.
• In asymptomatic pts, 24% of myelograms and 36% of CT scans show disc extension beyond interspace
• Jensen: 52% asymptomatic pts have disc bulge, 27% have protrusion
LOW BACK PAIN
RED FLAGS

• RECENT SIGNIFICANT TRAUMA, OR MILD TRAUMA > AGE 50
• UNEXPLAINED WEIGHT LOSS
• UNEXPLAINED FEVER
• IMMUNOSUPPRESSION
• HISTORY OF CANCER
• IV DRUG USE
• PROLONGED USE OF STEROIDS, OSTEOPOROSIS
• AGE>70
X-RAYS

• RECOMMENDED WHEN ANY RED FLAG PRESENT
• LS X-RAY MAY BE SUFFICIENT FOR
  – TRAUMA
  – PROLONGED STEROID USE
  – OSTEOPOROSIS
  – AGE>70
• FURTHER IMAGING NEEDED IF SUSPECT CANCER OR INFECTION
BONE SCAN

• LIMITED ROLE IN ACUTE LOW BACK PAIN
• YIELD VERY LOW IN PRESENCE OF NORMAL X-RAY
• HIGHEST YIELD IN PTS WITH KNOWN MALIGNANCY
• CONTRAINDICATED IN PREGNANCY
CT, MRI, MYELOGRAPHY, CT MYELOGRAPHY

- NO ROLE FOR ANY OF THESE STUDIES IN UNCOMPLICATED ACUTE LOW BACK PAIN
- RESERVE STUDIES FOR RED FLAGS SUCH AS TUMOR, INFECTION
- MRI FOR RADICULOPATHY, CAUDA EQUINA SYNDROME (BILATERAL LEG WEAKNESS, URINARY RETENTION, SADDLE ANESTHESIA)
  - USUALLY DUE TO HERNIATED DISC OR CANAL STENOSIS
Extruded HNP at 0.3T
1:10,000 pts with LBP and radiculopathy will have a conus tumor
Non-discogenic causes of back pain
Metastatic disease
Infection
Diskitis and Osteomyelitis

- Pyogenic disc space infection usually result of blood borne agent, lung or urinary tract
- begins in end plate
- organisms: staph>>strep, Ecoli,
- MRI; T1 dark, T2 bright (involved disk brightest), disc space, disc, and paravertebral tissues if involved will enhance
CONGENITAL
Lipoma and tethered cord
Chronic neck pain: imaging recommendations

• AP, LATERAL OPEN MOUTH X-RAY
• IF NORMAL AND NO NEURO SIGNS OR SXS, NO FURTHER IMAGING
• IF NORMAL AND HAVE NEURO SIGNS OR SXS, PERFORM MR
• IF X-RAY POSITIVE FOR SPONDYLOSIS, NO NEURO SIGNS OR SXS, NO FURTHER IMAGING
• IF X-RAY POSITIVE FOR SPONDYLOSIS, POSITIVE NEURO SIGNS AND SXS, PERFORM MR
• IF X-RAY SHOWS BONE OR DISC MARGIN DESTRUCTION, PERFORM MR
Cervical: Herniation, Syrinx C6-7

TR 4500, TE 138, 4mm, 256²
7 ½ min

TR 6850, TE 134, 4mm, 256
7 min.

Courtesy Longmont United Hospital
Pre-op 1.5T

Compressive myelomalacia
Metastatic breast carcinoma
Questions?