Advanced Cross-Sectional Imaging of Spinal Injuries

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Spinal Injury Imaging Choices

• Plain Films
• MRI
  – With or without contrast
  - Closed MRI, Open MRI, Open Upright MRI
• CT
  – without contrast
Plain Films

• Lumbar radiographs sufficient for the INITIAL evaluation of the following:
  – Recent significant trauma (at any age)
  – Osteoporosis
  – Age >70
Fall with Fracture/Subluxation
Plain Films

Advantages
• Fast Study (2-3 seconds)
• Quick Survey (Order 2-View)
• Inexpensive
• No contraindications
• Limited Radiation Dose

Disadvantages
• Only evaluates bones
• May not detect subtle fractures
• Small amount of radiation
MRI

- Invented in 1971, but took many years before it became clinically viable
- Images obtained within a strong magnetic field using the properties of hydrogen within tissue
MRI – Closed Bore
MRI – Open Bore
MRI – Indications in complicated Back Pain

• Order without contrast:
  – High suspicion for compression fracture
  – Radiculopathy, nerve, or spinal cord compression
  – Cauda Equina Syndrome

• Order WITH and without contrast:
  – History of Cancer, infection, or immunosuppresion
  – Prior Lumbar Surgery

• Gadolinium FDA warning (GFR<30)
MRI – Contraindications

• Pacemaker/Defibrillator
• Certain aneurysm clips, neural stimulator devices
• Metallic Foreign Bodies in orbits
• Infusion/Insulin Pumps
• 1st Trimester Pregnancy
• Severe claustrophobia
• Morbid obesity

• Call to speak with our Chief MR Tech or one of the Neuroradiologists with questions about patient safety
Fall with Fracture/Subluxation
Weightlifting injury with Pedicle Fracture Not Visible on Plain Film
Recent Fall, Back pain
Recent Fall, Back pain
Recent Fall, Back pain
Pt. with lifting injury at work with lumbar radiculopathy
Previous Lumbar Surgery in recent MVA, now with recurrent pain
• Hx of MVA 3 years earlier
• Persistent neck pain, and upper extremity numbness/tingling
• Comparison plain films from that date demonstrated instability at C5-6
• Open Upright MRI requested with flexion/extension views
54 y.o. female w/ neck & back pain & HA post-MVA
Pt. With fall, back pain and numbness, unable to lay flat due to kyphosis
MRI

Advantages

• No Radiation
• Excellent Soft Tissue, Spinal Canal and Cord Detail
• Sensitive for Edema
• Detects other lesions – cysts, tumors, etc.
• Can use non-iodinated contrast – diskitis
• Vertebroplasty Planning

Disadvantages

• Length of scan - 30-45 minutes
• Claustrophobia
• Weight limit
• Painful position - must lay flat and still for a prolonged time.
• Last 3 disadvantages reduced with open MRI and Open Upright MRI
CT

• Computed Tomography:
  – Large series of two-dimensional x-ray images taken around a single axis of rotation

• No IV contrast needed for spine studies

• Best Indications:
  – Patients unable to have MRI
  – Quick Evaluation of Acute Trauma (ER)
  – Evaluate Fusion Bone post surgery

• Contraindications
  – Pregnancy
CT
Pt. with acute back pain post trauma, with pacemaker
Ankylosing Spondylitis with acute injury and pain
Advantages
• Fast (30 sec.)
• Reconstructions- Sag./Cor.
• Excellent Bone Detail
• Surgical Planning
• Larger bore size than MRI
• No Contraindications for Metal Device (Pacers, etc)

Disadvantages
• Radiation Dose (10 mSv)
• Weight limits
• Disk and Soft Tissue Detail less than MRI
• Cannot evaluate Cord
Questions/Comments?

• Made CT and MR schedules accommodating to allow many add-ons during the day

• For questions:
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