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CT Arthrography and  
Postoperative Musculoskeletal  
Imaging with Current  
Multichannel Computed  
Tomography Systems

# OUTLINE

- Technical aspects
- MCCT arthrography
- MCCT postoperative imaging
- Conclusion

# Features of MCCT that enhance musculoskeletal CT imaging

- Pitch  $< 1$
- Thin, submillimeter overlapping slices
- Fast

As a result of these features  
MCCT scanners can

- Generate essentially isotropic data sets (volumetric) for exquisite MPR images
- Generate high mAs

# MCCT Arthrography

- Knee
- Shoulder
- Wrist
- Hip

# Indications for Knee MCCT Arthrography

- Post operative meniscal evaluation
- Presence of metal
- Contraindication to MRI

Lawrence M. White, et. al.

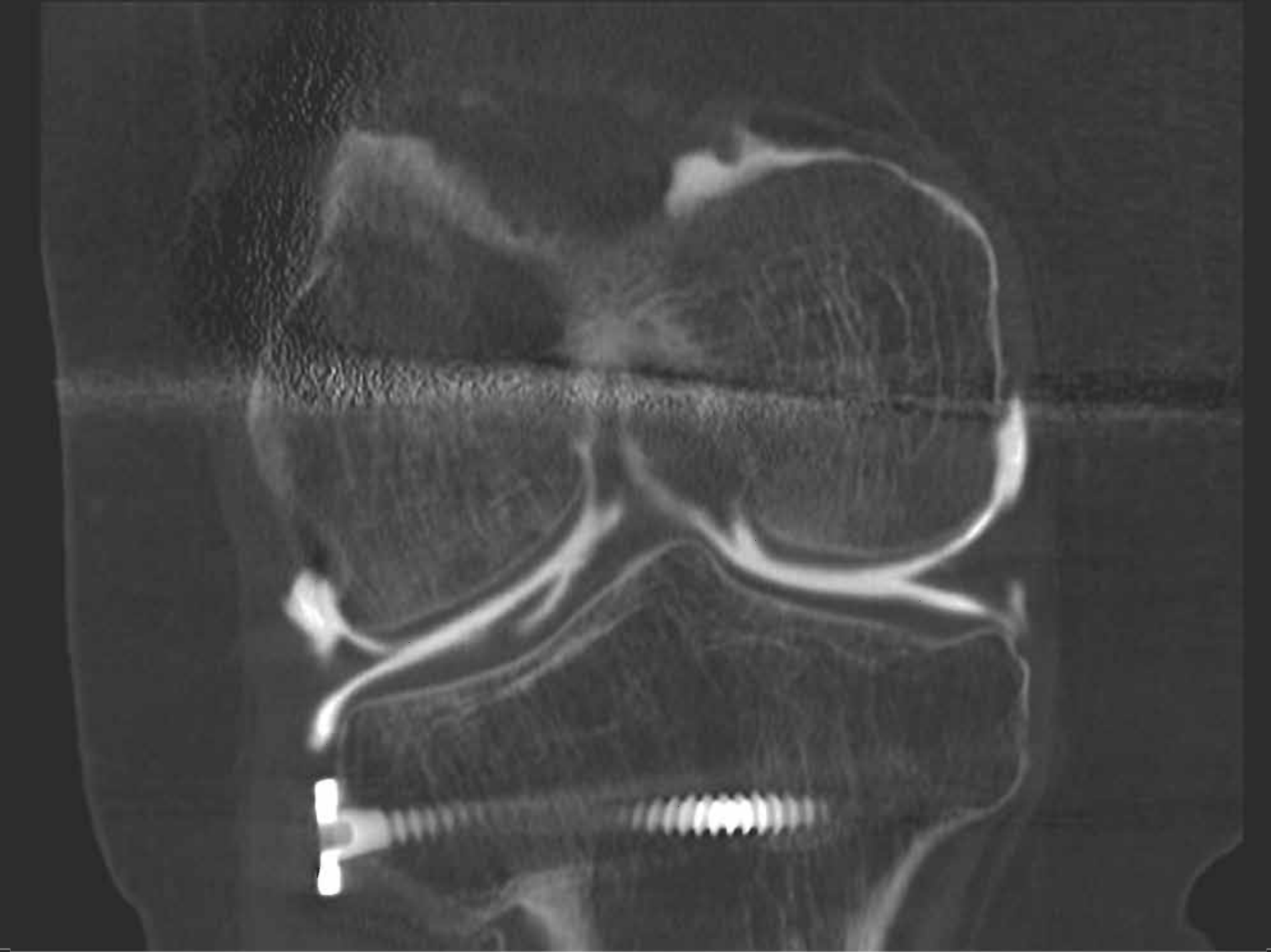
|                          | <u>Negative<br/>Predictive Value</u> | <u>Sensitivity</u> |
|--------------------------|--------------------------------------|--------------------|
| Conventional MR          | 71%                                  | 86%                |
| Indirect MR arthrography | 64%                                  | 83%                |
| Direct MR arthrography   | 78%                                  | 90%                |

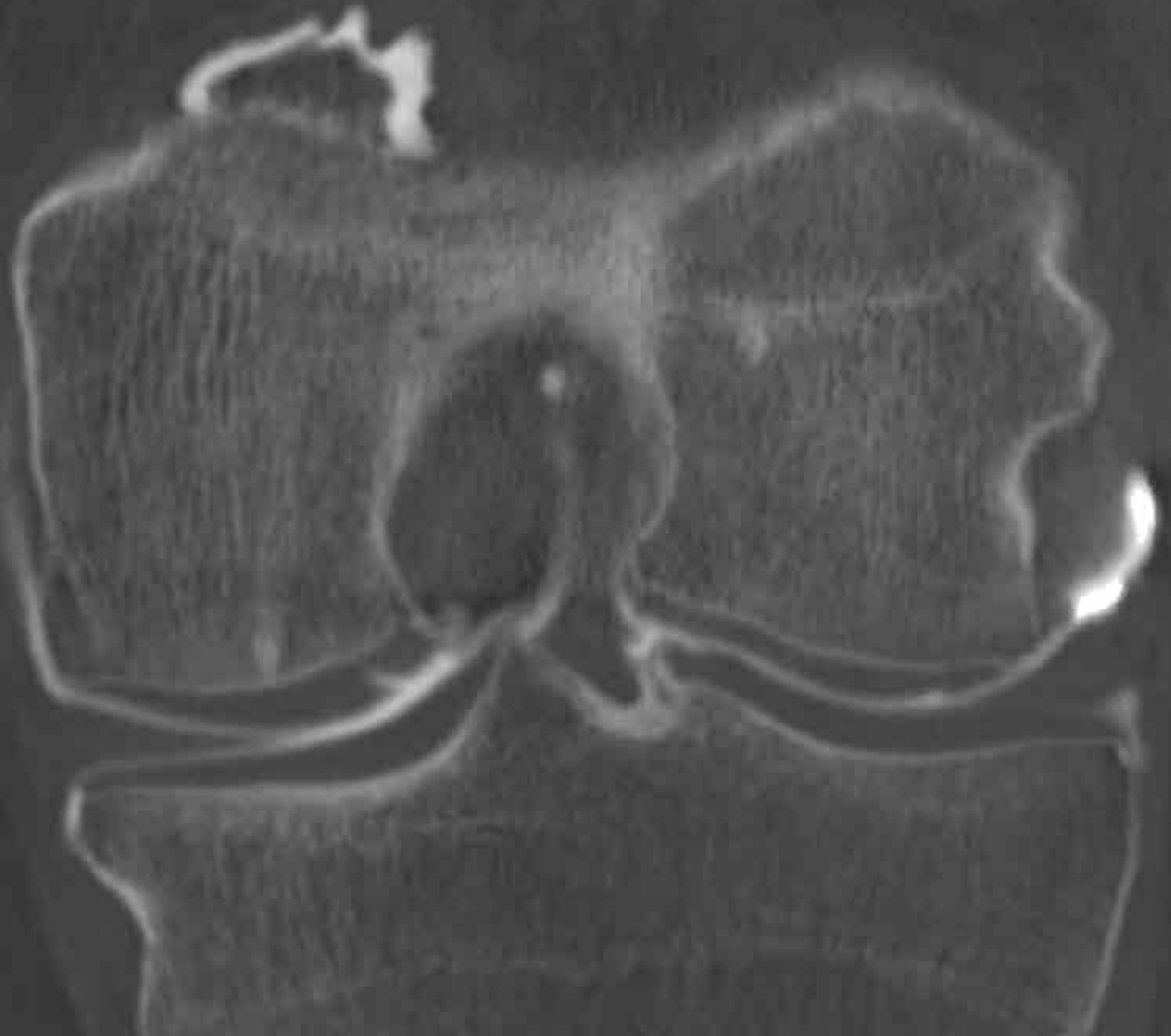
White LM, Schweitzer ME, et al. Diagnosis of Recurrent Meniscal Tears: Prospective Evaluation of Conventional MR Imaging, Indirect MR Arthrography, and Direct MR Arthrography. Radiology 2002;222:421-429.



# MCCT Arthrography of the Knee

- 0.6 mm slices at 0.2 mm intervals
- Pitch < 1
- 140 kVp
- Small focal spot
- Detail filter
- 2.5 – 3.0 mm MPR's
- 20 – 35 cc of full strength iodinated contrast





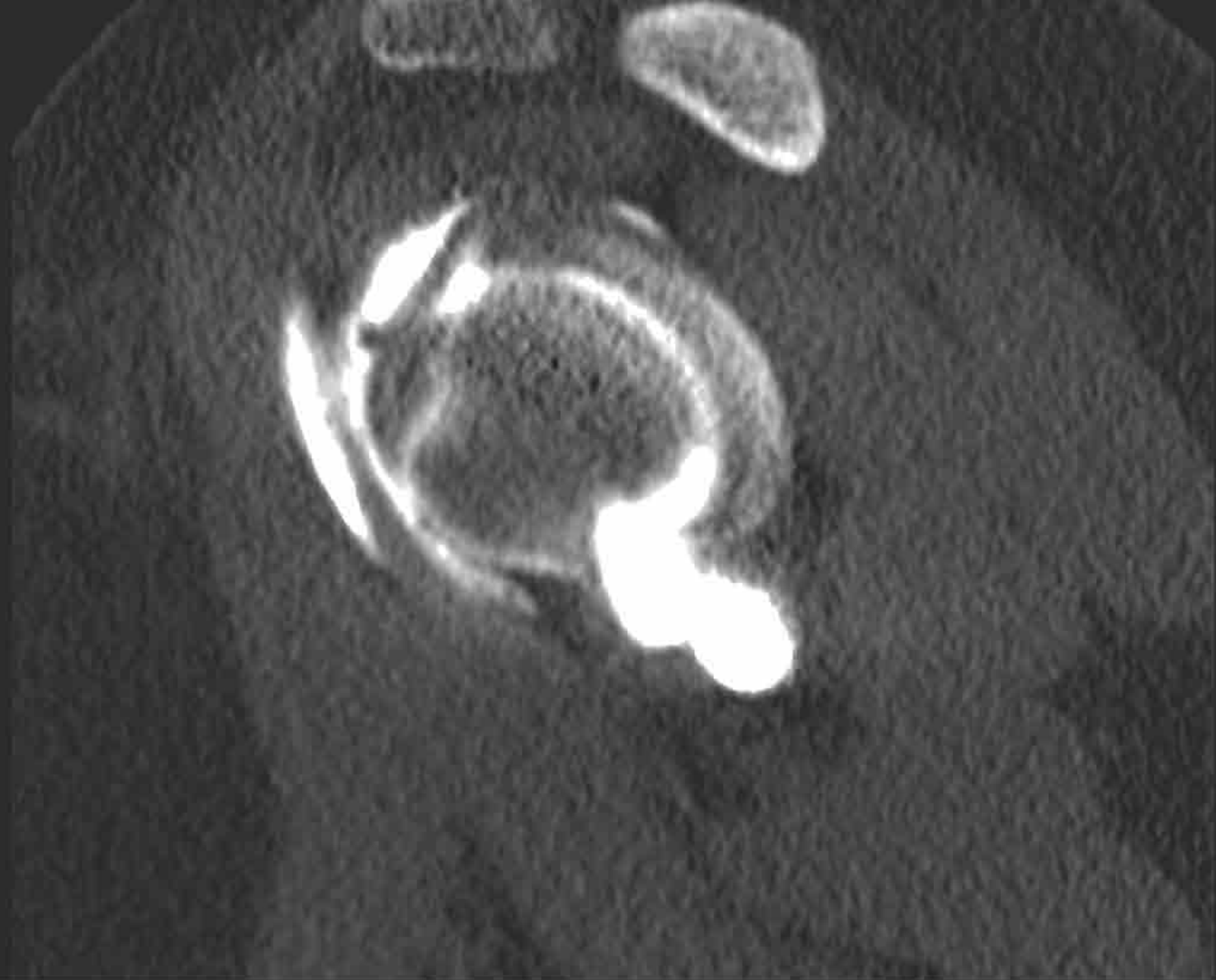
# Indications for Shoulder MCCT Arthrography

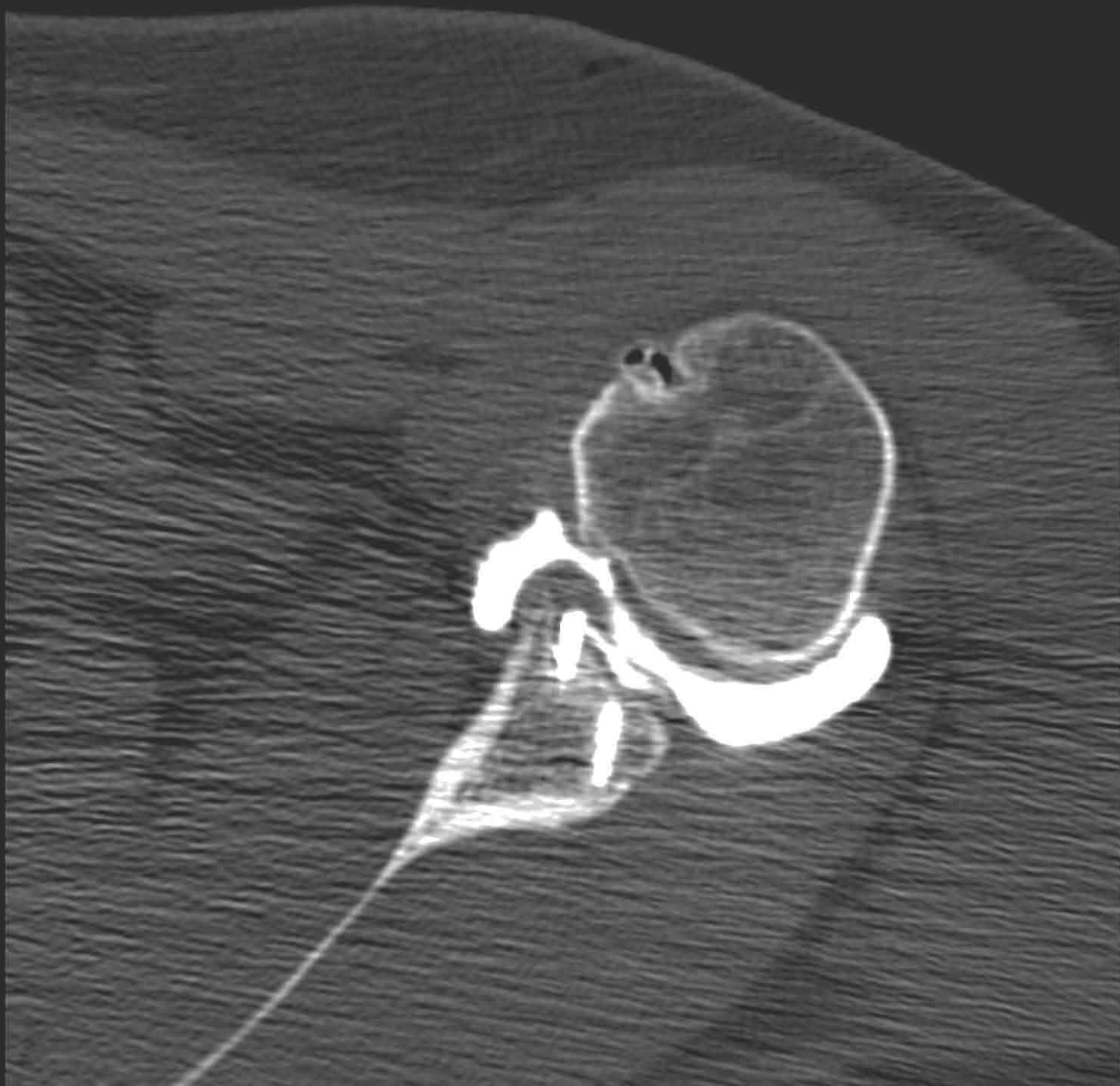
- Presence of metal
- Contraindication to MRI

# MCCT Arthrography of the Shoulder

- 1 -2 mm slices at 0.5 - 1 mm intervals
- Pitch < 1
- 140 kVp
- Small focal spot
- Detail filter
- 2.0 – 3.0 mm MPR's
- 12 – 15 cc of full strength iodinated contrast











# Indications for Wrist MCCT Arthrography

- Presence of metal
- Contraindication to MRI
- Compared to MR arthrography, better spatial resolution and absence of confounding signal in ligaments?

# MCCT Arthrography of the Wrist

- 0.5 – 0.6 mm slices at 0.2 mm intervals
- Pitch < 1
- 140 kVp
- Small focal spot
- Detail filter
- 1 - 2 mm MPR's
- 3 - 4 cc of full strength iodinated contrast
- Single oblique axial acquisition





# Indications for Hip MCCT Arthrography

- Presence of metal
- Contraindication to MRI
- Evaluation of chondral surfaces
- Patient body habitus

# MCCT Arthrography of the Hip

- 2 - 3 mm slices at 1 - 2 mm intervals
- Pitch < 1
- 140 kVp
- Small focal spot ?
- Detail filter ?
- 2 - 3 mm MPR's
- 10 - 15 cc of full strength iodinated contrast

R

5 cm

c1 500 30

D







P

# Postoperative musculoskeletal imaging using MCCT

- Hip
- Knee
- Femur
- Shoulder
- Wrist

# Trade Off

Spatial Resolution

VS

mAs

# Indications for THR evaluation with MCCT

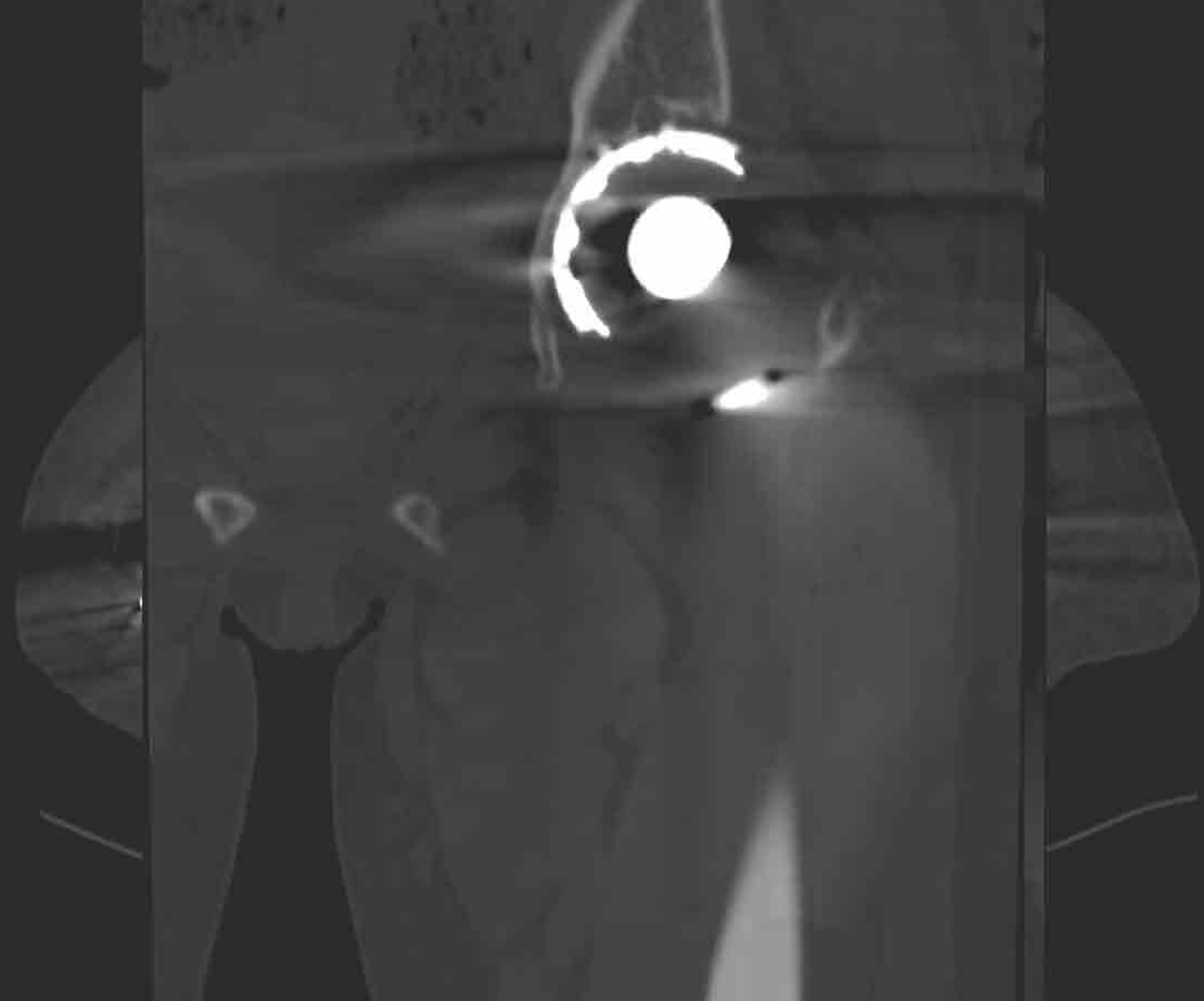
- Bone stock loss
- Loosening
- Particle disease
- Infection

# MCCT for THR Evaluation

- 2 - 3 mm slices at 1 mm intervals
  - Pitch < 1
  - 140 kVp
  - Large focal spot
  - Soft tissue filter
  - 2 - 3 mm MPR's
  - mAs of up to 900
- Scan and acquire data sets for both hips











## IU Data

- 43 patients with surgical correlation
- 39/41 for bone stock loss
- 5/5 for acetabular fracture

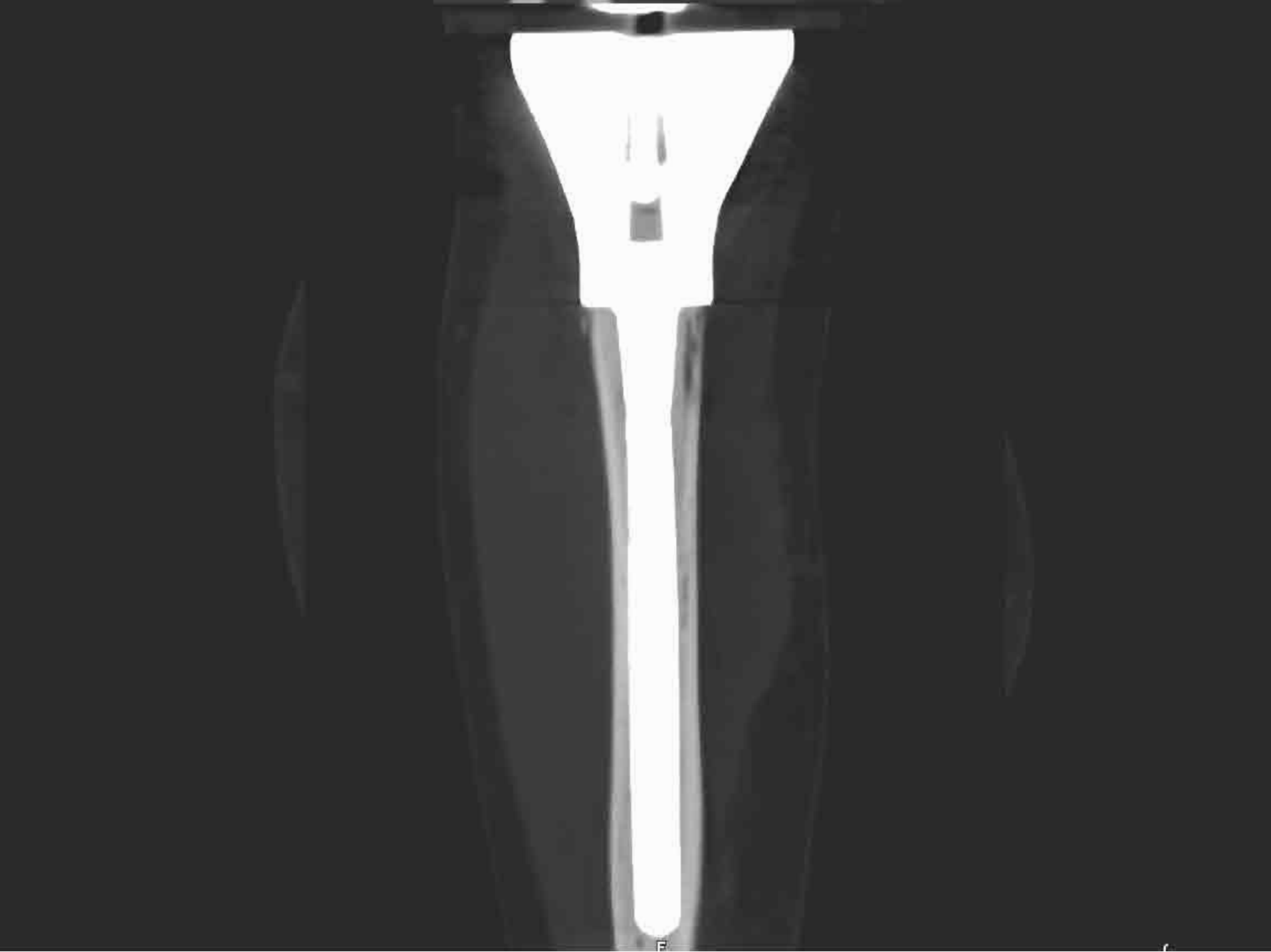
Evaluating liner wear, particle disease and loosening

# Indications for TKR evaluation with MCCT

- Bone stock loss
- Loosening
- Particle disease
- Infection

# MCCT for TKR Evaluation

- 2 - 3 mm slices at 1-2 mm intervals
- Pitch < 1
- 140 kVp
- Large focal spot
- Soft tissue filter
- 2 - 3 mm MPR's
- High mAs technique



# MCCT evaluation of fracture sites about orthopedic fixation devices

- Large body parts
- Small body parts

# Large Body Parts

- Thick slices with overlap
- Pitch < 1
- 140 kVp
- Large focal spot
- Soft tissue filter
- 2 - 3 mm MPR's
- “High mAs technique”

# Small Body Parts

- Thin slices with overlap
- Pitch  $< 1$
- 140 kVp
- Small focal spot
- Detail filter ?
- 1 - 2 mm MPR's
- “High spatial resolution technique”









# Conclusion

- MCCT versatile
- Can scan large and small body parts
- Can adjust scanning parameters to specific clinical concern and body part

# Conclusion

- MCCT arthrography is effective
- MCCT can evaluate post operative patients even if large orthopedic prostheses or fixation devices are present
- Certainly an adjunct, and in certain instances, perhaps a replacement for current MRI

