Musculoskeletal Applications for CT

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I have no commercial disclosures.
Why CT?

- Complimentary to other modalities
- Bony morphology
- Small fragments
- Alignment
- Mineralization/ossification
- Indwelling hardware
- 3D reformations
Upper Extremity
Anterior Shoulder Instability

• Bone loss is a common consequence of traumatic shoulder instability
  – Humerus, glenoid, or both
  – Positive correlation between number of dislocations and extent/depth of bone injury
  – Glenoid/humeral bone loss most common cause for failure after surgery
15 yo boy with prior anterior shoulder dislocation, continued pain
Anterior Shoulder Instability
Humerus
Hill Sachs Deformity

• Grooved defect of posterosuperolateral articulating humeral head
• 40-90% of anterior shoulder dislocations
• Up to 100% recurrent dislocations

*Hill HA, Sachs MD. Radiology 1940: 35; 690-700.
“Engaging”: large enough defect with edge over glenoid rim during abduction/external rotation
$18.2 + 64.2 = 82.4$

$18.2 \div 82.4 = \boxed{22\%}$
Hill Sachs Articular Deformity

- Arthroscopic Bankart effective
- Variable address humerus: osteotomy, bone graft

20% 30%
D/Diameter

Depth < 16% of humeral head diameter: arthroscopic Bankart repair *

Mean size: 52% of axial diameter is likely to be an engaging lesion*
Anterior Shoulder Instability
Glenoid

• Loss of glenoid concavity reduces stability
• Large defects require bone replacement techniques
• Arthroscopic versus open repair
"Inverted Pear*
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*Burkhart SS, DeBeer JF. Arthroscopy 2000
“Inverted Pear”*

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8.1mm/31.6mm = 25.6%

Deficiency >25%: consider bone reconstruction techniques
Anterior Glenoid Deficiency

- Rebuild anterior-inferior buttress with bone graft
- Large piece of bone (2-3 cm) recreates articulating arc of glenoid
- Coracoid transfer or iliac crest graft
Latarjet* Procedure

(Conjoined tendon of short head of biceps and coracobrachialis muscles)

*Latarjet M. Lyon Chir 1954;49:994-997
1 year later after Latarjet procedure, with increasing pain
Scaphoid Fractures

- Fracture pattern may predict ability to heal
- MRI: purely trabecular fractures—need shorter immobilization, more likely to heal, may miss nondisplaced “cortical” fractures
- CT: initial displacement (more likely for nonunion) and evaluate healing
1 month after pinning
Lower Extremities
Rotational Profiles

• *Version*: normal twisting of long bone on its anatomic longitudinal axis
  – Femur: anteversion, retroversion
  – Tibia: internal (medial), external (lateral) version

• Tibial tuberosity-trochlear groove (TT-TG) distance
Rotational Profiles

• Abnormalities of version
  – In-toeing, out-toeing
  – SCFE
  – Coxa vara
  – Neuromuscular disorders
  – DDH
  – Knee and patellar instability
  – Osteoarthritis
Femoral Version
Femoral Version

• Normal: 32° anteversion at 1 yr, 16° at 16 yrs
• Mean difference between sides approx 8°
Femoral Version

- Normal: 32° anteversion at 1 yr, 16° at 16 yrs
- Mean difference between sides approx 8°
- Incr version: in-toeing, pincer deformity
- Decr version: SCFE, cam deformity
axial oblique
40° externally rotated

40° - 20° = 20° anteversion

20° externally rotated
Tibial Version

- After birth, distal tibia rotates laterally (relative to proximal) = external tibial version
- 2-4° at birth, 10-20° at skeletal maturity
20 degrees internally rotated

50 degrees externally rotated
20 degrees internally rotated so, need to externally rotate 20 degrees to make proximal tibia neutral.
• Add 20 degrees external rotation to 50 degrees external rotation = 70 degrees external rotation
Tibial Tuberosity-Trochlear Groove (TT-TG)

• Lateralization of tibial tuberosity-predisposes to recurrent patellar dislocation
• Surgery to correct lateral offset: medialization of tibial tubercle
• Horizontal distance
  – normal ≈ 10mm, pathological > 20mm
10mm

normal
Which of the following statements is false?

a) Glenoid/humeral bone loss is the most common cause for failure after instability stabilization.
b) An “engaging lesion” refers to humeral bone loss.
c) The Latarjet procedure is used to reconstitute the humeral articulating surface.
d) “Inverted pear” is a type of dessert cake.
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Thank you!