Comparison of Radiographs and Computed Tomography for the Diagnosis of Anterior Inferior Iliac Spine Impingement

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Disclosures

- **Dr. Robert F. LaPrade is a consultant and receives royalties from Arthrex, Ossur and Smith & Nephew.**

- **Dr. Marc J. Philippon disclosures are:**
  - **Smith & Nephew[a,b], Arthrosurface[b], HIPCO[b], MIS[b], ConMed Linvatec[a], Bledsoe[a], Slack[a],ElSevier[a], DonJoy[a], Ossur[b], Arthrex[b], Siemens[b], Vail Valley Surgery Center[c], SPRI[c], ASIAM[c], Vail Health Services[c], ISHA[c]**

    A. Consulting/Royalty
    B. Research Support
    C. Board Member

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Background

- Assessment of the anterior inferior iliac spine (AIIS) impingement → Validated for CT scans.
- Radiographic protocols → Limit radiation exposure.
- No comparison of radiographic and 3D CT measurements exists to determine whether radiographs are a valid methodology.

Purpose

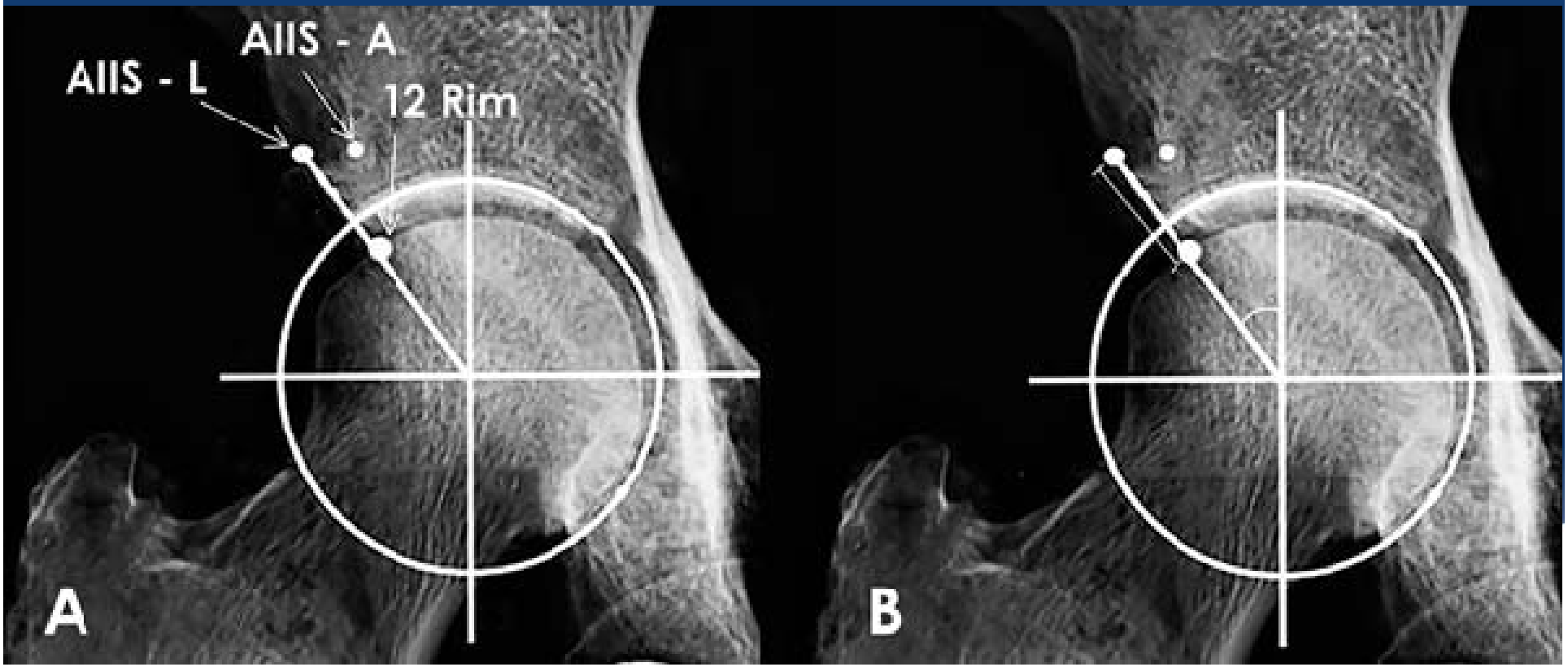
1. Define radiographic and 3D CT measurements related to the AIIS
2. Compare radiographic and 3D CT imaging modalities for the diagnosis of AIIS impingement

- **Hypothesis: High correlation → radiographic measurements vs. CT imaging modalities.**

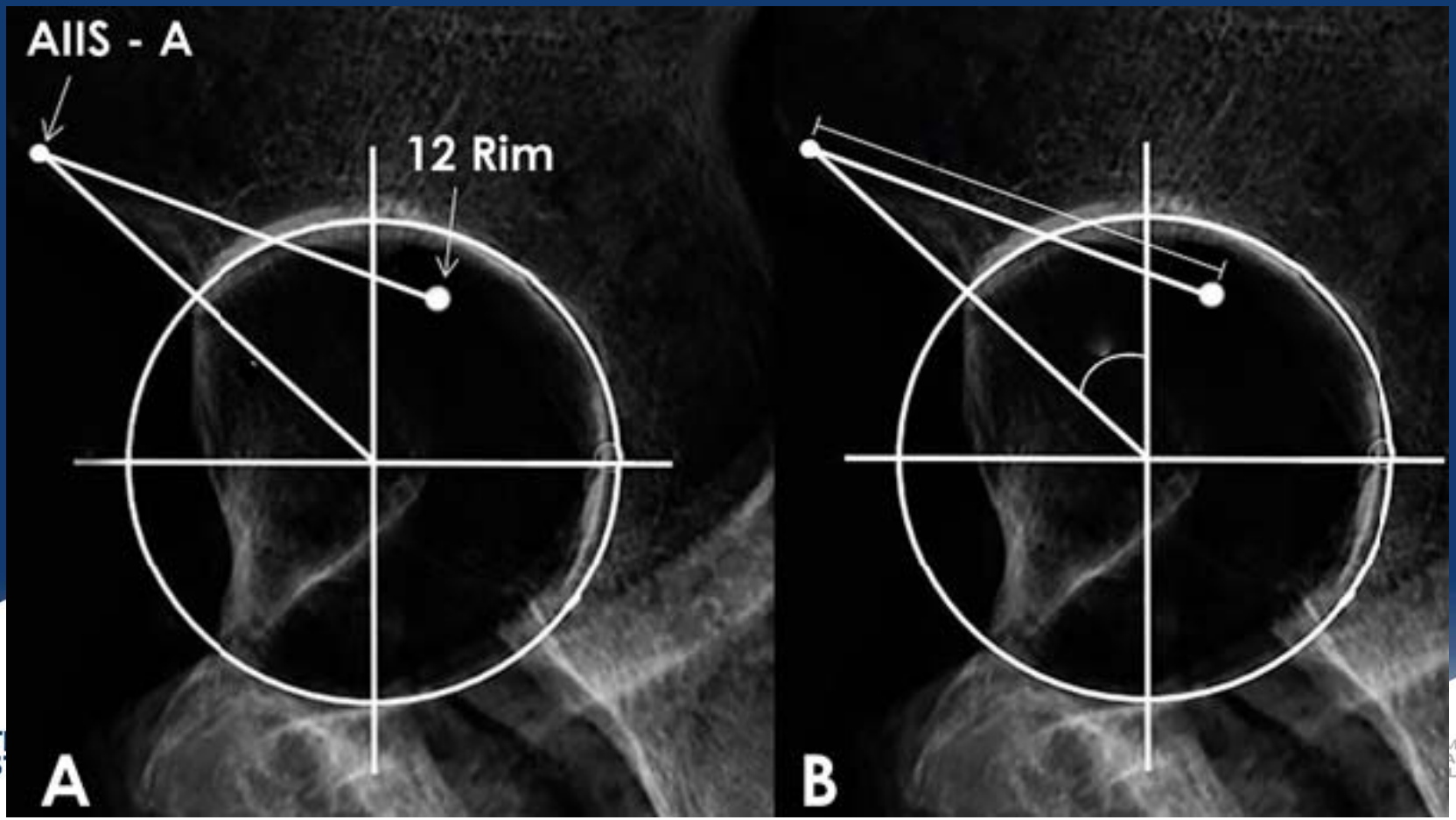
Methods

- Ten human cadaveric fresh-frozen pelvises
- Radio-opaque hardware on landmarks
- Image collection
  - Radiographic anteroposterior (AP) and false-profile views using an alignment fixture
  - Clinical-grade CT scans, followed by computational modeling software to create a 3D bone model

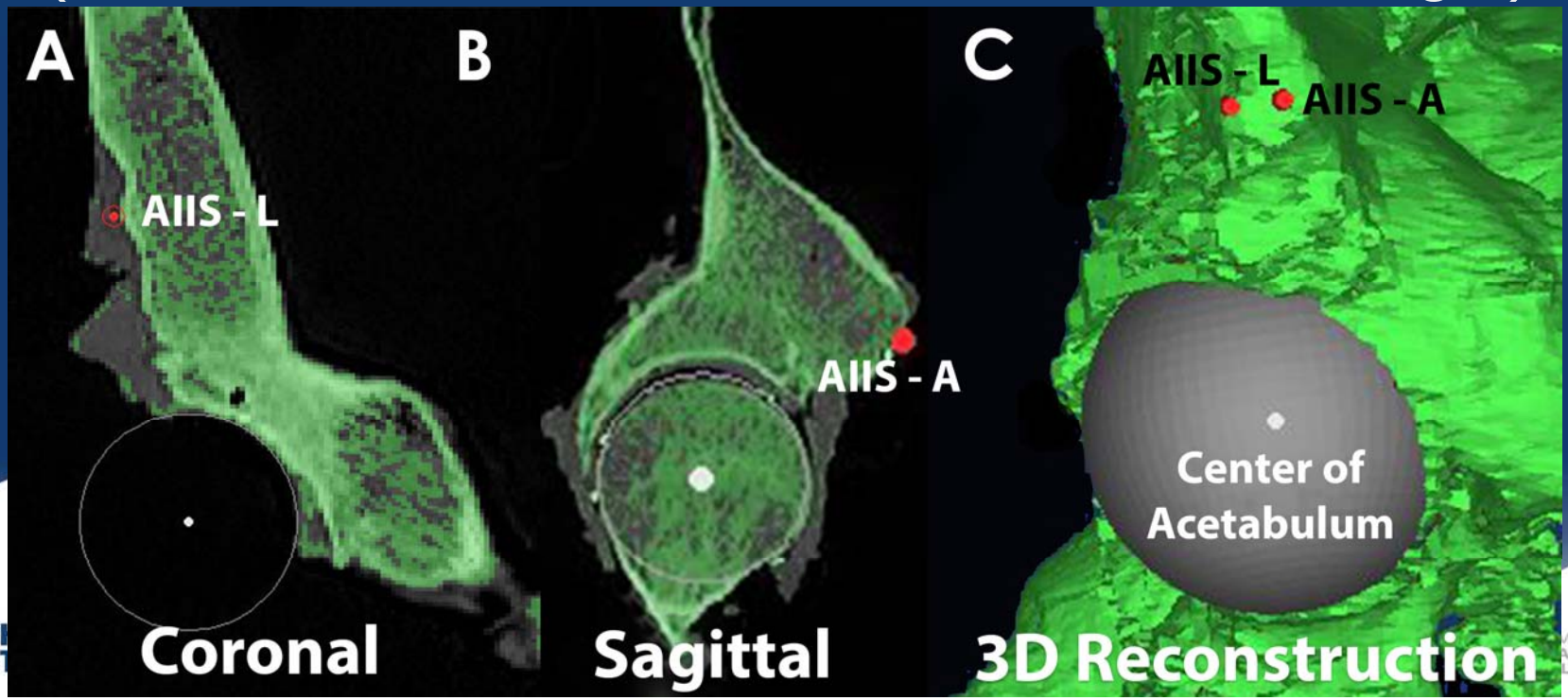
- Radiographic (AP)
  - Landmarks: AIIS-L (most lateral location of AIIS), AIIS-A (most anterior location of AIIS), 12 Rim (12 o'clock position)
  - Measurements: AP Distance (12 Rim to AIIS-L), AP Angle (AIIS-L to Sagittal plane)



- Radiographic (False-Profile)
  - Landmarks: AIIS-A (most anterior location of AIIS), 12 Rim (12 o'clock position)
  - Measurements: False-Profile Distance (12 Rim to AIIS-L), False-Profile Angle (AIIS-L to Sagittal plane)



- Computed Tomography
  - Each pelvis was computationally oriented to a normalized position and measurements were made (AP Distance and AP Angle)
  - Each pelvis was computationally transformed to the false-profile view and measurements were made (False-Profile Distance and False-Profile Angle)



Results

- Distance and angle measurements (Median)

	AP Distance (mm)	False-Profile Distance (mm)	AP Angle (°)	False-Profile Angle (°)
Radiographs	16.4	41.4	33.5	50.2
3D CT	20.2	42.5	28.1	42.8

AP Distance: 12 Rim to AIIS-L

False-Profile Distance: 12 Rim to AIIS-A

AP Angle: AIIS-L to Sagittal Plane

False-Profile Angle: AIIS-A to Sagittal Plane

Results

- **Intra**method Analyses

	AP Distance ICC	False-Profile Distance ICC	AP Angle ICC	False-Profile Angle ICC
Intrarater	0.980	0.995	0.962	0.995
Interrater	0.838	0.883	0.914	0.980

  - **Excellent reproducibility**
  - ***False-profile:*** Most repeatable angle and distance measurements

Results

- **Inter**method Analysis

	AP Distance	False-Profile Distance	AP Angle	False-Profile Angle
ICC	0.322	0.443	0.638	0.180
Bias	- 4.1 mm	- 0.1 mm	6.7°	8.3°
Agreement	Poor	Fair	Good	Poor

  - The systematic, quantitative bias between modalities will remain relatively consistent because of the strong intramethod reproducibility.

Discussion & Conclusions

- **Radiographic and 3D CT imaging modalities had strong reproducibility for measurements related to the AIIS.**
  - The false-profile radiographic view was most accurate and reproducible to demonstrate AIIS morphology.
- Radiographs can be reliably utilized to determine and classify potentially pathologic AIIS measurements.

Thank you!

Keeping people active.