# Trochlear position influences patellar tracking and J sign during active knee extension

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# Disclosures

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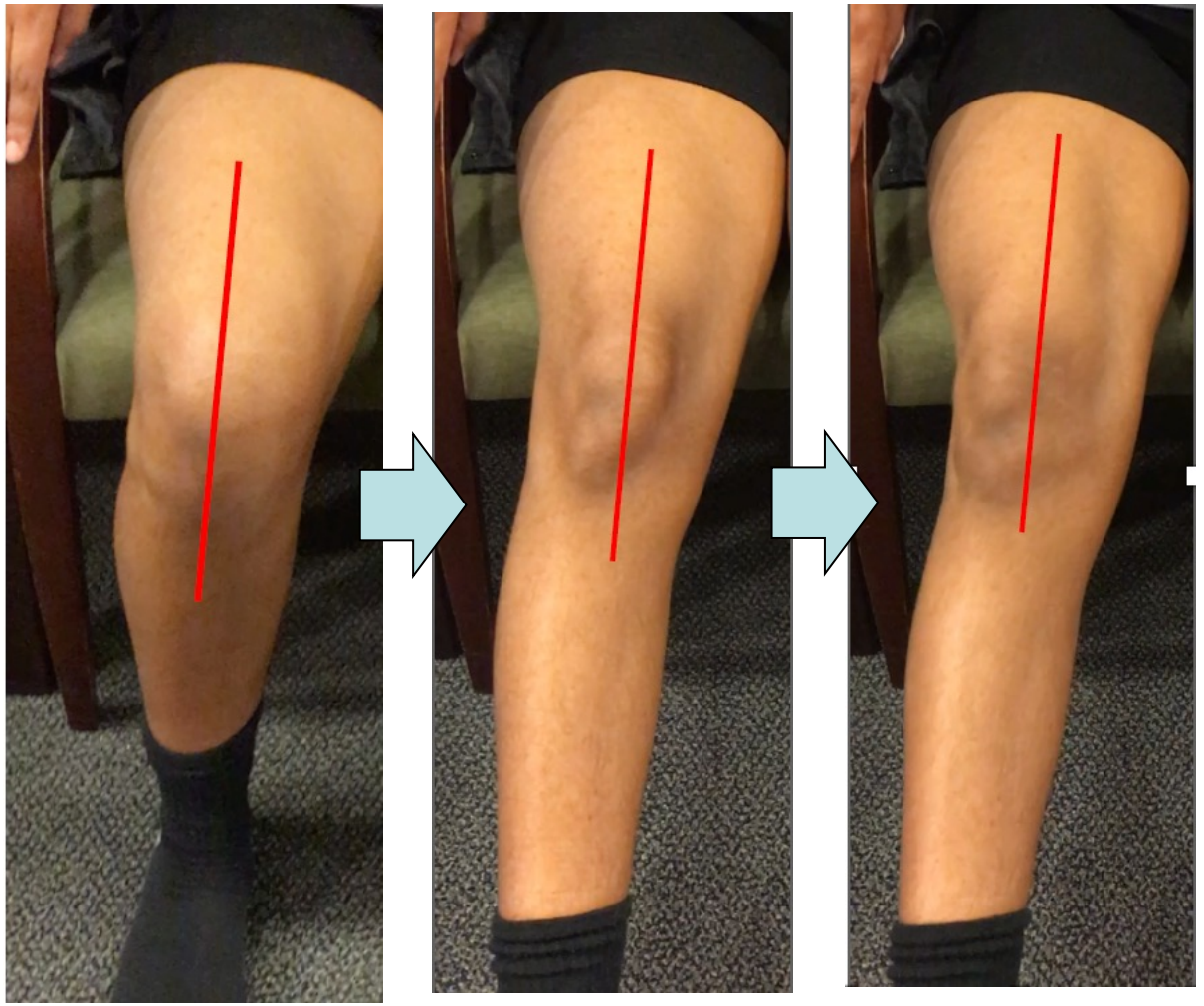
# Background

- The patellar J sign is a clinical examination finding that involves increased lateralization of the patella during active knee extension (1)
- Increased severity of the patellar J sign has been reported to have high sensitivity for detecting the presence of patellar instability (2), yet the factors that contribute to this are not fully understood
- Trochlear dysplasia is a known risk factor for patellar instability and refers to loss of the osteochondral restraint of the patellofemoral joint due to decreased depth of the groove (3, 4)
- Recent studies have highlighted the role of trochleoplasty in addressing this abnormality, but quantitative descriptions of trochlear dysplasia have not been well described (5,6)

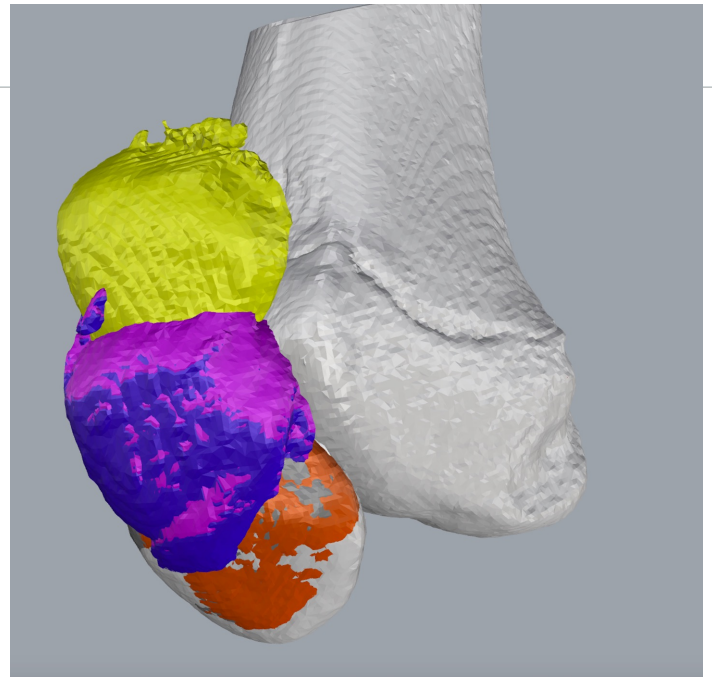


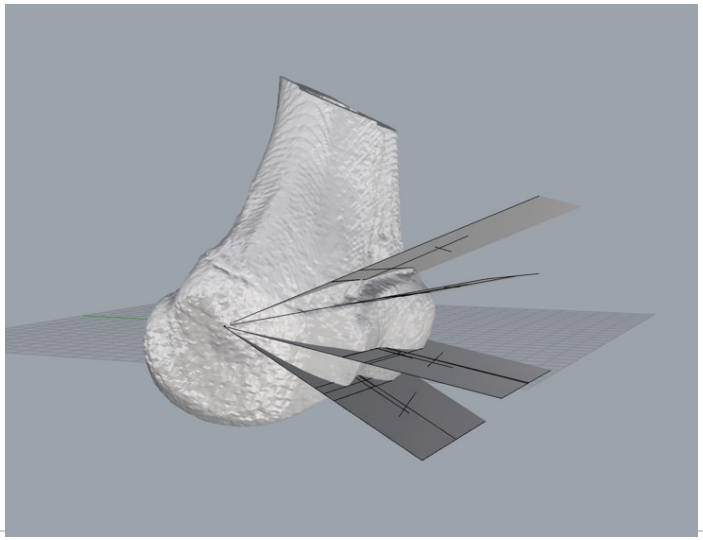
# Objective

- The purpose of this study was to determine the relationship between patellar J sign and abnormalities in trochlear morphology

# Methods

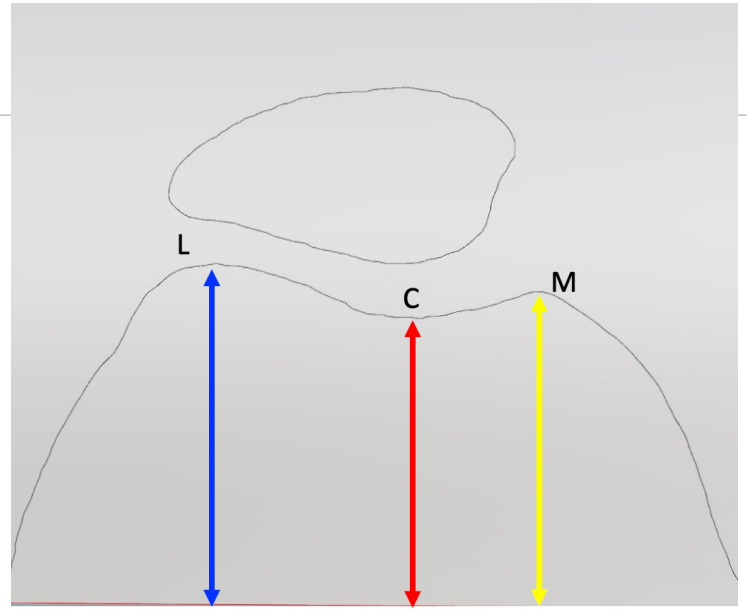
- Patients with patellar instability were included in this study
- The contralateral (asymptomatic) knees were analyzed to isolate the effects of morphological abnormalities without instability
- Knees were imaged on dynamic CT during active knee extension and kinematic 3D models were created for analysis
- Measurements were obtained at 10° intervals

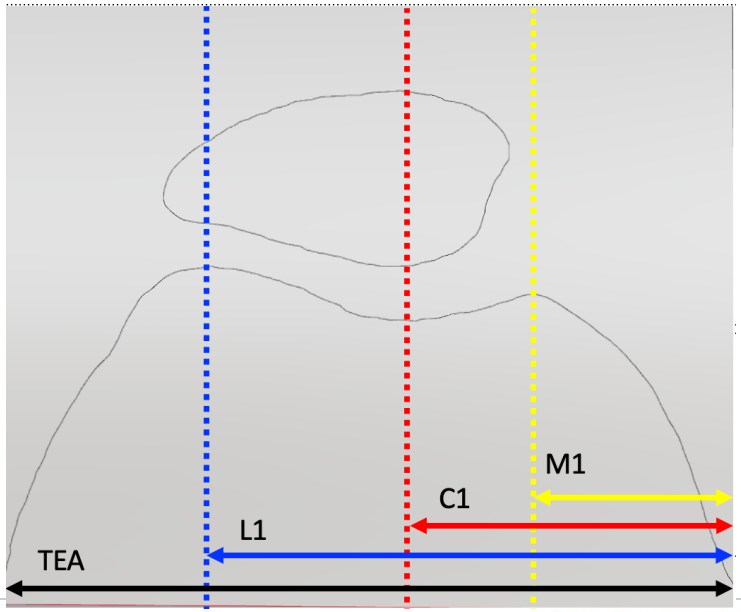




# Methods

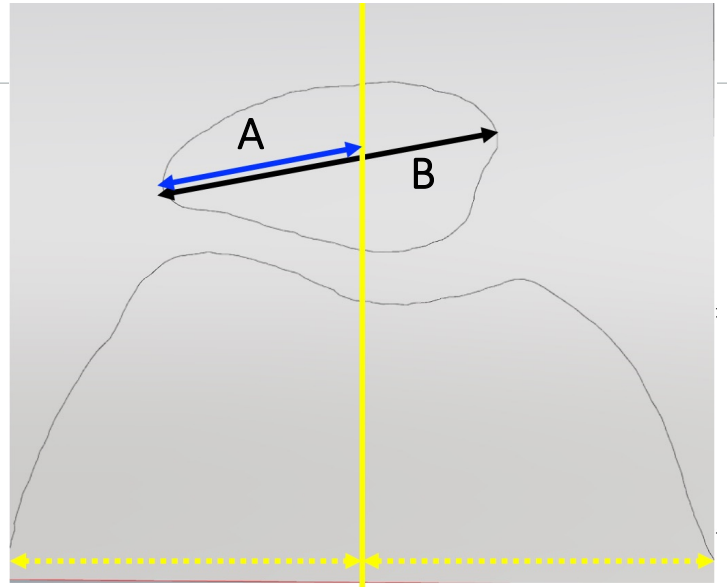
- Trochlear morphology was described at each interval using the following:
  - Depth=(L+M)/2-C
  - Width (% of femoral width) = (L1-M1)/TEA
  - Medial-lateral position on the femur (100% indicating the most lateral boundary of the femur)
    - M1/TEA
    - C1/TEA
    - L1/TEA



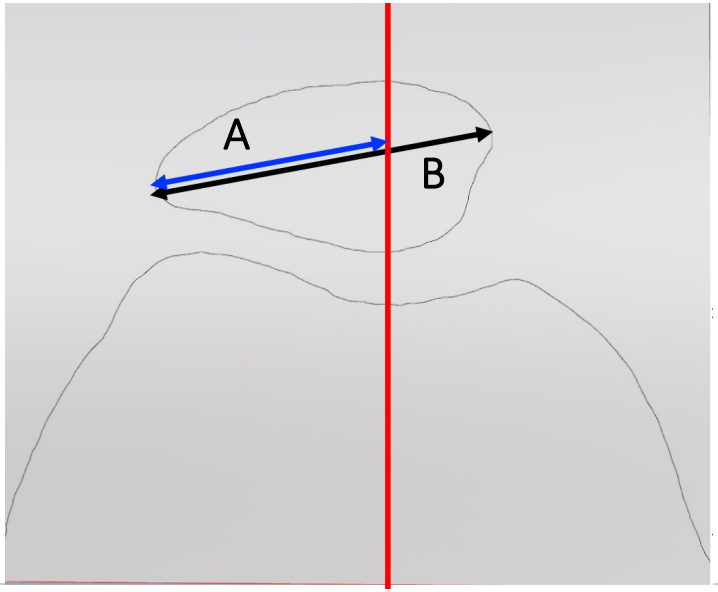



# Methods

- Corresponding position of the patella was assessed at 10° intervals through the transepicondylar axis (with 90° being directly anterior)
- In each condition, patellar position was described in terms of the following:
  - % lateralization (A/B) relative to the midline of the femur (yellow line)
  - % lateralization (A/B) relative to the center of the trochlear groove (red line)




Lateral Medial



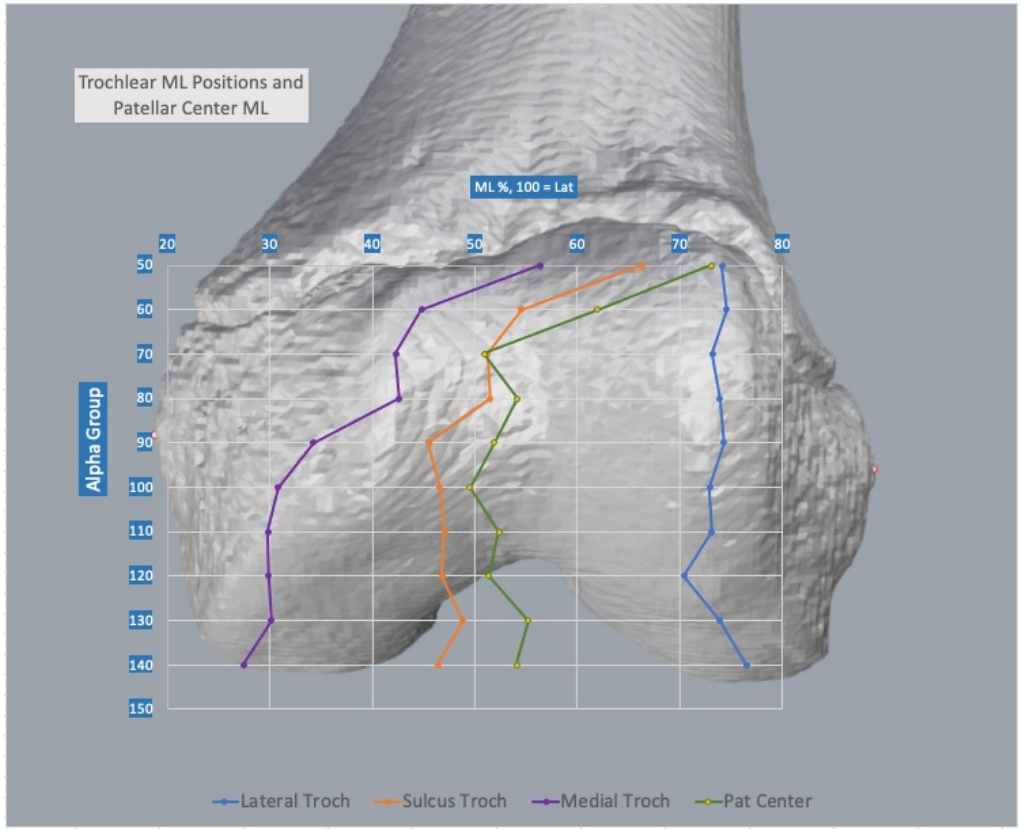
# Methods

- Univariate regression analysis was performed to determine the relationship of trochlear depth with trochlear width and position on the femur

- Stepwise multiple regression analysis was performed to assess for relationships between trochlear morphology and measurements of patellar position

# Results

- 17 knees were included in this study (age 23.3 ± 7.5; 5M, 12F)
- Increasing dysplasia (decreased depth) of the trochlea was associated with the following:
  - Decreased width of the trochlea
    - R=0.71, R2=0.51,p<0.001
  - Increased lateral position of the trochlea on the femur
    - R=0.47, R2=0.23,p<0.001



# Results

- During active knee extension, patellar lateralization relative to the femur correlated with increased lateralized position of the trochlea
  - R=0.42, R2=0.17, p=0.002
- No significant relationship between trochlear morphology and patellar displacement from the trochlear center was found in this group of asymptomatic knees

# Conclusions

- In knees with trochlear dysplasia without patellar instability, patellar lateralization in extension was found to correlate with the position of the trochlea on the femur rather than subluxation out of the trochlear groove
- Furthermore, trochlear dysplasia was associated with decreased width and increased lateralized position on the femur
- These findings may further our understanding of the role of trochlear dysplasia in surgical decision-making in the treatment of patellar instability

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# Thank you

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