

# Adolescent Femoroacetabular Impingement (FAI): Gender Differences in Hip Morphology

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International Society for Hip Arthroscopy - Annual Scientific Meeting

San Francisco, CA

September 15-17, 2016



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Department of Orthopaedic Surgery

# Disclosures

Perry Hooper, DO – None

Sameer Oak, MD – None

Gehan Ibrahim, MD – None

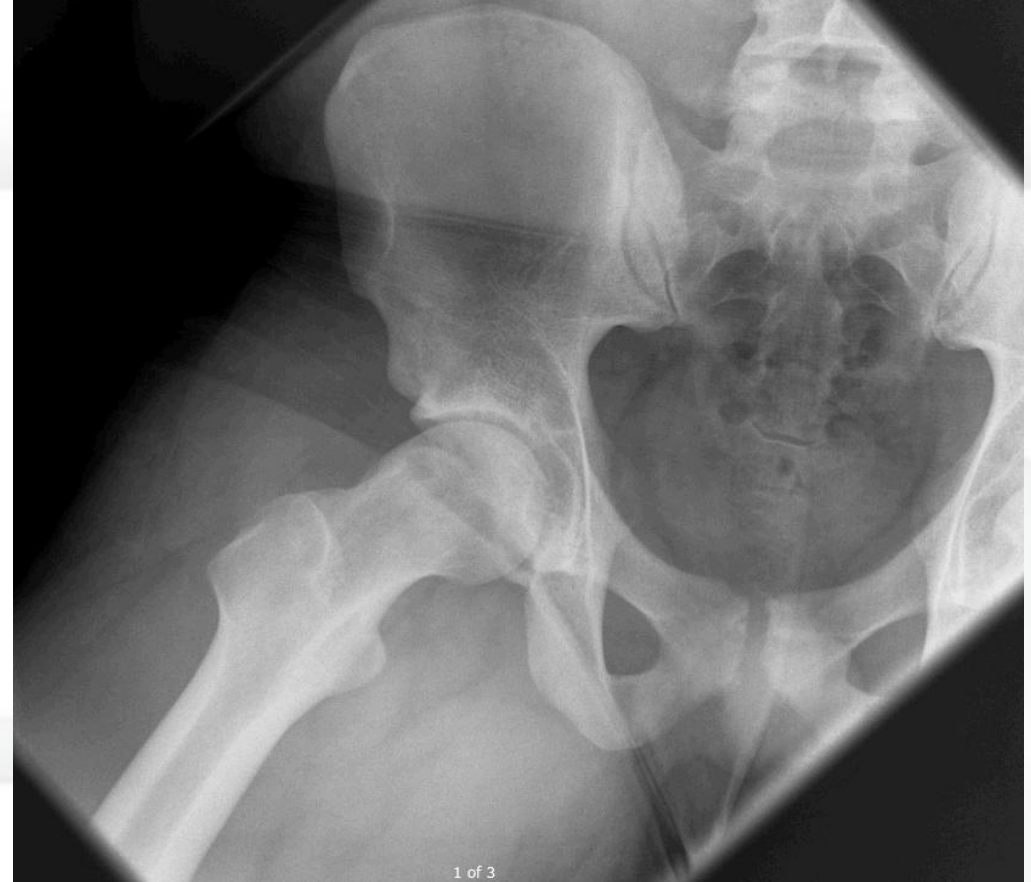
T. Sean Lynch, MD – None

Ryan Goodwin, MD – Paid consultant for Stryker

James Rosneck, MD – Paid consultant for Smith and Nephew

# Background

- Femoroacetabular impingement (FAI) has become an increasingly recognized cause of hip pain<sup>8,9</sup>
- FAI - abnormal bony offset or overgrowth creates irregular mechanical motion between the acetabulum and femoral head-neck junction<sup>9</sup>
- Repetitive contact from hip motion can damage the acetabular labrum and articular cartilage
- These morphological irregularities in adults can contribute to degenerative joint disease of the hip<sup>1,3,6,12,13,17</sup>



# Purpose

- Morphological differences between male and female adolescents with FAI have not been well published, nor is there a good understanding of the degree of potential intra-articular pathology linked to their condition.
- We compared male and female adolescents who underwent hip arthroscopy for FAI to ascertain radiographic and intraoperative differences.
- The purpose of our study is to determine if adolescent males have more preoperative bony hip abnormalities and more severe acetabular cartilage pathologies than adolescent females.



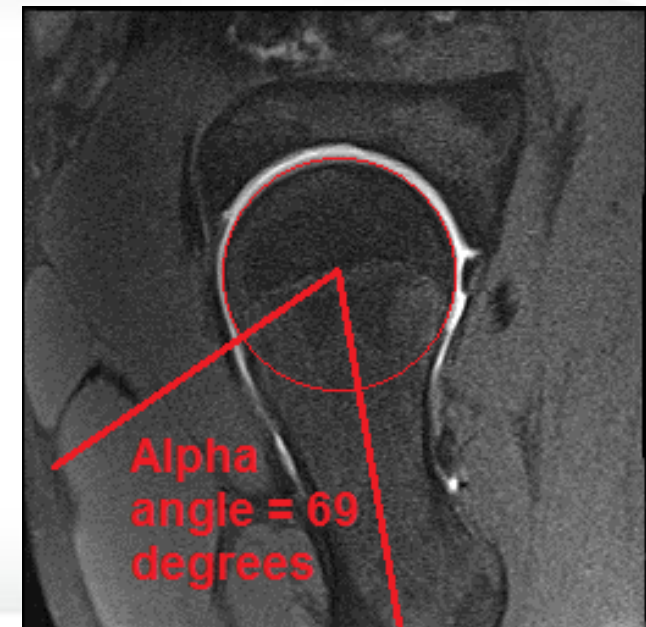
# Methods

- Retrospective review of 177 adolescents, 13 to 18 years of age, who were treated for FAI with hip arthroscopy
- Inclusion criteria - patients who presented with hip pain along with signs/symptoms of chondrolabral hip damage, which led to primary hip arthroscopy surgery
- Exclusion criteria - previous hip surgery, history of hip dysplasia, history of SCFE, history of Legg-Calve-Perthes disease and patients where both MRI and plain radiographs were unavailable
- Only the first operated hip was included for patients who had staged bilateral hip arthroscopies



# Methods

- MRI and plain radiographs – lateral center edge angle, Tonnis angle, and alpha angle were measured and then compared with intraoperative findings
- Outerbridge system to document chondromalacia – Grades 0-IV
- Labral pathology
  - Normal
  - Intact but with degenerative changes
  - Chondrolabral wave sign/debonding evidence
  - Full thickness tear with or without detachment
- Intraoperative procedures were documented



# Imaging Measurement Agreement

Measurement	Intraclass Correlation Coefficient	95% Confidence Interval
Lateral CEA* Radiograph	0.73	0.52 to 0.84
Tonnis Angle Radiograph	0.63	0.55 to 0.70
Alpha Angle Radiograph	0.56	0.43 to 0.67
Lateral CEA* MRI	0.74	0.67 to 0.80
Alpha Angle MRI	0.65	0.56 to 0.73
*CEA – Center Edge Angle		

- All measurements indicated moderate to strong agreement between the three readers

# Imaging Results

Alpha angle on MRI	Female	Male
$\leq 44.9^\circ$	74.5% (n=73)	19.4% (n=7)
45-54.9°	24.5% (n=24)	41.7% (n=15)
55-64.9°	1.0% (n=1)	22.2% (n=8)
$\geq 65^\circ$	0% (n=0)	16.7% (n=6)
<b>Total</b>	100% (n=98)	100% (n=36)

- 38.9% of males and 1% of females had an alpha angle  $> 55^\circ$  on axial oblique MRI ( $p < 0.0001$ )
- Average Alpha Angle ( $p < 0.0001$ )
  - Males –  $55.9^\circ$
  - Females –  $45.2^\circ$
- 11% of males and 6% of females with lateral CEA  $> 40^\circ$  ( $p = .32$ ) No statistically significant difference

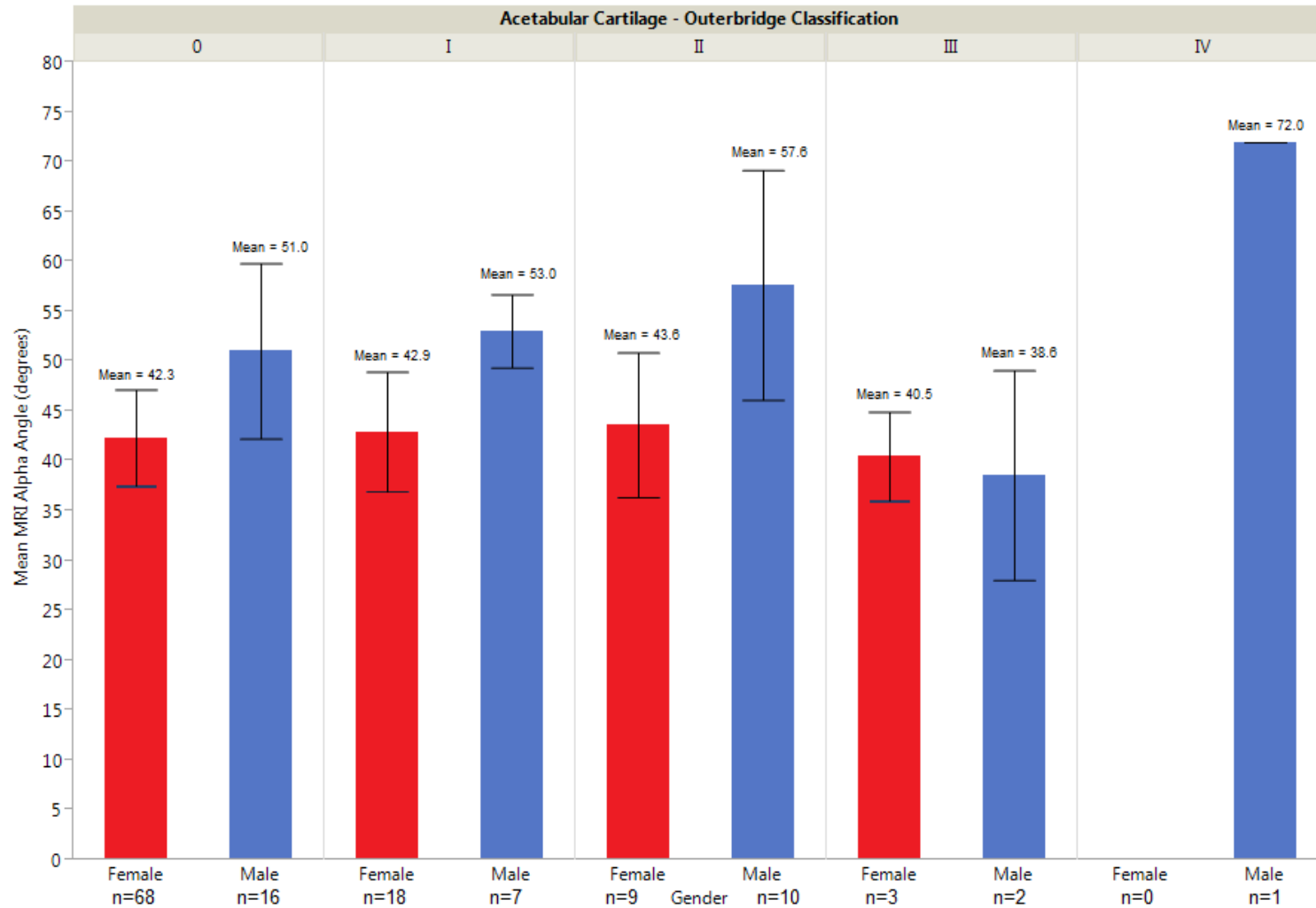




# Intraoperative Findings

- Males - more likely to display chondral injury intraoperatively
  - (56.3% versus 32.5%;  $p < 0.0001$ )
  - Males with cam deformity – 64.3%
- Debonding evidence or full thickness tear to the labrum was seen 69.8% in females and 72.9% in males
- Males underwent femoroplasty and acetabuloplasty (75% and 62.5%) more often than females (56.6% and 48.8%) [ $p = 0.025$  and  $p = 0.11$ ]

# Intraoperative Findings



# Conclusions

- In adolescents, distinct differences between sexes were seen on both preoperative imaging and at the time of hip arthroscopy
- We found that males with FAI displayed a larger mean alpha angle, and therefore a more severe cam-type deformity, than females
- Males were 20% more likely to have chondral injury than females
- Longitudinal studies are needed to ascertain if surgical intervention at a young age will prevent early onset degenerative hip disease



# Limitations

- Retrospective study
- Disproportionate number of females - 73%
  - Recent study with Dr Philippon - 69%; Microinstability/ligamentous laxity increases hip ROM?
- Our alpha angle measurements may be an underestimation
  - Recent data suggests radial imaging may better capture anterosuperior portion of the femoral head-neck junction where cam lesions typically occur
- No gonadal shields were used so the imaging reader could identify the patient's gender
- The crossing sign was not documented

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