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A Prospective Cohort Study Assessing the Development of Cam Femoro-Acetabular Impingement Morphology



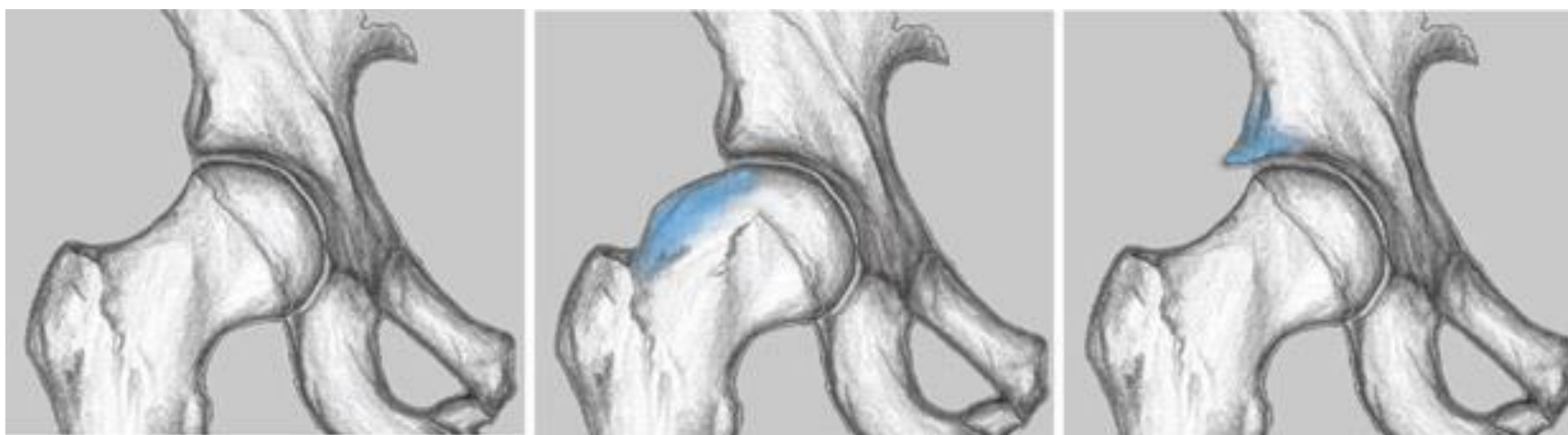
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Background

CAM FAI

- Pathologic contact between the femur and acetabulum which leads to early, predictable cartilage and labral degeneration



- FAI is an important cause of adolescent hip pain¹

- Etiology?** Genetics^{2,3,4} and Environment^{5,6,7}

- Pauwel principle – Intermittent pressure within the limits of physiologic stress stimulates growth plates

- Ottawa cross-sectional study**⁸

- 14% prevalence post physeal closure
- 0% prevalence pre physeal closure
- Cam FAI were more active

Objectives

- Primary** – Determined the incidence of Cam FAI
- Secondary** – Assess activity level as a modifiable risk factor.

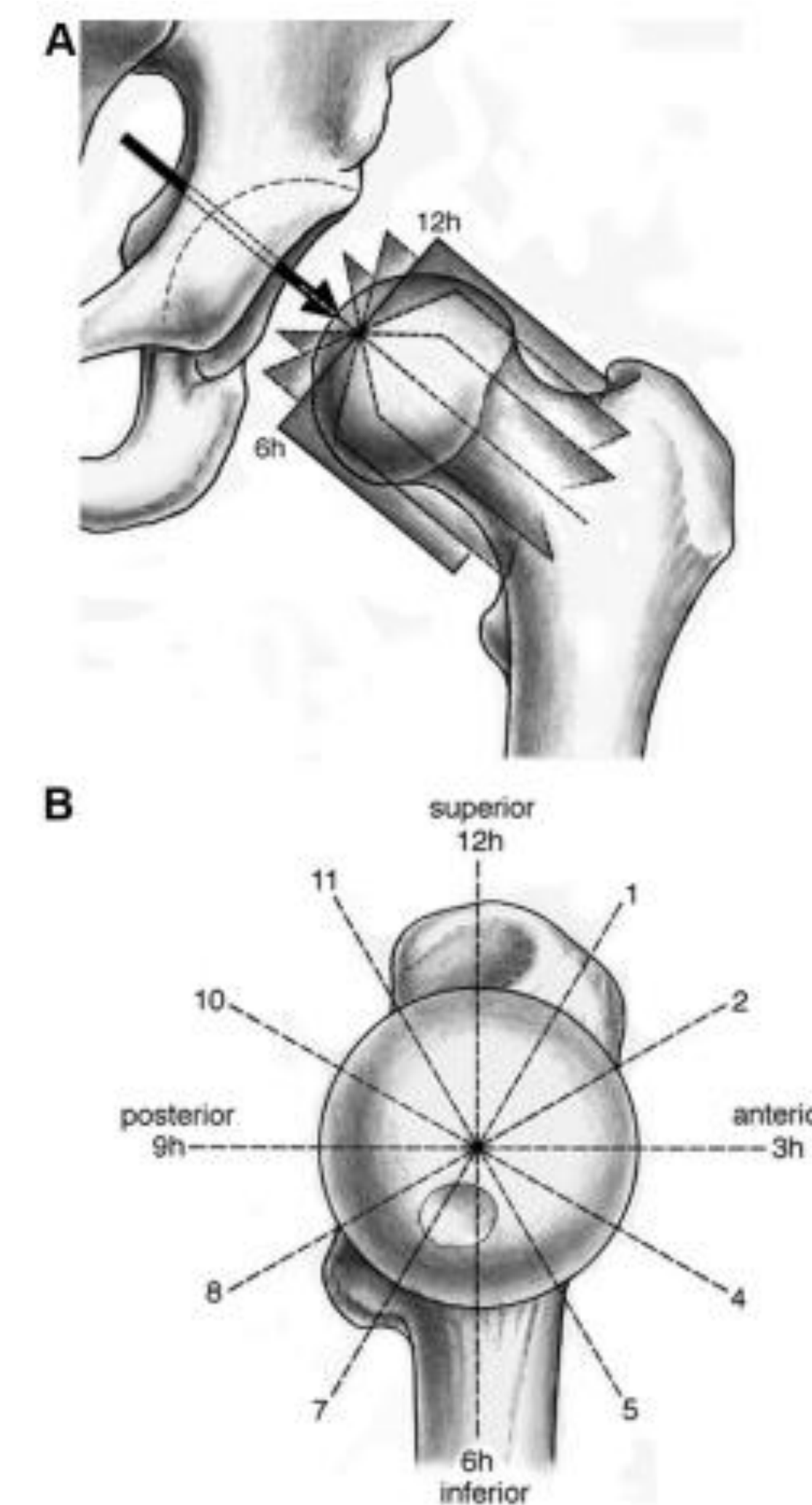
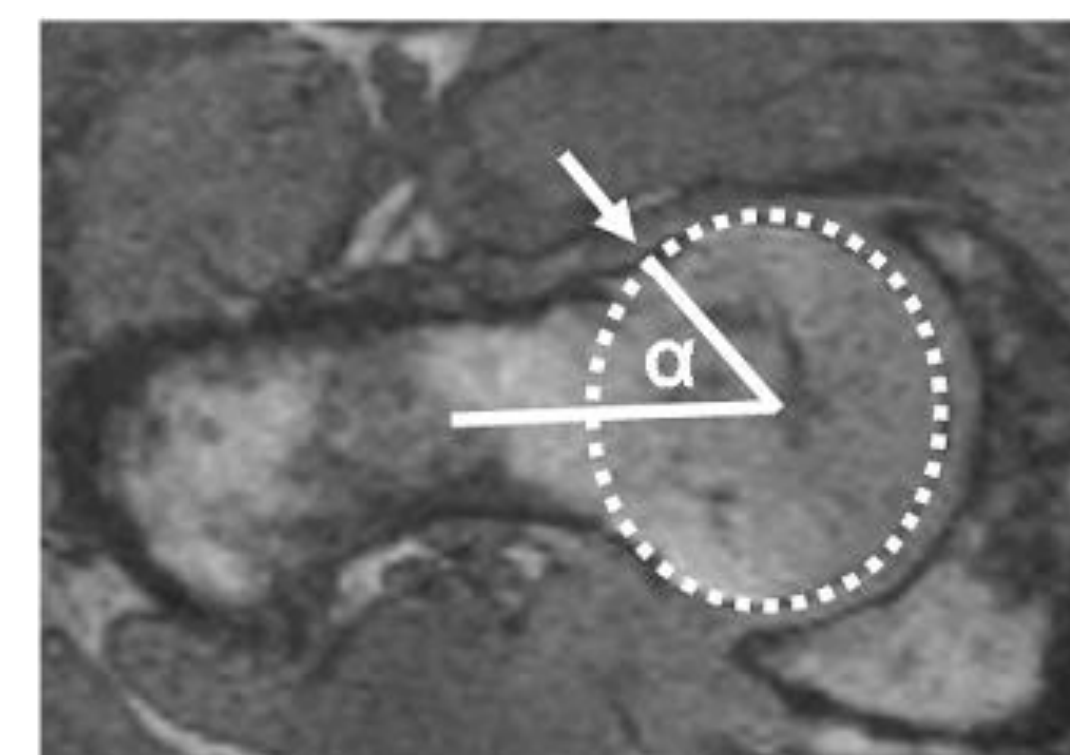
Study Design

- Prospective Cohort Study
- Inclusion criteria: M:10-12 and F 8-10 years old
- Exclusion criteria
 - >1 fracture, vertebral fracture, lower extremity pathology or injury, history of hip or knee pain, congenital or developmental msk disorder

- Initial time point: Hx, P.E., HAES, MRI
- Final time point: Hx, P.E., HAES, HSS-PediFABS, MRI

Radiographic Assessment

- Bilateral hip non-contrast MRI using FAI protocol
- Multiplanar/radial reformat
- Read by blinded MSK fellowship trained radiologist (KR)
- Cam FAI: Alpha angle $>55^\circ$ at 3:00 or $>60^\circ$ at 1:30



Results

- 20/23 Patients enrolled
 - 2 refused, 1 moved away
- Average follow-up 6.16 years**

Table 1. Demographics: pre versus post-physeal closure

Variable	Pre-Physeal Closure	Post-Physeal Closure
Sex (male/female)	9/11	9/11
Mean Age in years (SD)	10.55 (1.39)	16.71 (1.33)
Mean Body Mass Index (Kg/m) (SD)	19.93 (4.43)	25.03 (5.83)

- Mean alpha angle:
 - 3:00 position: $38^\circ \rightarrow 41^\circ$ ($p=0.003$)
 - 1:30 position: $44^\circ \rightarrow 50^\circ$ ($p < 0.001$)
- Hip ROM:
 - Prone IR: $58^\circ \rightarrow 46^\circ$ ($p=0.001$)
 - Cam vs No Cam IR: 41 vs 53 ($p=0.076$)
- Cam morphology:
 - 3/20 (15%) incidence
 - All males**
 - one bilateral**

Results (continued)

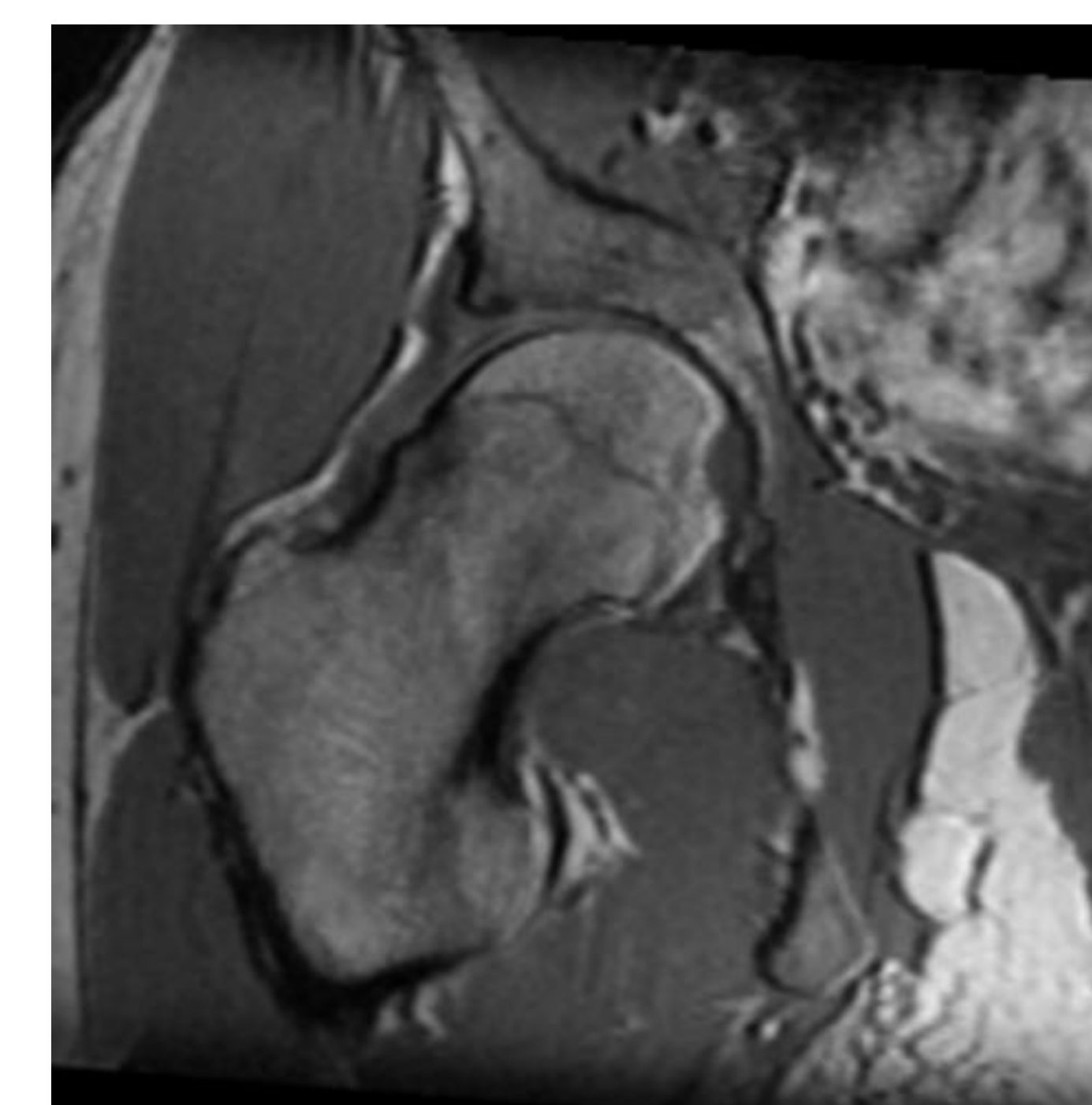
Table 2. The Hospital for Special Surgery Functional Activity Brief Scale (HSS Pedi-FABS) between cam FAI and non-cam FAI group

HSS_Pedi-FABS, Mean (SD)	Cam morphology at 130 and/or 3 O'clock*	No cam morphology	P-value
Male: Female	3: 0	6: 11	--
Running	3.67 (0.58)	2.50 (1.10)	0.950
Cutting	3.33 (0.58)	1.56 (1.15)	0.020
Decelerating	3.33 (0.58)	1.56 (1.15)	0.020
Pivoting	3.00 (1.00)	2.31 (1.20)	0.365
Duration	3.33 (0.58)	1.81 (1.47)	0.101
Endurance	3.00 (1.00)	2.19 (1.28)	0.315
Competition	2.00 (0.00)	0.88 (1.15)	0.115
Supervision	1.67 (0.577)	0.69 (0.793)	0.060
Total	23.33 (4.16)	13.50 (6.89)	0.031

*definition of FAI at 3 O'clock: greater than 55°

Discussion

- Incidence of Cam morphology: 15%
 - Consistent with adult literature
- Genetic predisposition to cam FAI exists
- Extrinsic forces during physeal closure influence development of cam morphology
- Activity level is a modifiable risk factor in the development of cam FAI



Conclusions

- Cam FAI **does** develop during skeletal maturity
- Activity level **is** a risk factor for radiographic cam FAI

References

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