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? Genetics2,3,4 and Environment5,6,7
  - Pauwel principle – Intermittent pressure within the limits of physiologic stress stimulates growth plates

• Ottawa cross-sectional study8
  - 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 reformats
• Read by blinded MSK fellowship trained radiologist (KR)
• Cam FAI: Alpha angle >55° at 3:00 or >60° at 1:30

Results

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

Results (continued)

Table 1. Demographics: pre versus post physeal closure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-Physeal Closure</th>
<th>Post-Physeal Closure</th>
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<tbody>
<tr>
<td>Sex (male/female)</td>
<td>9/11</td>
<td>9/11</td>
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<tr>
<td>Mean Age in years (SD)</td>
<td>10.55 (1.39)</td>
<td>16.71 (1.33)</td>
</tr>
<tr>
<td>Mean Body Mass Index (Kg/m) (SD)</td>
<td>19.93 (4.43)</td>
<td>25.03 (5.83)</td>
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• Mean alpha angle:
  • 3:00 position: 38° → 41° (p=0.003)
  • 1:30 position: 44° → 50° (p<0.001)

• Hip ROM:
  • Prone IR: 58° → 46° (p= 0.001)
  • Cam vs No Cam IR: 41 vs 53 (p=0.076)

• Cam morphology:
  • 3/20 (15%) incidence
  • All males
  • one bilateral

Discussion

• Indicence 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