Prevalence of Femoroacetabular Impingement Imaging Findings in Asymptomatic Volunteers: A Systematic Review

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Introduction

- Femoroacetabular impingement (FAI)
  - Abnormal osseous morphology
    - Proximal femur
    - Acetabulum
  - Labral injury
- FAI may be a precursor to hip osteoarthritis
  - Etiology, incidence, prevalence, symptomatology are incompletely understood
- It is unknown what the radiographic prevalence of FAI is in asymptomatic individuals
Purpose:

To perform a systematic review and meta-analysis that identifies and reports the prevalence of radiographic findings indicative of FAI and labral injury in asymptomatic individuals.
Methods

• PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines utilized

• Eligible studies investigated \textit{asymptomatic} subjects with imaging findings indicative of FAI
  – Plain radiographs
  – Magnetic resonance imaging (MRI)
  – Computed tomography (CT)

• Excluded:
  – Symptomatic subjects
  – Subjects with osteoarthritis
Methods

- **Proximal femur**
  - Alpha angle
  - Head-neck offset
  - Head-neck offset ratio
  - Triangular index
  - Pistol grip deformity
  - Asphericity

- **Acetabulum**
  - Crossover sign
  - Posterior wall sign
  - Ischial spine sign
  - Lateral center edge angle
  - Anterior center edge angle
  - Tonnis angle
  - Acetabular version
  - Coxa profunda
  - Protrusio acetabulae
  - Femoral head extrusion index
Methods

- Potentially relevant studies identified and screened (N = 237)
  - Potentially relevant studies identified and screened (N = 38)
  - Potentially relevant studies identified and screened (N = 34)
  - Potentially relevant studies identified and screened (N = 33)
  - Potentially relevant studies identified and screened (N = 29)
- Studies reporting on non-FAI pathologies (N = 199)
  - Studies reporting on ultrasound or bone scan modalities (N=4)
  - Non-English (N = 1)
  - Review articles (N = 4)
  - Symptomatic patients (N = 3)
- Final studies included for analysis (N = 26)
Results

• 26 studies (2,114 asymptomatic hips)
  – 57% male; 43% female
  – 33% athletes
    • NFL and NCAA football, army recruits, elite hockey
  – Mean subject age 25 ± 1.5 years
Results

- Prevalence of cam morphology 37% (7 - 100%)
- Mean alpha angle 54 ± 5.1°
  - X-ray (9 studies)
  - MRI (9 studies)
• Prevalence of pincer morphology 67% (61 - 76%)
• Mean lateral CEA 31 ± 4.9°
• Mean anterior CEA 30 ± 7.8°
• Each study had unique pincer definition
Results

• Prevalence of labral injury **68%**
  – 7 studies (MRI without arthrogram)
Results

$p < 0.05$

Cam Pincer Labral injury

Athlete

General population
Discussion

- High prevalence of FAI radiographic findings
  - Selection bias
    - High proportions athletes (33%)
    - Males > Females
    - Systematic review study selection process

- Higher prevalence of cam FAI in athletes
  - Cam → Labral injury

- Higher prevalence of pincer FAI in general population
  - Heterogeneity and imprecision in “definition” of pincer

- High prevalence of labral injury
  - Isolated indication for hip preservation surgery?
  - No arthroscopic correlation
Conclusions

• FAI morphology and labral injuries are common in asymptomatic patients
• Clinical decision-making should emphasize patient history and physical exam, rather than relying solely upon imaging


