Characterization of Symptomatic Hip Impingement in Butterfly Ice Hockey Goalies

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Disclosure

• None of the contributing authors nor any family members have conflicting financial relationships related to this presentation.
Background

• The "butterfly" is a commonly employed goalie technique in ice hockey
• Popularized by Glen Hall for effective defense of low and medium height shots
• Positions are demanding and require:
  – hip flexion
  – hip abduction
  – hip internal rotation
• Unique demands of this technique may predispose athletes to an increased risk of symptomatic hip impingement

• Purpose: To report on the radiographic deformity observed in a consecutive series of butterfly goalies with symptomatic, mechanical hip pain.
Methods and Materials:

• A consecutive series of 35 hips in 22 high school, collegiate, and professional butterfly goalies surgically treated for symptomatic hip pain were reviewed from 2004 to 2010.

• Well-aligned AP pelvis and modified Dunn lateral radiographs analyzed preoperatively (n=35) and postoperatively after arthroscopic decompression and labral re-fixation (n=25).
  
  — All patients with greater than Kellgren-Lawrence I degenerative changes were excluded.

• Measurements
  
  — AP and Lateral $\alpha$ angle
  — Lateral $\beta$ angle
  — Femoral head-neck offset
  — AP center-edge angle (CEA) of Wiberg
  — Cross-over sign (cranial retroversion)
  — Performed by two independent observers in a blinded fashion.
Representative Cases
Representative Cases
Representative Cases
Results

• All of the butterfly goalies demonstrated femoroacetabular impingement (FAI) with the unique features of:
  – Large cam lesion with distal and anterosuperior extension
  – With significant anterosuperior femoral cam and loss of head-neck offset.
  – Anterior acetabular overcoverage +/- significantly low AIIS
  – Often low-volume acetabulum with posterosuperior deficiency
Results

• **PREOPERATIVE**
  - AP alpha angle:   $67\pm10.4^\circ$
  - Lateral alpha angle :   $77.4\pm10.9^\circ$
  - Coronal CE angle:   $34.8\pm6.5^\circ$
  - Cross-over sign:  17 of 35 (49%)
  - Head-neck offset:   $0.8\pm3.4$mm
  - Beta angle:   $15.2\pm10.4^\circ$

• **POSTOPERATIVE**
  - AP alpha angle:   $54.4\pm7.4^\circ$ ($\Delta12.6^\circ$)  \(p<0.05\)
  - Lateral alpha angle:   $49.6\pm10.2^\circ$ ($\Delta27.8^\circ$)  \(p<0.05\)
  - Coronal CE angle:   $32.0\pm7.45^\circ$ ($\Delta2.8^\circ$)  \(p>0.05\)
  - Head-neck offset:   $7.95\pm1.8$mm ($\Delta7.15$mm)  \(p<0.05\)
  - Beta angle:   $44.8\pm11.9^\circ$ ($\Delta29.6^\circ$)  \(p<0.05\)
Discussion

• FAI is frequently observed in butterfly hockey goalies with symptomatic hip and groin pain
  – Cranial acetabular retroversion observed in approximately half of cases
  – Significant cam deformity with distal and anterosuperior extension

• Arthroscopic osteoplasty challenging but can successfully address the deformity completely on AP and modified Dunn lateral images

• Future clinical and biomechanical studies are necessary to characterize the impact on hip kinematics and functional outcomes

• Significant demands of hip flexion, abduction, and internal rotation with the butterfly goalie technique may predispose these athletes to develop symptomatic hip impingement.
Thank You