FEMORAL ACETABULAR IMPINGEMENT

Background
1. Definition - Osseous deformities on acetabular rim, femoral head-neck junction or both
   - At extremes of hip motion, can cause injury to acetabular labrum and cartilage
   - Results in pain and loss of motion.1
2. General Information – Two Types
   - Cam type – Anterior femoral neck loses concave anatomy
     - More common in young males.
   - Pincer type - Arises when anterior acetabular rim is prominent relative to posterior rim, or there is excessive coverage of acetabulum
     - Impinges on femoral neck during movement.
     - More common in middle aged women.
   - Mixed type can occur

Pathophysiology
1. Pathology of Disease - aberrant contact between acetabular rim and femoral head-neck complex during terminal motion
   - Causes lesions on acetabular rim or labrum leading to degenerative changes.2
2. Prevalence
   - Radiographic findings: In cohort of over 2,000 young adults
     - CAM impingement occurred in 35% of males, and 10% of females
     - Pincer type occurred in 34% of males and 17% of females.3
   - Clinical prevalence of hip impingement estimated at 10-15%.3
3. Risk Factors
   - Non spherical femoral head
   - Coxa Vara/Profunda
   - Mal-united femoral neck fracture
   - Legg-Calve-Perthes disease
   - Slipped capital femoral epiphysis
   - Prior femoral osteomy
   - Os acetabuli
   - Post-trauma
   - Protrusio acetabuli.
4. Morbidity / Mortality–can be a cause of chronic hip pain.
   - Reportedly associated with an increased risk of developing osteoarthritis at an earlier age2.
   - Also an association with increased incidence of labral tears.

Diagnostics
1. History
   - Commonly insidious onset
   - Young active adults
   - Pain initially intermittent, worsened by activities with terminal motion
o Pain deep in anterior hip/groin
o Catching, locking, clicking
o Pain worse after prolonged sitting or stair climbing (SOR:B).\(^4\)

2. Physical Examination
   o Positive C-Sign
     - Patient identifies the location of pain by gripping hip between abducted thumb and index finger just above and slightly anterior to greater trochanter
   o Limitation of internal rotation and adduction
     - Pain with FADIR test (forcing the hip into Flexion ADduction and Internal Rotation - (SOR:B)\(^4\)
   o Limitation of flexion, abduction and external rotation (FABER) (SOR:B)\(^4\)
   o Posterior Inferior Impingement test
     - Pain with passive external rotation of a hyperextended hip\(^4\)

5. Laboratory evaluation—none directly for condition
   o In appropriate clinical setting rheumatologic testing may be necessary to exclude other diagnoses.

6. Diagnostic imaging
   o Radiographs
     - Standing AP of pelvis to look for cross-over sign and to evaluate for arthritic changes.
     - Dunn view: Axial view of hip with hip in 45 degrees of flexion and abducted 20 degrees will evaluate for:
       - Osseous protuberance on anterior aspect of femoral neck
       - Reduced offset of femoral head-neck junction
       - Pronounced acetabular rim
       - Can be used to measure the alpha angle (SOR:A)\(^5,6,7\)
     - Cross-over sign
       - Anterior acetabular wall crosses over posterior wall and projects laterally rather than medially as it does in normal acetabulum\(^1\)
     - Alpha Angle
       - Angle between line drawn from center of femoral head through central axis of femoral neck and a second line drawn from center of head exceeds radius of subchondral femoral head
       - Normal is less than 55 degrees
   o MR arthrogram
     - MRI identifies depth and coverage of acetabulum, anterior femoral neck thickening or abnormal osseous protrusion.
     - Arthrogram enhances identification of labral tears.(SOR:B)\(^5,6,7\)

7. Diagnostic Criteria
   o Presence of clinical signs of impingement (SOR:B)
   o Evidence of Pincher Impingement/Alpha Angle greater than 55 degrees (SOR B)
   o Evidence of Cam Impingement/Crossover sign (SOR:B)
Differential Diagnosis

1. Key Differential Diagnoses
   o Athletic Pubalgia/sports hernia
   o Developmental dysplasia of the hip
   o Groin strain
   o Osteonecrosis of the femoral head
   o Iliopsoas impingement/_snapping hip
   o Trochanteric bursitis
   o Septic arthritis
   o Intra-articular loose body
   o Extensive Differential Diagnoses
     o Tumor of pelvis or spine
     o Intra-abdominal/pelvic pathology - appendix, ovarian cyst, endometriosis
     o Direct/Indirect Hernia

Therapeutics

1. Conservative Management\textsuperscript{8,9,10}
   o Initially patients undergo either rest, or relative rest depending on severity of symptoms.
   o For mild symptoms
     ▪ Avoid motions and activities that exacerbate symptoms.
     ▪ Seat position modification in biking
     ▪ When running, avoid treadmill and narrow straight trails; instead use zigzag or open courses.\textsuperscript{11}
   o NSAIDs for pain and/or other inflammatory causes.
   o Physical Therapy/Stretching
     ▪ Improve external rotation and abduction
     ▪ If tolerated well, add internal rotation stretches and flexion
   o Corticosteroid Intra-Articular Injections
     ▪ Can be used alone or in combination with MR arthrogram to provide diagnostic information
     ▪ Pain improvement can indicate intra-articular pathology
   o Surgical Management
     ▪ Open approach includes visualization of femoral head, labrum and acetabulum by dislocating hip
       ▪ Followed by removal of CAM and/or Pincher defects and possible repair or debridement of labral tears\textsuperscript{12,13}
     ▪ Arthroscopic approaches include examination of central compartment (inside joint capsule) with debridement and peripheral compartment with debridement/resection of osteophytes.\textsuperscript{8}

Follow-Up

1. Return to Office
   o Patients will likely need 4-6 weeks of modified activity and physical therapy interventions before follow-up.
   o Worsening of pain symptoms, mechanical or locking symptoms should follow-up sooner as surgical necessity is more likely.
2. Refer to Specialist
   - Diagnostic studies that indicate labral and/or articular cartilage pathology
   - Failure to improve symptoms after conservative management in those with CAM or pincer morphology without identified labral tear

**Prognosis**
1. Not well documented.
2. Current literature only discusses short-term and mid-term follow-up
   - Long-term follow-up studies limited at this time.

**Prevention**
1. None

**Patient Education**
1. Handout from American Academy Family Physicians - Hip Impingement
2. Handout from American Academy of Orthopedic Surgeons - Femoroacetabular Impingement

**References**
7. Leunig, M., Robertson, W., Ganz, R. Femoroacetabular Impingement: Diagnosis and Management, Including Open Surgical Technique. Oper Tech Sports Med. 15:178-188.


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