

Diagnosis and Treatment of Cam Lesions in the Hip

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Disclosures

- None pertaining to talk

Outline

- Anatomy
- Etiology
- Associated injuries
- Clinical diagnosis
- Imaging
- Treatment



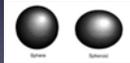
Cam Impingement

- Cam definition
 - a rotating or sliding piece (as an eccentric wheel or a cylinder with an irregular shape) in a mechanical linkage used especially in transforming rotary motion into linear motion or vice versa



Cam Impingement

- Loss of sphericity
 - Increased diameter of femoral neck in relationship to femoral head
 - Sphere to egg
 - Result is impact to the acetabular rim with ROM

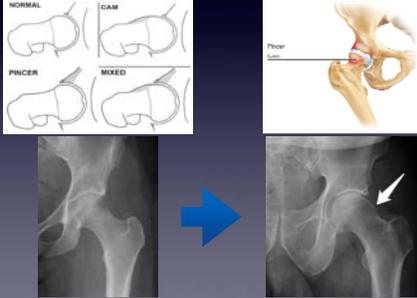


Cam Impingement

- Stulberg and Harris 1974
 - First described what is now termed a "cam lesion" as a "pistol grip deformity"
 - Found to be common in patients presenting with OA of the hip
- Ganz R, Parvizi J, Beck M, Leunig M, Notzli H, Siebenrock KA. [Femoroacetabular impingement: a cause for osteoarthritis of the hip.](#) Clin Orthop Relat Res. 2003;417:112–120.
- First coined the term FAI and described its relationship to the development of hip OA

FAI: Basics

- Cam vs. Pincer vs. Mixed



Etiology



- Abnormal contact between femoral head and acetabulum
 - Hack K, JBJS 2010
 - MRI study of asymptomatic volunteers
 - 14% with at least one hip with cam impingement
 - 3.5% with bilateral deformities
 - 79% of pathology in men

Etiology



- Cam impingement
 - Male predominance
 - Genetic predisposition
 - Increased RR among siblings
 - Increased incidence in western hemisphere
 - SCFE
 - Legg-Calve-Perthes disease

Etiology



- Developmental?
 - Cam lesion present in 94.3% of NFL players at combine with history of hip injury or complaints
 - Present in 95% of hips in asymptomatic college football players
 - Present in 50% of female collegiate athletes

Etiology

- Siebenrock KA, Kaschka J, Frauchiger L, et al. [Prevalence of cam-type deformity and hip pain in elite ice hockey players before and after the end of growth](#). Am J Sports Med 2013;41:2308–13.
- Siebenrock KA, Ferner F, Noble PC, et al. [The cam-type deformity of the proximal femur arises in childhood in response to vigorous sporting activity](#). Clin Orthop Relat Res 2011;469:3229–40.
- Agricola R, Bessems JH, Ginai AZ, et al. [The development of cam-type deformity in adolescent and young male soccer players](#). Am J Sports Med 2012;40: 1099–106.

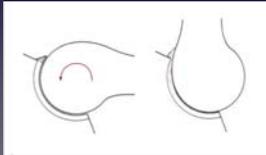
Etiology



- Nepple JJ, Vigdorich JM, Clohisy JC. [What is the association between sports participation and the development of proximal femoral cam deformity? A systematic review and meta-analysis](#). Am J Sports Med 2015;43(11):2833–40.
- Meta-analysis evaluating studies comparing prevalence of cam lesions in athletes to a control population
- High level male athletes are 1.9-8.0 times more likely to develop a cam lesion than male controls
- Repetitive mechanical forces on the developing proximal femoral physis likely results in osseous overgrowth
- Factors contributing to cam lesions are likely genetic and environmental

Associated injuries: Cam

- Shear forces at anterosuperior acetabulum
 - Labrochondral separation
 - Articular cartilage injury



Associated Injuries

- Clohisy JC, Baca G, Beaulé PE, Kim Y-J, Larson CM, Millis MB, et al. [Descriptive epidemiology of femoroacetabular impingement: a North American cohort of patients undergoing surgery](#). Am J Sports Med (2013) 41(6):1348–56.
- 93% of patients undergoing surgery for FAI had a labral tear and 83% had cartilage injury

Associated Injuries

- Relationship to osteoarthritis
 - Multiple studies correlating severity of cam lesion to development of OA
 - Mechanism thought to be from direct cartilage injury and labral injury resulting in loss of fluid barrier



Associated Injuries

- Bedi A, Lynch EB, Enselman ER, Davis ME, DeWolf PD, Makki TA, et al. [Elevation in circulating biomarkers of cartilage damage and inflammation in athletes with femoroacetabular impingement](#). Am J Sports Med (2013) 41(11):2585–90.
- Males with FAI had statistically significant increases in biomarkers associated with cartilage degradation and inflammation
- Elevation in Cartilage Oligomeric Matrix Protein (COMP) and CRP
- No long term studies demonstrate reduction in OA from surgical intervention for FAI

FAI: History

- Groin pain on deep flexion
- Extended walking, sitting; athletic activities
- Mechanical symptoms may indicate labral tear or cartilage flap
- Loss of internal rotation, limitation of abduction

FAI: Physical Exam

- Impingement test
- Flexion to 90, adduction, internal rotation
- Posterior impingement test
- External rotation with extension



FAI: Diagnosis

- Differential diagnosis
 - Hip "mimickers"
 - Iliopsoas tendinopathy
 - IT band syndrome
 - Adductor and piriformis strains
 - Sports hernia
 - Gastrointestinal or Genitourinary conditions



FAI: Imaging

- X-ray
 - AP and cross table lateral x-rays
 - Pistol grip deformity



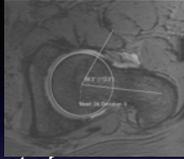
FAI imaging

- Dunn lateral view
 - Measurement of alpha angle
 - Best fit circle
 - Line drawn at center of neck and intersection to circle
 - >55 degrees considered abnormal
 - Can also be used to quantify offset



FAI: Imaging

- MRI
- Allows precise measurement of acetabular version, center-edge angle
- Alpha angle
- Impingement cyst
- Labral tears and chondral lesions



FAI: Imaging

- CT scans
- Fine cuts with 3d reconstructions
- Shown to enhance accuracy of alpha angle measurement and evaluation of area involved



FAI: Imaging

- Heyworth BE, Dolan MM, Nguyen JT, et al. [Preoperative three-dimensional CT predicts intraoperative findings in hip arthroscopy](#). Clin Orthop Relat Res 2012; 470:1950–7.
- Increasing values of CT based alpha angles had a high correlation with intraarticular pathology

FAI: Treatment

- Nonoperative treatment
 - Abductor strengthening
 - Maintenance of hip flexibility
 - Core strengthening
 - Improved body mechanics may prevent impingement in terminal ROM
 - NSAIDS
 - Injections



FAI: Treatment

- Hip arthroscopy
 - Michael S. Burman 1931
 - First attempt at hip arthroscopy on cadaveric specimens
 - Takagi 1939
 - First documented use of hip arthroscopy in clinical setting
 - Two charcot joints, one tuberculous arthritis, one septic arthritis
 - Further refinements in the past two decades

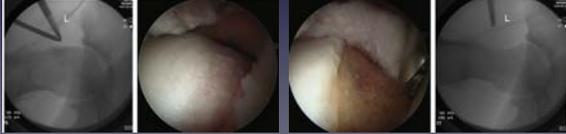


Hip arthroscopy

- Performed in supine position
- Two to three portals utilized
- Traction to distract joint
- Key to addressing intraarticular pathology



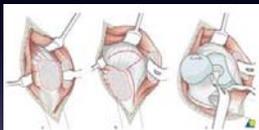
Hip arthroscopy



Open surgical dislocation

- Developed by Ganz et al
- Allows for safe dislocation of hip w/o disruption of vascular supply
- Osteoplasty performed in open fashion

Open surgical dislocation



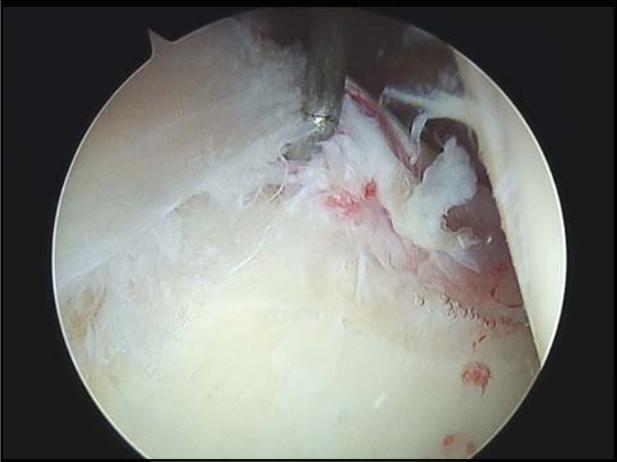
Case Example

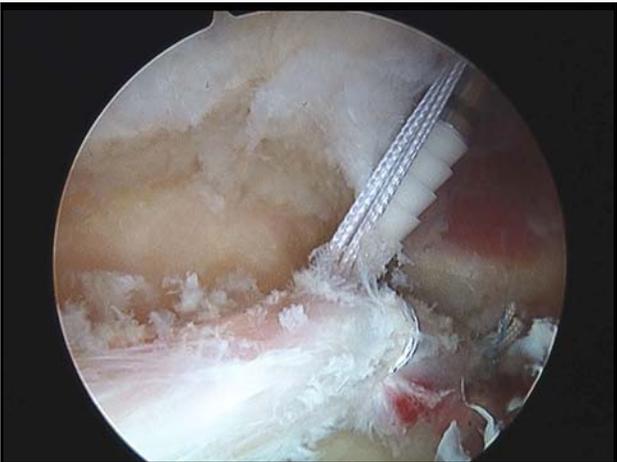


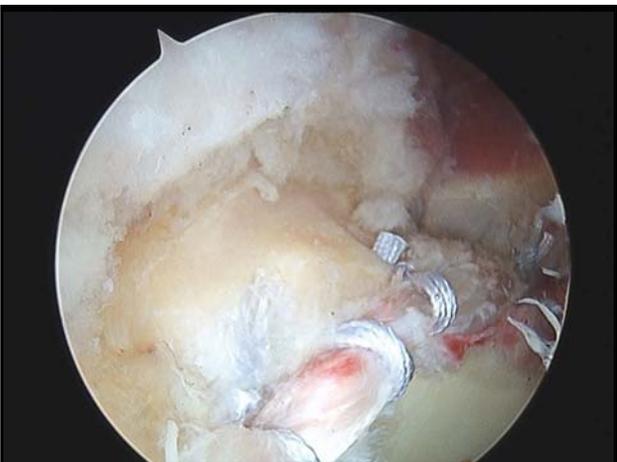
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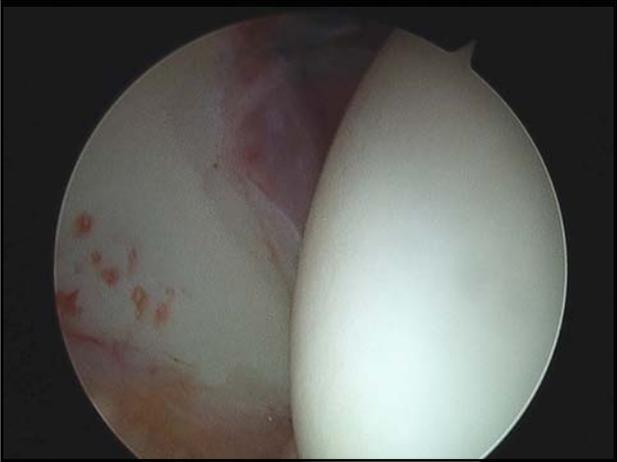
















Thank You!
