Keynote: What I have learned in over a decade about femoroplasty and CAM lesions

FAI Myth or reality
1. Proof of concept-Femoroplasty (Osteochondroplasty)
2. Etiology of the CAM defect
3. Classification CAM defect?
4. Damage to the labrum and acetabulum
5. Technique of Femoroplasty
6. Results of Femoroplasty
7. Failures of Femoroplasty
8. Recurrence of the CAM defect
9. Long term implications and outcomes?

Complication of Periacetabular Osteotomy
The impingement is produced by abutment of the femoral head or head to neck junction on the anterior rim of the properly aligned acetabulum. The symptoms are those of restricted flexion, and limited or absent internal rotation in flexion, with variable groin pain.

Etiology
“Doctor, why did I develop this bump”
1. Osteophyte
2. Enesthesis
3. Bunion of the femoral head-neck junction
4. Genetic predisposition
5. Exercise related
6. Why phenotypically expressed at different ages 12-85 years old
7. Male vs female types
8. Mega vs. micro-CAMs
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The most common question from patients....

- Doctor, what causes the bony deformity?
- Wolff’s law? states that bone in a healthy person or animal will adapt to the loads under which it is placed
- Is it reactive bone from abutment "Bunion of the Hip?"

Bone grows toward force

Asphericity of the Femoral Head may be a variation of "Normal" Poirier’s Facet/ Reaction Area

Variation of the Anterior Aspect of the Femoral Head-Neck Junction in a Modern Human Identified Skeletal Collection

Nico Radi,1* Valentina Mariotti,1 Alessandro Riga,1 Stefania Zampetti,1 Chiara Villa,2 and M. Giovanna Belcastro1


Aspherical Head thought to be Normal Lead to an Aspherical Hip Prosthesis

The etiology of primary femoroacetabular impingement: genetics or acquired deformity?

Jonathan D. Packer and Marc R. Safran*

1. Etiology of primary FAI remains controversial.
2. Both genetic and acquired causes have been postulated and studied.
3. No conclusive evidence transmitted genetically.
4. Currently, most popular theory development of cam-type deformities is repetitive injury to the proximal femoral physis occurs during a critical period of development.
5. Correlation of high volume of impact activities during adolescence and the development of cam-type deformities.
6. Multiple studies have found a high prevalence of FAI in elite football, ice hockey, basketball and soccer players. In this article, we review the current literature relating to the etiology of primary FAI

Learned to look at X-rays differently

- Appears normal
- Look for subtleties
**Alpha (α) Angle Nötzli**
- Quantify concavity of femoral head-neck junction
- Abnormal alpha angle: Wide femoral neck, osteophytes, posterior displacement of femoral head

**Subtle MRI may indicate bad damage**

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**Imaging**
- Position of the CAM
- Xray series AP Pelvis, Frogleg, Shoot through lateral, False profile
- 3D-CT (The Plan®)
- MRI vs MRA with Radial imaging

**Final Image is Surgical**

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**FAI is associated with other pathology**
- Osteoid Osteoma and Impingement
- PVNS and Impingement
- Synovial Chondromatosis and Impingement

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- FAI is associated with other pathology
  - CPPD (Calcium Pyrophosphate Disease) and Impingement

- FAI can develop as a complication to THR
  - 59 Y.O. Male ex-Firefighter 4 yrs. post op with painful left hip and severe limited ROM

- FAI is associated with other pathology
  - Post Arthroplasty CAM and Impingement

- Femoral Heads are Aspherical and each very different
  - Female Dancer
  - Male Bullrider

- The prevalence of cam-type femoroacetabular deformity in asymptomatic adults
  - Males mean α-angle was 59.12°:
    - 15.95% defined as pathological
    - 14.88% borderline
    - 71.16% normal
  - Female mean α-angle was 45.47°:
    - 5.56% defined as pathological
    - 6.11% as borderline
    - 88.33% as normal.

- Femoroacetabular impingement and classification of the cam deformity: the reference interval in normal hips
  - Anterior Offset Ratio (AOR)
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“CAM Perspective”
1. Seeing the conflict from both sides of the joint
2. It’s a dance between the acetabular rim and the head-neck junction causing:
3. Reaction and Damage to the articular cartilage, bone, and labrum

The way I see it
CAM Classification
1. Obvious
2. Micro-CAM
3. Soft tissue CAM
4. Reaction to the Pincer

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CAM Surgery “Femoroplasty”
1. Femoroplasty
2. Open vs. Scope
3. Learning Curve
4. Volume and shape of femoroplasty
5. Too Much vs. Too little
6. Protect the Head Blood Supply
7. Maintaining the labral seal
8. Protect the labral repair

Femoroplasty
Both Effective and Arthroscopic has Evolved
Open Surgical Dislocation Arthroscopic

Capsulotomy is mandatory for exposure

Capsulotomy Debate
“To close or not”
Capsulotomy used in the open technique of surgical dislocation

Optimize Access with Capsulotomy and Expose the Femoral Neck

Learning Curve is shortened with ideal exposure and a planned technique

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Note Pincer Demarcation Zones

Too Much too little resection

Excessive head neck resection

Spontaneous Fracture at 6 Post Op weeks on Remicade

Femoral neck fractures after arthroscopic femoral neck osteochondroplasty for femoroacetabular impingement.

Mardones RM, Gonzalez C, Chen Q, Zobitz M, Kaufman RR, Trousdale RT

Femoral neck insufficiency fractures

Surgical treatment of femoroacetabular impingement: evaluation of the effect of the size of the resection

1.9% in 430 hips
Residual deformity is the most common reason for revision hip arthroscopy: a three-dimensional CT study.

- (1) define the three-dimensional (3-D) morphology of hips with residual symptoms before revision femoroacetabular impingement (FAI) surgery
- (2) determine the limitation in range of motion (ROM) in these patients using dynamic, computer-assisted, 3-D analysis
- (3) compare these measures with a cohort of patients who underwent successful arthroscopic surgery for FAI by a high-volume hip arthroscopist.

Arthroscopic femoroplasty in the management of cam-type femoroacetabular


One of many studies that show proof of concept... Arthroscopic femoroplasty is effective and beneficial using a less invasive technique compared to open surgical dislocation.

Pre-Op Fluoroscopic Evaluation

Post Op Fluoro Check: Conflict removed

Conflict removed

Post Op Fluoro Check: Compare with pre-op

Contour the femoroplasty to preserve and test for labral seal

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What to do with the Fibro-osseous cyst

Open Physis Femoroplasty

My opinion is that recurrence occurs!
Lack of complete resection also occurs!!

The Trend (Future)
Computer assisted Plan® and Surgery

Conclusion: There was no recurrence of cam deformity at 2 years after femoral neck osteoplasty for femoroacetabular impingement.
PRO scores were improved at the 3-month and 2-year postoperative time points.

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Last words
- Has it become the SAD (Sub-acromial decompression) of the hip?
- What are the Long term implications and outcomes?
- Are we modifying “normal” anatomy on many?
- Pick the right patients and the right reasons.
- Obtain good exposure
- Be conservative with the resection and slope
- Maintain a labral seal
- Be critical of your work and document with images to aid in the learning curve

Thank You

Thank you