I. Evaluation of the Failed Hip Arthroscopy (Including Revision Outcomes)

Why do hip arthroscopy procedures fail?
Bogunovic L, Gottlieb M, Pashos G, Baca G, Clohisy JC.

- Characterized patients whose symptoms recurred after hip arthroscopy necessitating a revision hip preservation procedure or hip arthroplasty, (2) determined the etiologies of failure, (3) and reported the profile of revision surgical procedures.
- In a prospective database of 1724 consecutive hip surgeries, we identified 58 patients (60 hips) with a history of failed hip arthroscopy. Thirty-seven patients (38 hips) underwent revision hip preservation and 21 (22) hip arthroplasty. Thirty-nine (67%) were female. Demographics, etiology of failure, and type of revision surgery were analyzed.
- Patients treated with revision hip preservation were younger, had a lower BMI, and lower Tönnis osteoarthritis grade at the time of revision surgery compared to patients treated with hip arthroplasty. Common etiologies of failure were residual femoroacetabular impingement (68%) and acetabular dysplasia (24%) in patients treated with revision hip preservation and advanced osteoarthritis in patients treated with hip arthroplasty. The revision preservation procedures included arthroscopy in 16 (42%), arthroscopy with limited open capsulorraphy in two (5.3%), periacetabular osteotomy in nine (24%), and surgical dislocation in 12 (32%)
- Residual or unaddressed structural deformity of the hip and underlying osteoarthritis are commonly associated with failure after hip arthroscopy. Thorough patient evaluation with detailed characterization of structural hip anatomy and articular cartilage integrity are critical to the selection of proper surgical intervention and successful patient outcome.

1. The Incorrect Diagnosis

   a. Challenges of physical exam; limited sensitivity and specificity.
   b. Difficulty in interpretation of radiographs and risk of false-positive findings.
      i. The crossover sign overestimates acetabular retroversion.
         Zaltz I, Kelly BT, Hetsoni I, Bedi A. Clin Orthop Relat Res. 2013 Aug;471
      ii. Radiographic evaluation of the hip has limited reliability.
   c. The Value of 3D Imaging and dynamic analysis.
      ii. Occult Dysplasia
      iii. Risk of Extra-articular Impingement
         1. Subspine Impingement
         2. Trochanteric-Pelvic Impingement (Perthes, Excessive Anteversion, Ischiofemoral Impingement Patterns)
   d. Confounding Compensatory Injuries and Athletic Pubalgia.

Layered Evaluation to the Hip

- Layer 1: Osteochondral Layer, Mechanics of joint
  - Structures: Femur, Pelvis, Acetabulum
  - Purpose: Joint congruence and normal osteo / arthro kinematics
    - Dynamic Impingement
      - Cam Impingement
      - Rim Impingement
      - Femoral Retroversion
      - Femoral Varus
    - Static Overload
      - Acetabular Dysplasia
      - Femoral Anteversion
      - Femoral Valgus
- Layer 2: Inert Layer
  - Structures: labrum, joint capsule, ligamentous complex, ligamentum teres
  - Purpose: Static stability of the joint
    - Labral Injury
    - Cartilage Injury
    - Capsular Injury
    - Instability
    - Adhesive capsulitis
- Layer 3: Dynamic Layer
  - Structures: All musculature including lumbosacral musculature
  - Purpose: Dynamic stability
    - Hemi-pelvis – “Pubalgia”
    - Medial Enthesopathy
      - Adductor Tendinopathy
      - Rectus Tendinopathy
    - Anterior Enthesopathy
      - Hip Flexor Strain
      - Psoas Impingement
      - Sub-Spine Impingement
    - Posterior Enthesopathy
      - Proximal Hamstring Syndrome
    - Lateral Enthesopathy
      - Peritrochanteric Space Disorders
- Layer 4: Neural Layer
  - Structures: TLS Plexus, Lumbopelvic structures, LE structures
  - Purpose: Neuromuscular linking and functional control of the entire segment as it functions within its environment
    - Nerve compression syndromes
    - Pain syndromes
    - Neuromuscular dysfunction
    - Spine referral patterns
2. Technical Limitations in Accomplishing the Desired Correction

a. Deformity not amenable to an arthroscopic approach
   i. SCFE (excessive head tilt and epiphyseal translation)
   ii. Perthes (Vara, breva with trochanteric-pelvic impingement)
   iii. Global over-coverage (profunda, protrusion deformity)
   iv. Extensive posterior or superior cam-type extension


b. Errant portal placement

   c. Poor visualization
      i. Inadequate exposure
      ii. Inadequate dynamic examination

d. Inadequate Correction
   i. Primary reason for revision surgical intervention
   ii. Inadequate use of intraoperative fluoroscopy
   iii. Inadequate dynamic examination
   iv. Inadequate access and exposure to circumferential head-neck junction for full restoration of sphericity and offset.


3. Poor Management of the Soft Tissues and Iatrogenic Injury to the Chondral Surfaces and Capsulolabral complex

a. Iatrogenic Muscle Injury and Heterotopic Ossification

b. Poor capsular management (i.e. capsulectomy), psoas lengthening/release
   i. Iatrogenic Instability


c. Iatrogenic chondral injury

d. Poor management and preservation of the labrum

4. Too Much Arthritis

i. <2mm was predictive of conversion to hip arthroplasty.
i. 25% of arthroscopies with arthritis were converted to THR.

5. Inadequate Rehabilitation

i. Phase 1 should be to protect healing tissues through activity modifications.
ii. Phase 2 intends to return the patient to pain-free community ambulation without compensation or irritation. A review of hip muscular actions during gait is presented to guide exercise progressions during this phase.
iii. Phase 3 should reestablish neuromuscular control through strength and endurance training to provide the foundation for return to functional activities or sports training progressions.

Revision Hip Arthroscopy Outcomes
Hip arthroscopy is being performed with increasing frequency. Femoroacetabular impingement (FAI) may be the most frequent diagnosis for performing hip arthroscopy, and there is a steep learning curve when performing this procedure. The increasing number of surgeons performing these procedures combined with this steep learning curve have the potential to result in an increasing number of failed hip arthroscopies. There is very limited data in the literature regarding revision hip arthroscopy.

**Arthroscopic Hip Revision Surgery for Residual FAI: Surgical Outcomes Compared to a Matched Cohort after Primary Arthroscopic FAI Correction. Larson et al, AJSM in submission**

- 79 patients (85 hips) underwent arthroscopic revision FAI correction (mean 20.8 months follow-up). There were 98 previous arthroscopic surgeries and 4 previous surgical dislocations. There were 35 males and 44 females with a mean age of 29.5 years (range 16 - 59). 80 hips had residual cam-type FAI, and 64 hips had residual pincer-type FAI and underwent femoral and rim resections, respectively. The labrum was debrided in 27 hips, repaired in 48 hips, and reconstructed with allograft in 8 hips. Adhesions were excised for 54 hips.
- The results of revision arthroscopic FAI correction were compared to 221 patients (239 hips) that underwent primary arthroscopic FAI correction (mean 22.7 months follow-up).
- The mean improvement for outcomes scores after revision FAI correction was 18.9 points (MHHS, p<.01), 13.4 points (SF-12, p<.01), and 2.2 points (VAS, p<.01) compared to 24.1 points (MHHS, p<.01), 25.1 points (SF-12, p<.01), and 5.4 points (VAS, p<.01) after primary arthroscopic FAI correction.
- Most recent outcomes scores and mean improvement in outcome scores were significantly better after primary (81.4% good/ excellent results) compared to revision (69.8% good/excellent results) FAI correction (MHHS (p=.042), SF-12 (p<.01), VAS (p<.01).
- Outcomes were inferior to those after primary arthroscopic FAI corrective surgery.


**Philippon et al, Revision Hip Arthroscopy, AJSM, Vol. 35, No. 11;1918-21, 2007**

**Heyworth et al, Radiologic and Intraoperative Findings in Revision Hip Arthroscopy, Arthroscopy, Vol 23, No 12;1295-1302, 2007.**