Arthroscopic Femoral Head Partial Resurfacing

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Chondral Injuries

• **Acute**
  - Dislocation/subluxation
  - Lateral impact injury
    (Byrd Clin Sport Med 2001)

• **Chronic**
  - Femoroacetabular impingement
    (Ganz JBJS Br 2005)
  - Degenerative
Treatment Options

• **Femoral head:**
  - Chondroplasty
  - Microfracture
  - OBI bone graft substitute plugs
  - Partial arthroplasty
  - OATS/Mosaicplasty

• **Acetabulum**
  - Chondroplasty
  - Microfracture
  - OBI bone graft substitute plugs
  - OATS/Mosaicplasty
Partial resurfacing

- Used in the hip to:
  - Treat large (>2 cm) grade IV chondral defects on the femoral head with minimal diffuse changes and inadequate bleeding
  - Collapsed AVN and loss of cartilage cap
  - Delay THA
- 30 arthroscopic femoral head partial resurfacing procedures performed between June 2003 and September 2005
Principles

• Treat central compartment pathology (acetabular chondral defect, labral tears, pincer)
  • Treat Cam if present in the peripheral compartment
  • Treat femoral head chondral defect
  • If lesion is too central, convert to open approach
Microfracture

**Indications:**

- Focal/contained chondral lesions
- Typically less than 2-4 cm in size
- Full-thickness (grade IV) defect
- Unstable lesion with intact subchondral bone
- DJD lesion (focal and not too extensive)
Microfracture

Contraindications:

- Partial thickness defects
- Bony defects associated with chondral lesions
- Patients inability or unwillingness to comply with rehab
Hip Microfracture

- Acetabular chondral defects respond well
- Femoral head
  - Small isolated traumatic defects
  - Good borders to contain the clot

Curette to prepare smooth perpendicular border
Microfracture
Punctate bleeding
Microfracture Outcomes

- **Byrd et al.**
  - 9 patients
  - Average age = 51 years
  - Acetabular lesions
  - Improved modified Harris Hip score
  - Patients returned to activity

  Byrd et al. Arthroscopy 2002

- **Byrd et al.**
  - 21 patients
  - Average age = 35 years
  - Mean lesion size = 12.2 mm²
  - Minimum 2 year f/u
  - 86% improvement
  - No complications

  Byrd et al. ISAKOS 2005
2nd Look Microfracture

- 4 pro. athletes
- Initial defect = 200 mm2
- Average time to 2nd look = 65 weeks
- % fill = 98%
  (range: 95% to 100%)

Philippon et al. AANA 2006, Miami, FL
Anchor Repair
Anchor repair + Rim trimming
2nd Look Labral Repair
Arthroscopic Approach

• Philippon et al. (Clin Sports Med 2006)
  • Technique for acetabular rim trimming and suture anchor repair through the lateral arthroscopic portal
  • Labral re-fixation most commonly performed in combination with decompression of femoroacetabular impingement
Arthroscopic Approach

- Philippon et al. (Arthroscopy Dec. 2005)
  - Current concepts highlighting techniques of suture anchor repair for detached labra and intra-substance repair for midsubstance tears
  - Describes experience with over 400 arthroscopic repairs
Preliminary Histology (12 wks.)

- **Labral Resection:**
  - Decreased glycosaminoglycan staining of acetabular cartilage

- **Labral Repair:**
  - Main cell type was chondrocytes of articular cartilage
  - Minimal fibrocartilage
  - Moderate glycosaminoglycan content
  - No signs of inflammation or cartilage degeneration.
  - Excellent integration between labrum and acetabular bone was observed in 66% of animals
  - Moderate labrum vascularization was observed for all specimens
Ovine Model

- *In vivo* ovine model
- Labral resection: more joint inflammation than control or repair
- Repaired labri stable
- Fibrovascular scar tissue healing

Philippon et al. AAOS 2006, Chicago, IL
Space Available for Labrum

- Debridement may be sufficient when joint clearance is good
- Most labral repair procedures are performed in combination with decompression of FAI
Femoral Head
Partial Resurfacing
Surgical Approach

- **Modified supine position with gentle traction**
- **Arthroscopic portals**: anterior, anterolateral
- **Access to the femoral head lesion**:
  - Extend anterior portal for better visualization and instrument clearance
  - Dynamic analysis
  - Hip positioned in extension, adduction, external rotation allows good access to a majority of weight-bearing femoral head lesions
Implant

- **Articulating surface:**
  - Cobalt chrome
  - Sizes: 15-35 mm
- **Stem:** titanium coated

Product of Arthrosurface, Franklin, MA
Early Experience

• June 2003 to September 2005
• 30 Patients
• Average age: 42 (18-59)
• 23/31 good results at 18-30 months F/U(HHS)
• 1 Professional baseball Pitcher return to play
Early Experience

• 7 patients converted to THR
• 1 large AVN lesion, 6 advanced arthritis
Conclusion

• Focal chondral defect, early focal arthritis do well at 30 months
• 25-30mm AVN lesions
• The central and peripheral compartment pathology must be treated to optimized the outcome
• Not indicated for advanced arthritis, but can be used as a bridge procedure for moderate arthritis
• Convert to open procedure for central lesions
• Longer follow-up is needed
Thank you!
Personal Experience

Sept. 1, 2002 to August 2005

• 1002 hip arthroscopies
• 547 labral repairs
  ➢ Midsubstance (intrasubstance tears)
  ➢ Suture anchor (detached tears)
• 52 labral repairs in high demand patients (professional athletes)
• Early results are promising
• No complication related to labral repair technique
Acetabular Labrum

- **Function:**
  - Deepens the acetabulum
  - Seal against fluid flow in and out of intra-articular space
  - Nociception/proprioception

Labral Tears

- Increase articular cartilage consolidation
- Increases joint contact forces
- Increase femoral head lateral movement

Personal Experience

March 1, 2005 to November 1, 2005

• Technique has evolved
• 272 hip arthroscopies
  • 120 suture anchor repairs
  • 12 intrasubstance repairs
• Important considerations:
  • Quality of labral tissue
  • Re-create anatomic triangular conformation
  • Detached labra associated with CAM
  • Labral degeneration associated with pincer
• At revision arthroscopy bony rim and untreated detachment appear to be related to persistent symptoms
Review of last 300 consecutive hip arthroscopies performed this year:

- Labral Tear (90%)
  - Trauma (14%)
  - Capsular Laxity (35%)
  - Femoral-Acetabular Impingement (33%)
  - Dysplasia (4%)
  - Degenerative (14%)

Arthritis
When to Repair?

- Dependent on:
  - Activity level
  - Articular vs. Capsular
  - Detached, Midsubstance, Frayed, vs. Flap
  - Size of the tear
Vascular Considerations

*Kelly et al, Arthroscopy 2005*

- Capsular (Zone I) contribution demonstrated significantly more vascularity than Zone II (articular side) \( p<0.005 \)
- Capsule provided major contribution to the labrum
- Capsule was the only source of vascularity in 11/12 hips
Is it technically possible to repair the labrum?

YES
Detached labrum repaired
Mid-substance labral repair
Why repair the labrum?
Outcome Study

- Retrospective study of 52 patients
- Open surgical dislocation
- Labral re-fixation vs. labral resection
- 12 month f/u
  - Merle-d’Aubigne, Postel, Tonnis scores

Leunig et al. Third Symposium on Joint Preserving and Minimally Invasive Surgery of the Hip. Montreal, Canada, June 2004
Outcome Study

- **Debridement**
  - Excellent (28%)
  - Good (48%)
  - Moderate (20%)
  - Poor (4%)

- **Repair**
  - Excellent (81%)
  - Good (15%)
  - Moderate (3%)

Leunig et al. Third Symposium on Joint Preserving and Minimally Invasive Surgery of the Hip. Montreal, Canada, June 2004
Personal Experience

• Over 30 cases of femoral head partial resurfacing
  • 2.5 year follow-up
  • Patients are doing well and many have returned to activities and sports

• Indications and contra-indications?
Conclusion

- Preserving joint anatomy is a proven concept in Orthopaedic Surgery
- Incompetent labrum appear to be associated with persistent symptoms
- Clinical results and ovine model appear to support labral repair concept in the hip
- New techniques facilitate the repair