Revision For Capsular Problems:
Heterotopic, Instability, Stiffness, Adhesions

Shane J. Nho, MD, MS
Hip Preservation Center, Division of Sports Medicine
Department of Orthopedic Surgery, Rush University Medical Center
• My appreciation for the hip capsule has evolved over time in my practice.
• What started as a clinical problem led us to perform numerous cadaveric studies to understand the biomechanical properties of the capsule.
• These findings were also corroborated with our clinical experience.

Evolution of Capsular Technique

Partial Closure

Complete Closure
**Improved Outcomes After Hip Arthroscopic Surgery in Patients Undergoing T-Capsulotomy With Complete Repair Versus Partial Repair for Femoroacetabular Impingement**

A Comparative Matched-Pair Analysis


*Investigation performed at Rush University Medical Center, Chicago, Illinois, USA*

<table>
<thead>
<tr>
<th></th>
<th>Partial Closure</th>
<th>Complete Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Age</td>
<td>32.87±9.84</td>
<td>32.65±10.16</td>
</tr>
<tr>
<td>Side of Surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Right</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Center Edge Angle</td>
<td>33.27±5.51</td>
<td>34.15±5.57</td>
</tr>
<tr>
<td>Alpha Angle</td>
<td>56.91±11.15</td>
<td>59.43±8.27</td>
</tr>
<tr>
<td>Follow-up (min-max)</td>
<td>20.63 (12.1-31.73)</td>
<td>15.08 (12.10-19.04)</td>
</tr>
</tbody>
</table>

Frank et al. AJSM 2014.
* 4 Partial Closure Patients Required Revision Surgery
Partial Closure vs. Complete Closure HOS SS

A

HOS-SS: Partial Closure vs. Complete Closure

Outcome Score

Pre-Op  6 Month  1 Year  2 Year

(*=significant)

Parital Repair  Complete Repair
Heterotopic Ossification

- 25% H.O. without NSAID vs. 5% with NSAID (Beckmann et al. AJSM 2014)
  - Mixed FAI and lack of NSAID were predictors of H.O.
- 8.3% H.O. without NSAID vs. 1.8% with NSAID (Bedi et al. AJSM 2012)
  - Osteoplasty with capsulotomies in males were highest risk
  - 1% required revision surgery
- Indocin 75 mg Daily for 10 days
Case Example

Index Surgery 1/2012

Revision 3/2013
Case Example

Pre-Op

Post-Op
Case Example
Capsular Adhesions
Second Look of Partial vs Complete Closures

Partial Closure

Complete Closure
Benefits of Complete Closures

• Anatomic repair restores biomechanical characteristics of iliofemoral ligament (strain, rotation, and translation)
  • 92.5% Healing after repair
• Higher PROs especially athletic activities
• Decreases complications and reoperation: defects / instability, heterotopic ossification, and adhesions

Stiffness

**Phase I:**
- 20 FFWB w crutches 2-4 wks
- Hip orthosis and night abduction splint x 4 wks
- Passive ROM and circumduction
- Limit Extension and ER for 4 wks

**Phase II:**
- Gait training
- Core, trunk, and proximal motor control
- Closed chain LE strength
11 reported cases on macroinstability after hip arthroscopy

- Benali & Katthagen, Arthroscopy 2009.
- Ranawat et al. JBJS 2009.
- Sansone et al. KSSTA 2013.
Evidence of capsular defect following hip arthroscopy

Frank McCormick · William Slikker III · Joshua D. Harris · Anil K. Gupta · Geoffrey D. Abrams · Jonathan Frank · Bernard R. Bach Jr · Shane J. Nho

Study Flow Diagram

Enrollment

Assessed for eligibility October 2011 to October 2012

Revision

Hip arthroscopy performed within study period (n= 342)

Patient undergoing revision hip arthroscopy (N = 25)
- Patients with radiographic evidence of residual FAI ( N = 16)
- Patients without residual FAI and MRA obtained prior to revision surgery (N = 9)

Analysis

Eligible for Analysis (n=9)
- Capsular defect N= 7/9
- Capsular abnormalities N= 9/9

McCormick et al. KSSTA 2013.
Why do I close the capsule?

• 20 yr old woman
  • Oct 2011: femoral osteochondroplasty
  • Oct 2012: Iliopsoas lengthening

• She cannot participate in any recreational activities

• Groin pain worse w sitting, shoes and socks, walking on her toes
Why?
Axial Strain

Video courtesy of Stephen Aoki, MD
Axial Strain

Video courtesy of Stephen Aoki, MD
Out of 1100 cases, 33 patients developed symptomatic instability after HA

2 of 33 with hip dislocations

31 of 33 with microinstability

All underwent index HA for treatment of FAI with interportal capsulotomy

Revision surgery for capsular repair Wylie et al. AJSM 2015.
Still Not Convinced?
Clinical Signs of Iatrogenic Microinstability

- History: Pain with ADL
- Pain worse than prior to index surgery
- Physical Exam
- Instability Test
- Apprehension
- Hypermobility

Capsular Adhesions

Drive Through Sign

Capsular Defect

Capsular Defects
Capsular Reconstruction

Irreparable Defect

Capsular Reconstruction
Survivorship of Hip Arthroscopy for Treatment of FAI and Capsular Mgt

Conclusions

• Revision surgery for capsular issues are becoming more common as the problem is more widely recognized

• Capsular repair has been shown to restore biomechanical profile of the IFL with excellent post-operative healing

• More predictable outcomes with improved decreased revision surgery
Thank you!

Shane J. Nho, MD, MS
shane.nho@rushortho.com
Arthroscopic Hip Revision Surgery for Residual Femoroacetabular Impingement (FAI)

Surgical Outcomes Compared With a Matched Cohort After Primary Arthroscopic FAI Correction

Christopher M. Larson,*,† MD, M. Russell Giveans,‡ PhD, Kathryn M. Samuelson,† BS, Rebecca M. Stone,† MS, ATC, and Asheesh Bedi,‡ MD
Investigation performed at Minnesota Orthopedic Sports Medicine Institute

220 Revision HA for FAI compared to 237 age- and gender- matched Primary HA

Predictors of improved MHHS
• AIIS Impingement
• Increased Femoral Offset
• Labral Repair / Reconstruction
• Capsular Repair / Plication