Arthroscopic Capsular Reconstruction of the Hip with Acellular Dermal Extracellular Matrix – Surgical Technique and a Case Report

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Disclosures

- American Hip Institute\textsuperscript{a}, AANA Learning Center Committee\textsuperscript{a}, Amplitude\textsuperscript{c}, Arthrex\textsuperscript{b,c,d}, ATI\textsuperscript{b}, Breg\textsuperscript{b}, DJO Global\textsuperscript{d}, Orthomerica\textsuperscript{d}, Pacira\textsuperscript{b,c}, Stryker\textsuperscript{b,c}

  - a – boardmember; b – research support; c – consulting; d – royalty
Hip Stability / Instability

Structural Factors

- Bony constraints
  - Acetabular coverage
  - Femoral antversion
- Soft tissue constraints
  - Ligamentum teres
  - Labrum
  - Capsule – iliofemoral lig.
  - Illiopsoas

Patient Factors

- Ligamentous laxity
- Supraphysiological motion
- Repeated axial loading and external rotation
Iliofemoral Ligament

Myers et al, AJSM 2011

Martin et al, Arthroscopy 2008
Indications for capsular plication

- Borderline dysplasia
- Generalized ligamentous laxity

Arthroscopic Capsulotomy, Capsular Repair, and Capsular Plication of the Hip: Relation to Atraumatic Instability

Benjamin G. Domb, M.D., Marc J. Philippon, M.D., and Brian D. Giordano, M.D.
Indications for capsular reconstruction

• Capsule is needed to help stabilize the joint but there is not sufficient tissue to perform a plication.
• Ligamentous laxity of the native tissue may not suffice for a plication.
Case Report

- 27 year old male farmer
  - Ongoing hip pain 3 years post hip arthroscopy treating femoroacetabular impingement and labral tear
  - Reported improvement of symptoms for one year post-operatively
  - Since then, he has had anterior, lateral, and posterior hip pain exacerbated with activity that failed to improve with physical therapy
- Post-operative physical exam reveals normal gait and no points of tenderness. Hip range of motion shows flexion of 120°, internal rotation of 5°, external rotation of 25° and abduction of 30°. Provocative Tests included log roll, anterior, lateral and posterior impingement, FABER, and anterior apprehension were all negative.
- Post-operative radiographs:
  - lateral center edge angle 32°
  - anterior center edge angle of 24°
  - alpha angle of 40°
  - Tonnis angle of 2°
  - No evidence of left hip arthritis and joint space was intact
  - No evidence of hip fractures or dislocation.
- Post-operative Magnetic Resonance Arthrogram revealed post-operative changes and capsular deficiency from around 12-3 in the clock face.
- The patient went through a revision hip arthroscopy. A diagnostic arthroscopy was performed and revealed capsular deficiency. Remaining capsular tissue was inadequate for plication and of poor quality. The labral reconstruction was intact, there was an ALAD 2 at the 1:30 to 2:30 clock face, and there was a partial tear of the ligamentum teres. The revision procedure included capsular reconstruction with Arthroflex dermal graft, femoroplasty of peripheral compartment, and iliopsoas fractional lengthening.
The hip joint is accessed through the anterolateral, the mid anterior, and the distal lateral accessory portals (DLAP).

Diagnostic arthroscopy performed to assess the ligamentum teres, labrum, chondral damage, and labral size – any pathologies are treated according to findings.

Preparing the capsular surface includes two procedures:
1. Debridement of the scar tissue where the capsule once was
2. Decortication of the acetabular and femoral beds for a better graft incorporation.

Traction is released and the capsular defect is measured using an arthroscopic measuring tool (Arthrex, Inc., Naples, FL, USA) on the acetabular rim and on the femoral neck, from proximal to distal and medial to lateral.

Four SutureTak anchors (Arthrex, Inc.) are placed in the corners of the capsular defect; two are anchored in the acetabular rim, and two in the femoral neck.

The loose ends of all four sutures are pulled out through the DLAP. The distances between each of the four anchors are measured using the arthroscopic measuring tool (Arthrex, Inc.) (Fig 2)
Surgical Technique

- A 1.5 mm thick Arthroflex (Arthrex Inc.) is cut after adding 1 cm in each direction from the anchor measurement. The graft is trimmed to the planned size (Figure 3).

- The sutures are passed in a mattress formation through the four corners of the Arthroflex graft with a free needle in the particular order. A sliding knot (Tennessee slider) is tied on each of the two proximal anchors.

- The posts of both proximal sliding knots are pulled simultaneously to slide the graft towards both acetabular anchors. The knots are tied down over the acetabular and the femoral attachments and are secured to all four corners of the graft (Figure 4).

- To perform a side-to-side repair, fiberwire sutures are passed using a hip scorpion (Arthrex Inc.) through the anchored graft and the remnant of the native capsule at the medial and lateral borders. Two sutures are tied on the medial side, and two on the lateral side. The reconstructed capsule is assessed on all sides, and extraneous tissue is debrided (Figure 5).
# Pearls & Pitfalls

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<tr>
<th>Pearls</th>
<th>Pitfalls</th>
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<tbody>
<tr>
<td>• Use acellular dermal matrix graft</td>
<td>• Not maintaining suture order and create knotting among strands</td>
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<tr>
<td>• Prepare the remnant capsule appropriately to suture it to the graft</td>
<td>• Incorrect measurement of the capsular defect</td>
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<td>at the end of the procedure</td>
<td>• Passing sutures through the wrong corners of the graft will leave the</td>
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<tr>
<td>• Cut the graft to dimensions 1 cm beyond each anchor distance and</td>
<td>graft rotated in the incorrect orientation</td>
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<td>trim to the planned lengths</td>
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<tr>
<td>• Place a dot on the graft where the anchors should be</td>
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<tr>
<td>• Use different colors for the proximal and distal sutures and mark</td>
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<td>the posterior sutures with a marking pen</td>
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## Advantages, Risks and Limitations

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<td><strong>Advantages</strong></td>
<td>• Treating hip instability when there is a defect in the capsule</td>
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<td>• Using allograft and reducing donor site complications</td>
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<td><strong>Risks</strong></td>
<td>• The minor risk of infection using an allograft</td>
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<td><strong>Limitations</strong></td>
<td>• Technically-demanding technique</td>
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Thank You

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