Arthroscopic Treatment of Labral Tears and Instability in Professional Dancers: Patterns of Clinical Presentation and Intraarticular Derangements, Radiological Associations, and Minimum Two-Year Outcomes

Sivashankar Chandrasekaran, MBBS, FRACS
Nader Darwish, BS
John P Walsh, MA
Parth Lodhia, MD, FRCSC
Carlos Suarez-Ahedo, MD
Benjamin G. Domb, MD
Disclosures

- American Orthopedic Foundation\textsuperscript{a}, American Hip Foundation\textsuperscript{a}, AANA Learning Center Committee\textsuperscript{a}, Adventist Hinsdale Hospital\textsuperscript{c}, Hinsdale Hospital Foundation\textsuperscript{a}, Hinsdale Orthopedic Associates\textsuperscript{e}, Hinsdale Orthopedic Imaging\textsuperscript{e}, American Hip Institute\textsuperscript{e}, Arthroscopy Journal\textsuperscript{a}, SCD\#3\textsuperscript{e}, North Shore Surgical Suites\textsuperscript{e}, Munster Specialty Surgery Center\textsuperscript{e}, Amplitude\textsuperscript{c}, Arthrex\textsuperscript{b,c,d}, DJO Global\textsuperscript{d}, Medacta\textsuperscript{b,c}, Orthomerica\textsuperscript{d}, Stryker\textsuperscript{b,c}

- \textsuperscript{a} – boardmember; \textsuperscript{b} – research support; \textsuperscript{c} – consulting; \textsuperscript{d} – royalty; \textsuperscript{e} – ownership interest
Background

- The hip region is involved in approximately one in four injuries sustained by dancers, limiting their ability to train and perform.¹
- Soft tissue laxity in dancers has been associated with injury to other joints such as the knee and shoulder.²
- The extremes of hip motion required for dancing coupled with ligamentous laxity may lead to labral damage despite osseous anatomy that is not stereotypical of femoroacetabular impingement.
- Poor outcomes have been reported in hips with those features when soft tissue constraints have not been adequately addressed. Capsular plication in this setting has lead to improved outcomes with hip arthroscopy.³

Purpose and Study Design

• To report on patterns of clinical presentation, intra-articular derangements, radiological associations and minimum two-year outcomes following hip arthroscopy in patients who are professional dancers.

• This study was a retrospective case series on prospectively collected data on patients who had undergone hip arthroscopy for treatment of painful intra-articular disorders that had failed non-operative management during the study period from April 2008 to April 2013.
Methods – Patient Selection

• Inclusion Criteria
  • Patients undergoing hip arthroscopy for labral tears refractory to non-operative management
  • Professional dancers
  • Minimum two-year follow-up were included in the study

• Exclusion Criteria
  • Revision surgeries
  • Previous Hip Conditions
    • AVN
    • SCFE
    • Inflammatory arthritis
    • Hip fractures
  • LCEA <20
    • Consideration of PAO + HA
  • Tönnis grade > 1 OA
Methods

• Outcomes
  • PROs
    o mHHS
    o NASH
    o HOS-ADL
    o HOS-SSS
  • VAS/10
  • Patient satisfaction/10
  • Revision Arthroscopy
  • THA
    o Progression of chondropathy at follow-up was considered the main source of pain.

• Statistics
  • A paired t-test was used to test for differences in means for numerical data
  • Chi-square analysis was used to detect differences within categorical data
  • Values of p < 0.05 were considered statistically significant.
  • Intra-rater reliability of radiographic measurements was determined using Bartko’s method for measuring a rater’s self-consistency
    o The intra-class correlation coefficient was found to be greater than 0.89 for all radiological measurements
## Results - Demographics

<table>
<thead>
<tr>
<th>DEMOGRAPHICS</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures eligible for study</td>
<td>14</td>
</tr>
<tr>
<td>Procedures with two year follow-up</td>
<td>14 (100%)</td>
</tr>
<tr>
<td>Female:Male</td>
<td>14:0</td>
</tr>
<tr>
<td>Right:Left</td>
<td>10:4</td>
</tr>
<tr>
<td>Age at surgery (years) (mean and range)</td>
<td>16.8 (14.6 – 21.9)</td>
</tr>
<tr>
<td>BMI (kg/cm²)</td>
<td>20.6 ± 2.73</td>
</tr>
<tr>
<td>Follow-up time (months) (mean and range)</td>
<td>26.2 (19.0 – 37.3)</td>
</tr>
<tr>
<td>Conversion to arthroplasty</td>
<td>0</td>
</tr>
<tr>
<td>Time to arthroplasty (months) (mean and range)</td>
<td>NA</td>
</tr>
<tr>
<td>Revision Arthroscopies</td>
<td>0</td>
</tr>
<tr>
<td>Time to Revision Arthroscopies (months) (mean and range)</td>
<td>NA</td>
</tr>
<tr>
<td>Tonnis 0</td>
<td>14 (100%)</td>
</tr>
</tbody>
</table>
## Results – Findings

<table>
<thead>
<tr>
<th>Clinical examination parameters</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion in degrees (mean and std deviation)</td>
<td>137.4 ± 18.5</td>
</tr>
<tr>
<td>Abduction in degrees (mean and std deviation)</td>
<td>44.4 ± 13.0</td>
</tr>
<tr>
<td>Internal rotation in degrees (mean and std deviation)</td>
<td>47.8 ± 14.0</td>
</tr>
<tr>
<td>External rotation in degrees (mean and std deviation)</td>
<td>38.9 ± 16.8</td>
</tr>
<tr>
<td>Anterior Impingement (%)</td>
<td>14 (100%)</td>
</tr>
<tr>
<td>Posterior Impingement (%)</td>
<td>11 (76%)</td>
</tr>
<tr>
<td>Lateral Impingement (%)</td>
<td>9 (64%)</td>
</tr>
<tr>
<td>Beighton’s Score</td>
<td>5.6 ± 2.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radiological parameters</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCEA mean and std dev</td>
<td>21.3 ± 4.69</td>
</tr>
<tr>
<td>ACEA mean and std dev</td>
<td>22.7 ± 7.52</td>
</tr>
<tr>
<td>Acetabular inclination mean and std dev</td>
<td>6.18 ± 6.29</td>
</tr>
<tr>
<td>Cross over sign (%)</td>
<td>8 (57.0%)</td>
</tr>
<tr>
<td>Coxa Profunda</td>
<td>6 (46%)</td>
</tr>
<tr>
<td>Alpha angle</td>
<td>58.3 ± 17.3</td>
</tr>
<tr>
<td>MRI femoral anteversion</td>
<td>21.3 ± 12.4</td>
</tr>
</tbody>
</table>
# Results – Intraoperative Diagnoses and Procedures

<table>
<thead>
<tr>
<th>Intra-operative diagnoses</th>
<th>Classification</th>
<th>Study Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seldes Tear Type</td>
<td>Type 1</td>
<td>8 (57.1%)</td>
</tr>
<tr>
<td></td>
<td>Type 2</td>
<td>3 (21.4%)</td>
</tr>
<tr>
<td></td>
<td>Type 1 and 2</td>
<td>3 (21.4%)</td>
</tr>
<tr>
<td>Labral tear size (mean ± sd)</td>
<td></td>
<td>1.86 ± 0.99</td>
</tr>
<tr>
<td>Acetabular Chondral Lesion (ALAD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 0</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Grade 1</td>
<td>6 (42.9%)</td>
</tr>
<tr>
<td></td>
<td>Grade 2</td>
<td>7 (50.0%)</td>
</tr>
<tr>
<td></td>
<td>Grade 3</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Grade 4</td>
<td>1 (7.14%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labral Treatment</td>
<td>12 (85.7%)</td>
</tr>
<tr>
<td>Repair</td>
<td>2 (14.3%)</td>
</tr>
<tr>
<td>Debridement</td>
<td></td>
</tr>
<tr>
<td>Capsular Treatment</td>
<td></td>
</tr>
<tr>
<td>Repair</td>
<td>14 (100%)</td>
</tr>
<tr>
<td>Acetabuloplasty</td>
<td>14 (100%)</td>
</tr>
<tr>
<td>Acetabular Chondroplasty</td>
<td>5 (35.7%)</td>
</tr>
<tr>
<td>Femoral Osteoplasty</td>
<td>14 (100%)</td>
</tr>
<tr>
<td>Iliopsoas release</td>
<td>11 (78.6%)</td>
</tr>
</tbody>
</table>
# Results - PROs

<table>
<thead>
<tr>
<th>Score</th>
<th>Dancers</th>
<th></th>
<th></th>
<th>p - Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Change</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>mHHS</td>
<td>56.8 ± 21.5</td>
<td>86.3 ± 15.5</td>
<td>29.5 ± 30.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HOS-ADLS</td>
<td>54.9 ± 25.5</td>
<td>90.5 ± 9.18</td>
<td>35.5 ± 27.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HOS-SSS</td>
<td>36.4 ± 26.2</td>
<td>68.2 ± 28.7</td>
<td>31.8 ± 29.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NAHS</td>
<td>52.9 ± 22.3</td>
<td>86.1 ± 13.0</td>
<td>33.2 ± 28.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>VAS</td>
<td>7.50 ± 1.22</td>
<td>2.29 ± 2.20</td>
<td>-5.21 ± 2.55</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td>8.14 ± 2.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• Strengths of this study:
  o Multiple PROs
  o Mean 2 year follow-up

• Limitations of this study:
  o Is the benefit sustained for greater than 2 years?

• The pattern of labral injury in professional dancers is most likely due to instability and soft tissue laxity.

• Morphological features in this cohort include borderline dysplasia and increased femoral anteversion.

• An arthroscopic approach that entails, labral preservation, minimal acetabuloplasty and capsular plication are associated with improvements in patient outcomes and pain at minimum two-year follow-up with a mean patient satisfaction of 8.14.
Sivashankar Chandrasekaran, MBBS, FRACS, Nader Darwish, BS, John P Walsh, MA, Parth Lodhia, MD, FRCSC, Carlos Suarez-Ahedo, MD, Benjamin G. Domb, MD


