Assessment of Gender-Related Variation in Adolescent Hip Arthroscopy Patients

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Disclosures

• Allston J. Stubbs, M.D., M.B.A.
  – I have financial relationships with the following companies:
    • Consultant: Smith & Nephew
    • Stock: Johnson & Johnson
    • Research Support: Bauerfeind
    • Department Support: Smith & Nephew Endoscopy, Depuy, Mitek
    • Boards/Committees: AOSSM, ISHA, AANA, ABOS, AAOS, ISAKOS

• Austin V. Stone, M.D., Ph.D.
  – I have financial relationships with the following companies:
    • Research Support: Smith & Nephew

• Sandeep Mannava, M.D., Ph.D.
  – I have financial relationships with the following companies:
    • Research Support: ABMS, ABOS
    • Boards/Committees: AANA

• Mr. Schallmo, Dr. Marquez-Lara, Dr. Luo, and Dr. Howse have nothing to disclose.
Introduction

• Increased utilization of hip arthroscopy in adolescent populations.\textsuperscript{1-4}

• Differences in reported utilization of hip arthroscopy\textsuperscript{5-7} and outcomes\textsuperscript{7} between genders (adolescent and adult populations):
  o Males predominate in numerous studies\textsuperscript{5-7}
  o Males have shown higher Quality of Life (QoL) scores pre- and post-operatively\textsuperscript{7}

• \textit{Can gender predict symptoms, pathology, and treatment at the time of hip arthroscopy for adolescent patients?}
Methods

- Retrospective database review
- Assessed patient symptoms and physical exam findings, diagnostic imaging findings, and intraoperative pathology and procedures.
- Statistical analysis performed using Chi-squared and Student’s $t$-test for categorical and continuous variables, respectively.
- Regression analysis (odds ratio, “OR”) was performed to assess the impact of gender on hip pathology and arthroscopic treatment.
Results

- Patient demographics, clinical presentation, and physical examination based on gender

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>64 (72.1%)</td>
<td>24 (27.9%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>16.5±1.2</td>
<td>16.8±1.2</td>
</tr>
<tr>
<td>Physical Therapy*</td>
<td>75%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Internal Rotation – Operative Side*</td>
<td>13.8±11.8</td>
<td>3.7±9.9</td>
</tr>
<tr>
<td>Internal Rotation – Non-operative Side*</td>
<td>27.2±17.6</td>
<td>13.6±10.5</td>
</tr>
<tr>
<td>Pain with Low-impact&lt;sup&gt;a&lt;/sup&gt; Activity</td>
<td>14.3%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Pain with High-impact&lt;sup&gt;b&lt;/sup&gt; Activity</td>
<td>85.7%</td>
<td>90.0%</td>
</tr>
<tr>
<td>Duration of Symptoms (months)</td>
<td>15.9±12.3</td>
<td>18.5±18.0</td>
</tr>
</tbody>
</table>

<sup>a</sup>Low-impact activities included bending, standing, sitting, and yoga. <sup>b</sup>High-impact activities included walking, running (including sports), squatting, and stairs. *Denotes significance (p<0.05). Gender-based differences among other clinical presentation and physical examination findings, including laterality, location of pain, lower back pain, mechanical symptoms, and use of pain medications (NSAIDs and narcotics) did not reach significance and are not shown.
Results

- Impact of gender on hip pathology

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
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<tbody>
<tr>
<td>CMI&lt;sup&gt;a&lt;/sup&gt; – Acetabulum&lt;sup&gt;*&lt;/sup&gt;</td>
<td>124.5±70.1</td>
<td>372.0±350.4</td>
</tr>
<tr>
<td>CMI&lt;sup&gt;a&lt;/sup&gt; – Femoral Head&lt;sup&gt;*&lt;/sup&gt;</td>
<td>82.0±139.7</td>
<td>211.9±308.4</td>
</tr>
</tbody>
</table>

<sup>a</sup>CMI = chondromalacia severity index, defined as the cumulative sum of the product of outerbridge chondromalacia grade (I to IV) and effected surface area for each chondral lesion (severity • mm<sup>2</sup>). *Multivariate linear regression confirmed male gender to be a significant independent positive predictor of acetabular (β: 0.45, R<sup>2</sup>=0.351, 95% CI [-348.4-(-121.5)]; p<0.001) and femoral head (β=0.26, R<sup>2</sup>=0.140, 95% CI [-248.9-(-0.720)]; p=0.049) CMI. No significant gender-based differences in radiographic or ultrasound measurements, including lateral center edge angle, Sharp’s angle, anterior center edge angle, or alpha angle. No significant gender-based differences in other pathological MRI findings, including acetabular retroversion, coxa profunda, acetabular labral tear, acetabular chondromalacia, or acetabular subchondral cyst.
Results

- Pathology and arthroscopic intervention based on gender

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsular Release*</td>
<td>1.6%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Loose Body Excision*</td>
<td>1.6%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Chondroplasty – Femoral Head†</td>
<td>32.3%</td>
<td>58.3%</td>
</tr>
<tr>
<td>Microfracture – Acetabulum</td>
<td>3.2%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

*Denotes significance ($p<0.05$). †Logistic regression analysis confirmed male patients to be at increased probability of undergoing chondroplasty of the femoral head (OR=5.2, 95% CI [1.5-17.5]; $p=0.009$). Gender-based differences among other arthroscopic treatments, including synovectomy, acetabuloplasty, femoroplasty, acetabular chondroplasty, labral repair, labral debridement, ligamentus teres debridement, and iliopsoas release did not reach significance and are not shown.
Conclusions

- Gender was found to be a significant predictor of hip mobility, CMI, and selection of intraoperative procedures.
- Males demonstrated reduced range on motion on the operative and non-operative side, a higher CMI, and a higher probability of undergoing chondroplasty.
- Microfracture was rarely performed on patients in this study.
- The findings of this study will support efforts to develop standardized diagnostic and treatment algorithms to enhance patient selection and post-operative outcomes.
References


Thank You

Winston-Salem, NC