Independent Risk Factors for Revision Surgery or Conversion to THA after Hip Arthroscopy: An Analysis of 3,957 Patients

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BACKGROUND

- The volume of hip arthroscopy (HA) procedures has increased by over 600% between 2006 and 2010 alone.
- Indications for hip arthroscopy have expanded to include femoroacetabular impingement (FAI), labral tears and chondral injuries among others.
- As reimbursement models evolve toward a bundled-payment system, emphasis is placed on quantifying the added value of surgical procedures on long-term patient outcomes.

OBJECTIVE

- Use a large heterogeneous population to identify risk factors associated with revision HA and conversion to total hip arthroplasty (THA) in patients undergoing primary HA procedures.

METHODS

- NYS Department of Health Statewide Planning and Research Cooperative System (SPARCS) database.
- Outpatient surgery database queried from 2011 through 2012 to identify patients with ICD-9-CM procedure codes for diagnostic arthroscopy, removal of loose or foreign body, chondroplasty, abrasion arthroplasty and/or resection of labrum with or without synovectomy and labral repair.
- Patients were followed longitudinally for a minimum of 2 years.
- Demographics and comorbidities were compared among groups using the student’s t-test and Fisher Exact test or chi-squared analysis for numerical and categorical variables, respectively.
- Multivariate analysis was performed to determine the risk factors for revision HA and conversion to THA.

RESULTS

- Between 2011 and 2012, a total of 3,957 patients underwent HA procedures.
- Distribution of primary HA procedures:
  - 48.9% - Labral repair
  - 37.9% - Chondroplasty
  - 25.5% - CAM resection
  - 21.7% - Pincer resection
- Rate of revision HA: 3.7% (n=148) at an average of 15.8 months (SD ± 9.6)
- Rate of conversion to THA: 5.9% (n=253) at an average of 14.7 months (SD ± 9.2)
- Multivariate analysis found the following:
  - Risk factors for revision HA and conversion to THA
    - Female gender and
    - Index surgery performed by lowest volume HA surgeons (<40 procedures)
    - Younger age (32.9 +/- 11.6 vs 35.9 +/- 13.2)
    - Risk factor for conversion to THA only
      - Older patients (48.7 +/- 9.7 vs 35.0 +/- 12.9)
      - Obesity (OR 5.6; 2.7 – 12.1)

<table>
<thead>
<tr>
<th>Revision Hip Arthroscopy</th>
<th>Conversion to THA</th>
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<tbody>
<tr>
<td>Risk Factor</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Less than 40</td>
<td>4.4 (1.8 - 18.0)</td>
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<tr>
<td>Between 40-50</td>
<td>3.4 (0.9 - 12.0)</td>
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<tr>
<td>Between 50-60</td>
<td>1.5 (0.3 - 6.1)</td>
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<tr>
<td>Greater than 60</td>
<td>Reference</td>
</tr>
<tr>
<td>Female Gender</td>
<td>1.6 (1.1 - 2.3)</td>
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<tr>
<td>Surgeon volume in 3rd Tertile*</td>
<td>1.9 (1.2 - 2.8)</td>
</tr>
<tr>
<td>Absence of Labral Repair*</td>
<td>1.71 (1.1 - 2.8)</td>
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<tr>
<td>*At index hip arthroscopy</td>
<td>1.75 (1.09 - 2.8)</td>
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<tr>
<td>*At index hip arthroscopy</td>
<td>2.3 (1.7 - 3.4)</td>
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DISCUSSION

- Independent Risk Factors for Revision Hip Arthroscopy
  - Female gender, age under 40, absence of labral repairs, and index procedure performed by low-volume surgeons
  - Independent Risk Factors for Conversion to THA
    - Female gender, obesity, pre-existing osteoarthritis, age over 60, tobacco use and index procedure performed by low-volume surgeon
- Although still controversial, studies have shown that patients with isolated hip osteoarthritis may have increased risk of conversion to THA after HA procedures.
- Patients with hip osteoarthritis in our sample had 2.4 increased odds of conversion to THA within the minimal 2-year follow-up.
- It may be prudent for hip arthroscopy to be performed by medium to high-volume surgeons in order to limit the risk of revision surgery.
- We found 1.7 and 1.9 increased odds ratio for revision HA and conversion to THA, respectively, in patients operated by surgeons with less than 40 cases (low-volume)

CONCLUSIONS

- Patients with identified risk factors for revision arthroscopy or THA conversion should be counseled pre-operatively on potential adverse outcomes, thus allowing patient-physician engagement during the shared decision-making process.
- Continued educational focus in both orthopaedic residency and fellowship regarding hip arthroscopy is warranted to further improve results.
- Results from this study have implications for the cost-effectiveness of healthcare delivery in the emerging bundled-payment and pay-for-performance models as it may aid in the development of more accurate cost/risk stratification methods for potential HA patients.