Hip Arthroscopy: Prevalence Of Intra-Articular Pathologic Findings After Traumatic Injury Of The Hip

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Background

- The application of hip arthroscopy for the diagnosis and treatment of hip trauma has been studied previously and reported in the literature. (1-6)
- However, the role and indications for hip arthroscopy in the posttraumatic patient remains undefined.
- Traumatic injuries to the hip include simple dislocations without a fracture to complex injuries involving gross displacement and fracture of the acetabulum, pelvic ring, or femoral head/neck.
- Despite fractures and/or dislocations being treated with anatomical reduction, many patients still fail to return to their pre-injury functional level. (7)
- In one study, a traumatic arthritis prevalence rate of 24% was reported in patients 5 years after injury. (8) This rate was seen in patients who experienced a simple hip dislocation without an associated fracture. The prevalence rate increased to as high as 54% when more complex injuries, such as fracture dislocations, were included. (9-11)
Purpose and Hypothesis

Purpose

• The purpose of this study was to document and compare the incidence of intra-articular hip pathologic findings identified using arthroscopy versus conventional imaging in patients with acute trauma to the hip.

Hypothesis

• Our hypothesis was that a potential cause for failure in patients with traumatic hip injuries consists of underappreciated intra-articular pathologic disorders. Furthermore we hypothesized that hip arthroscopy is a superior means of detecting intra-articular pathologic conditions in patients after acute hip trauma compared with routine imaging techniques (plain radiographs, CT scans, and MRI/MRA).
Methods

- Prospective cohort study
- All patients were referred to a single surgeon (IW) following identification and management of their acute traumatic hip injury
- Defined traumatic injury to the hip as any high-energy injury to the hip region resulting in:
  - hip dislocation
  - proximal femur fracture
  - pelvic ring fracture
  - acetabular fracture
  - penetrating injury (eg, gunshot wound)
  - soft tissue injury (involved in high-speed trauma (i.e. MVC) and with no radiographic evidence of bony injury but, on H/P continued to have ongoing pain specific to the hip that was not present before the trauma)
- Exclusion criteria: previous hip arthroscopy and/or refusal to consent to hip arthroscopy.
# Patient Demographics

<table>
<thead>
<tr>
<th>Table 1. Patient Demographics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hips (N)</td>
<td>29</td>
</tr>
<tr>
<td>Right hip</td>
<td>14</td>
</tr>
<tr>
<td>Left hip</td>
<td>15</td>
</tr>
<tr>
<td>Mean age (yr)</td>
<td>38.5 (19-65)</td>
</tr>
<tr>
<td>Median time from trauma to arthroscopy (d)</td>
<td>65 (1-1201)</td>
</tr>
<tr>
<td>Radiographs</td>
<td>29</td>
</tr>
<tr>
<td>CT scans</td>
<td>19</td>
</tr>
<tr>
<td>MRI/MRA</td>
<td>11</td>
</tr>
</tbody>
</table>

CT, computed tomographic; MRI/MRA, magnetic resonance imaging/magnetic resonance angiography.
Measurements

Radiographic Measurements
• Based on review of images by a musculoskeletal radiologist who was blinded to the findings of the hip arthroscopy.

Arthroscopy Measurements
• Intraoperative arthroscopic findings were independently recorded as either positive or negative through review of the operative video by the study investigator (VK). The study investigator was blinded regarding the initial hip injury and to any preoperative imaging.
Surgical Technique

- Arthroscopy performed in supine position with traction applied through a perineal post.
- Standard anterolateral and lateral portals
- Complete diagnostic arthroscopy performed in each hip
- If a pathologic condition amenable to treatment was identified, patients underwent the appropriate intervention at the time of arthroscopy (i.e. labral tear repair, loose body removal, etc.)
Results

- 29 hips enrolled from 28 patients (1 patient x bilateral hips)
- 27/29 patients had labral tears and 17/29 hips had intra-articular loose bodies on arthroscopy
- Low sensitivity for Xray/CT to identify loose bodies / joint incongruity (i.e. of the 17 hips identified as having loose bodies by arthroscopy, only 1 was identified preoperatively by Xray and only 2 by CT.)

<table>
<thead>
<tr>
<th>Pelvic Ring Fracture</th>
<th>Acetabular Fracture</th>
<th>Proximal Femur Fracture</th>
<th>Posterior Hip Dislocation</th>
<th>Soft Tissue Injury</th>
<th>Gunshot Wound</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 5</td>
<td>n = 6</td>
<td>n = 7</td>
<td>n = 2</td>
<td>n = 8</td>
<td>n = 1</td>
</tr>
<tr>
<td>Loose body</td>
<td>3 of 5</td>
<td>6 of 6</td>
<td>4 of 7</td>
<td>0 of 2</td>
<td>3 of 8</td>
</tr>
<tr>
<td>Step deformity</td>
<td>2 of 5</td>
<td>5 of 6</td>
<td>2 of 7</td>
<td>0 of 2</td>
<td>1 of 8</td>
</tr>
<tr>
<td>Osteochondral lesion</td>
<td>2 of 5</td>
<td>5 of 6</td>
<td>4 of 7</td>
<td>1 of 2</td>
<td>1 of 8</td>
</tr>
<tr>
<td>Labral tear</td>
<td>5 of 5</td>
<td>5 of 6</td>
<td>7 of 7</td>
<td>2 of 2</td>
<td>8 of 8</td>
</tr>
</tbody>
</table>
Results

Table 3. Radiographic and Computed CT Loose Body Identification (95% CI)

<table>
<thead>
<tr>
<th></th>
<th>Radiograph</th>
<th>CT Scan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>6% (1%-27%)</td>
<td>14% (4%-40%)</td>
</tr>
<tr>
<td>Specificity</td>
<td>100% (75%-100%)</td>
<td>100% (56%-100%)</td>
</tr>
<tr>
<td>PPV</td>
<td>100% (21%-100%)</td>
<td>100% (34%-100%)</td>
</tr>
<tr>
<td>NPV</td>
<td>43% (26%-65%)</td>
<td>29% (13%-53%)</td>
</tr>
</tbody>
</table>

CI, confidence interval; CT, computed tomographic; NPV, negative predictive value; PPV, positive predictive value.

Table 4. Radiograph and CT Joint Incongruity/Step Deformity Identification (95% CI)

<table>
<thead>
<tr>
<th></th>
<th>Radiograph</th>
<th>CT Scan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>45% (21%-72%)</td>
<td>67% (35%-88%)</td>
</tr>
<tr>
<td>Specificity</td>
<td>100% (82%-100%)</td>
<td>90% (60%-98%)</td>
</tr>
<tr>
<td>PPV</td>
<td>100% (56%-100%)</td>
<td>86% (49%-97%)</td>
</tr>
<tr>
<td>NPV</td>
<td>75% (55%-88%)</td>
<td>75% (47%-91%)</td>
</tr>
</tbody>
</table>

CI, confidence interval; CT, computed tomographic; NPV, negative predictive value; PPV, positive predictive value.

Fig 1. Images from a 35-year-old man after a simple posterior left hip dislocation. Treated with closed reduction, his groin pain persisted. Magnetic resonance angiogram suggested presence of labral tear. (A) Intraoperative finding of a labral tear as well as a large cartilaginous defect of the acetabulum. (B) Intraoperative photograph of the osteochondral lesion after debridement.
Results

- One of the few studies in the literature to compare MRI and MRA with arthroscopic findings.
- MRI and MRA was able to identify labral tears in all but one hip that subsequently had a tear identified by arthroscopy.
- MRI/MRA failed to identify osteochondral lesions in 4 hips that were subsequently found to have osteochondral lesions by arthroscopy.

Table 5. Intra-articular Pathologic Findings Identified by MRI/MRA Versus Arthroscopy

<table>
<thead>
<tr>
<th></th>
<th>MRI/MRA</th>
<th>Arthroscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose bodies</td>
<td>1 of 11 (9%)</td>
<td>2 of 11 (18%)</td>
</tr>
<tr>
<td>Step deformity</td>
<td>0 of 11 (0%)</td>
<td>1 of 11 (9%)</td>
</tr>
<tr>
<td>Osteochondral lesion</td>
<td>0 of 11 (0%)</td>
<td>4 of 11 (36%)</td>
</tr>
<tr>
<td>Labral tears</td>
<td>10 of 11 (91%)</td>
<td>11 of 11 (100%)</td>
</tr>
</tbody>
</table>

MRI/MRA, magnetic resonance imaging/magnetic resonance angiography.
Conclusions

- Traumatic injuries of the hip result in substantial intra-articular pathologic findings, including loose bodies, labral tears, step deformities, and osteochondral lesions.
- Our data suggests that intra-articular injuries are not limited to hip dislocations only but can result from other traumatic injuries to the hip.
- The arthroscope is a powerful tool in identifying these injuries.
- Plain radiographs and CT scans appear to underestimate the true incidence of loose bodies and step deformities within the joint when compared with hip arthroscopy after a traumatic injury of the hip.
References