ORTHOPEDICS INSTITUTE

ANTERIOR TIBIAL SPINE FRACTURE WITH CONCOMITANT ANTERIOR CRUCIATE LIGAMENT RUPTURE IN PEDIATRIC PATIENTS

A RETROSPECTIVE REVIEW OF 67 CASES
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Background

Anterior tibial spine fracture (ATSF) considered the pediatric equivalent of anterior cruciate ligament (ACL) injury in adults

- Weaker strength & elasticity of the incompletely ossified ATS relative to the ACL may underlie primary failure
  - Injuries to the ligament are considered extremely rare
  - Cases reported in which ATSF is associated with complete ACL insufficiency

The purpose of this study was to determine incidence of ATSF with concomitant ACL rupture among pediatric patients
Methods

• Retrospective analysis of 67 skeletally immature patients
  • Sustained ATSF between 1/1/06 & 12/31/11 and between 5-18 y/o
  • Meyers and McKeever classification used
  • ACL injury graded using MRI and/or arthroscopic imaging
  • Clinical records, imaging, and intraoperative reports obtained

<table>
<thead>
<tr>
<th>Fracture Type</th>
<th>Degree of Displacement</th>
<th>Usual Treatment Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>Minimal/no displacement</td>
<td>Conservative</td>
</tr>
<tr>
<td>Type II</td>
<td>Bird’s beak appearance with superior displacement of anterior aspect of the fracture</td>
<td>Case by case</td>
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<tr>
<td></td>
<td>with an intact posterior section</td>
<td></td>
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<tr>
<td>Type III</td>
<td>Complete displacement</td>
<td>Surgical Reduction</td>
</tr>
</tbody>
</table>
Results: Grossly visible ACL Damage at time of surgery

<table>
<thead>
<tr>
<th>Fracture Type</th>
<th>Included Patients</th>
<th>ACL Damage at time of Injury</th>
<th>Went on to ACL Reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>6</td>
<td>0 (no operative cases)</td>
<td>0</td>
</tr>
<tr>
<td>Type II</td>
<td>35</td>
<td>7</td>
<td>2 (Delayed after initial tibial spine only fixation)</td>
</tr>
<tr>
<td>Type III</td>
<td>26</td>
<td>4</td>
<td>2 (Immediate)</td>
</tr>
</tbody>
</table>
Results

20% of Type II Injuries Had Gross ACL Damage → 40% of those required reconstruction in a delayed fashion after initial fixation of only the tibial spine

15% of Type III Injuries Had Gross ACL Damage → 50% underwent Reconstruction in an immediate setting

Arthroscopic image of complete ACL tear with Type II anterior tibial spine fracture
Conclusion & Significance

• Incidence of ATSF with concomitant ACL rupture is more common than previously described
  • Diagnostic evaluation of pediatric patients with suspected ATSF pathology must involve MRI &/or arthroscopy

• This cohort of patients with ATSF & concomitant ACL injury has not previously been described
  • Data suggests a need to scrutinize radiographic & arthroscopic findings closely to see associated ACL injuries, specifically in type II and III fractures.
  • More data needed to evaluate possible need for ACL reconstruction when associated with anterior tibial spine fracture