Clinical and Radiographic Examinations Do Not Correlate with MRI Determined Plantar plate or Collateral Ligament Tears of the Second MTP joint

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Conflict of Interest

My disclosure is in the Final AOFAS Program Book.
I have no potential conflicts with this presentation.
Introduction

• Second MTP synovitis is a spectrum of disease ranging from a painful stable joint to a unstable and dislocated MTP joint
• Currently, treatment of unstable MTP joints with Weil osteotomies or a flexor to extensor transfers have a high rate of failure due to stiffness or floating toes
• There is a recent interest in treating unstable joints with direct anatomic repairs to avoid these complications
• If an anatomic repair is considered it is important to understand what structures are injured to guide treatment
• In order to guide direct repairs, the purpose of this study was to determine if signs of instability on physical and radiographic exams correlated with tears of the plantar plate and collateral ligaments as determined by MRI.
Methods

- Retrospective review of patients presenting with 2\textsuperscript{nd} MTP pain between November 2010 - March 2012
- Physical exam and radiographs obtained
  - Physical criteria for instability
    - Medial or lateral deviation of toe
    - Elevation of tip of toe off ground
    - Lachman dorsal drawer test with >50% joint subluxation
  - Radiographic criteria for instability
    - Lack of concentricity of joint
    - Medial or lateral deviation of proximal phalanx >5°
    - Clawing on lateral radiograph
- All patients underwent MRI arthrogram of 2\textsuperscript{nd} MTP joint
  - Plantar plate and collateral ligament tears identified (Figure 1)
- Tears of the plantar plate and collateral ligaments identified during fluoroscopic guided injection were noted
Figure 1. MRI arthrogram demonstrating a distal plantar plate and lateral collateral ligament tear. The patient demonstrated instability and deviation on physical and radiographic examinations.
Methods

• Pearson’s correlation coefficient calculated between physical and radiographic signs of instability and MRI determined tears
• Sensitivity and specificity calculated using MRI as the “gold standard” for detecting a plantar plate or collateral ligament tear
Results

• 23 patients identified to meet inclusion criteria
• 18.8 months average duration of symptoms prior to evaluation
  – 74% had a plantar plate tear or attenuation on MRI
    • 88% of plantar plate abnormalities occurred within the distal 1/3 of plantar plate
  – 30% had a collateral ligament tear
    • All collateral ligament tears occurred in conjunction with a plantar plate tear
## Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
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</thead>
<tbody>
<tr>
<td>Physical Exam Deviation</td>
<td>65</td>
<td>17</td>
<td>69</td>
<td>14</td>
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<tr>
<td>Positive Lachman Test</td>
<td>76</td>
<td>33</td>
<td>76</td>
<td>33</td>
</tr>
<tr>
<td>Physical Exam Elevation</td>
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<td>50</td>
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<td>Radiographic Clawing</td>
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<tr>
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<td>Radiographic Concentricity</td>
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<td>74</td>
<td>25</td>
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<tr>
<td>Radiographic Clawing or Deviation</td>
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<tr>
<td>Fluoroscopic Tear</td>
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### Pearson Correlation Coefficient

<table>
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<td>Positive Lachman Test and MRI Tear</td>
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<td>Physical Exam Elevation and MRI Tear</td>
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<tr>
<td>Radiographic Clawing and MRI Tear</td>
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<tr>
<td>Radiographic Deviation and MRI Tear</td>
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<td>Radiographic Concentricity and MRI Tear</td>
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<td>Radiographic Clawing or Deviation and MRI Tear</td>
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</tr>
<tr>
<td>MRI tear and Fluoro tear</td>
<td>0.52</td>
</tr>
</tbody>
</table>
Conclusions

• Physical and radiographic exam findings of 2\textsuperscript{nd} MTP instability failed to correlate with MRI determined tears of the plantar plate and collateral ligaments
  – Lack of correlation could be due to:
    • Inability of the physical and radiographic exam to determine instability
    • MRI detecting tears that were not unstable on physical and radiographic exams
    • Tissue incompetence that created instability on physical and radiographic exams but that did not show a tear on MRI (Figure 2)

• Using MRI as the gold standard revealed a poor sensitivity, specificity, PPV, and NPV for physical and radiographic exam signs of instability

• MRI not recommended during the routine evaluation of MTP pain, but with improved interpretation and clinical correlations MRI will likely have an increased role when considering a direct anatomic repair of the plantar plate
Figure 2. MRI arthrogram interpreted to have an intact plantar plate and collateral ligaments. The patient demonstrated significant clawing and instability on physical examination.