Arthroscopic Evaluation of Syndesmotic Malreduction and Stability in a Cadaveric Model

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Our disclosures are in the Final AOFAS Mobile App. There is a potential conflict with this presentation due to: This cadaveric study was funded by DJO Global.
Evaluation of Instability

- Clinical tests DO NOT identify partial disruption efficiently
- Radiographic parameters suffer from anatomic variability and depend on technique
- 4mm of syndesmotic diastasis must be present to reliably identify diastasis radiographically
- Ankle arthroscopy has been suggested to be 100% sensitive to partial syndesmotic injury
Syndesmotic Malreduction

- Post operative CT Incidence
  - Gardner, FAI 2006
    - 52% malreduction
  - Sanders, JOT 2012
    - Indirect technique – 44%
- Morbidity of Malreduction
  - Inferior functional outcomes scores
  - Inferior pain scores
- Current recommendations
  - Bilateral postoperative CT
  - Immediate revision if >2mm malreduction

Sanders, JOT 2012
Evaluation of Malreduction

- Radiographic parameters ineffective
  - Difficult to determine 2mm of malreduction
  - Anatomy has significant variability
  - Tib-fib clear space
    - Does not change with fibular rotation
      - (5 degrees ER to 25 degrees IR)
      - Marmor, FAI 2011
- Direct reduction techniques
  - Improve malreduction rates but 15-16% are still malreduced
- Intraoperative CT (O-arm)
  - Effective but...
    - Time consuming
    - Increases radiation exposure
    - Limited availability
- Ankle Arthroscopy
  - No current literature available
Purpose & Hypothesis

• Goal 1
  – Determine surgeon ability to diagnose partial syndesmotic disruption
• Goal 2
  – Determine what role arthroscopy may have in evaluating syndesmotic reduction
• Hypothesis 1
  – High sensitivity in recognizing partially disrupted syndesmosis
• Hypothesis 2
  – High sensitivity in recognizing sagittal plane malreduction
  – Low sensitivity to identify rotational malreduction
Methods & Materials

• Protocol 1 (Instability)
  – 2 groups (10 Specimens)
    • Group 1: Superficial dissection only
    • Group 2: Direct disruption of AITFL/IOL
  – Blinded surgeon evaluation

• Protocol 2 (Malreduction)
  – Complete disruption with subsequent fixation into 3 groups
    • Group 1: Anatomic
    • Group 2: 5mm sagittal plane
    • Group 3: 15 degrees IR or ER
  – Blinded surgeon evaluation
## Results (Instability)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Surgeon 1 (90%)</th>
<th>Surgeon 2 (60%)</th>
<th>Ligament status</th>
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<tr>
<td>1</td>
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<td>Unstable</td>
<td>Partial Disruption (PD)</td>
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<tr>
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<td>10</td>
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</tbody>
</table>
Results (Malreduction)

- **Sagittal**
  - % Correctly Diagnosed as Reduced: 100
  - % Malreduction Accurately Identified: 50

- **Internal Rotation**
  - % Correctly Diagnosed as Reduced: 50
  - % Malreduction Accurately Identified: 33

- **External Rotation**
  - % Correctly Diagnosed as Reduced: 50
  - % Malreduction Accurately Identified: 33

- **Anatomic**
  - % Correctly Diagnosed as Reduced: 17
  - % Malreduction Accurately Identified: 33
Conclusion

- Ankle arthroscopy for instability
  - 75% sensitive in identifying 2mm of diastasis with partial disruption model
  - May be a significant learning curve
  - May be a useful tool particularly in subtle instability where radiographs can not identify diastasis
- Ankle arthroscopy in ankle fractures
  - Ankle arthroscopy has been shown to be beneficial in identifying additional pathology at the time of primary repair
    - Syndesmosis instability
    - Cartilage injury/Subchondral impaction
    - Degenerative condition at injury
    - Loose bodies
    - Evaluation of articular reduction
  - Evolving role with further studies necessary for clear recommendations
Conclusion

• Ankle arthroscopy for evaluation of malreduction
  – Sagittal Plane
    • 100% Sensitive
  – Transverse plane
    • 50% Sensitive
• May be a useful tool for some surgeons but…
  – Technique dependent
  – Significant learning curve
  – Not standard of care
  – Questionable benefit when only 1 plane can reliably be identified
  – Needs further study
References