Does a Patient’s Self-Reported Ability to Weight-Bear Immediately after Injury Predict Stability for Ankle Fractures?

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Disclaimer

- Nothing to disclose
Introduction

• Determining Weber B ankle fractures and injuries leading to instability can be challenging

• Other methods to determine stability: physical exam, gravity, stress and weight-bearing radiographs may NOT be as reliable
Methodology

• Prospective cohort study
• Included isolated unilateral lateral malleolar, bimalleolar, trimalleolar fractures
• Determined mechanism of injury & weight-bearing ability
  – Full weight-bearing=no assistive devices
  – Stability classified on X-rays as medial clear space $\leq$ superior clear space, confirmed by negative gravity stress view and/or anatomic mortise after 2-week trial of full weight-bearing in removable fracture boot
Table 1. Demographics, mechanism of injury, and fracture characteristics

*Two-tailed values of $p < 0.05$ were considered statistically significant.

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>Mean=47 years (range 18-96)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Males=53; Females=68</td>
</tr>
<tr>
<td><strong>Mechanism of injury</strong></td>
<td>1. twisting injury=95</td>
</tr>
<tr>
<td></td>
<td>2. fall from height=19</td>
</tr>
<tr>
<td></td>
<td>3. motor vehicle or motor cycle accident=5</td>
</tr>
<tr>
<td></td>
<td>4. direct blow=2</td>
</tr>
</tbody>
</table>

**Total cohort**

|                         | n=121; stable=48; unstable=73 |

**Subgroup of isolated fibula fractures**

|                         | n=67; stable=34; unstable=33 |

**Subgroup of apparent isolated fibula fractures & anatomic mortise**

|                         | n=43; stable=30; unstable=13 |

**Lauge-Hansen classification**

|                         | SER 2=35; SER 3=3; SER 4=25; SER 4D=33 |
|                         | PER 2=1; PER 3=9; PER 4=6 |
|                         | SAD 1=8; SAD 3=1 |

**Weber classification**

|                         | A=9; B=92; B/C=1; C=15; none/NA (i.e. isolated posterior malleolus fracture)=4 |
**Entire Cohort Results**

- Odds ratio: 8.7 (95% CI: 3.6-21.0, $P < 0.001$); odds of stability for those who could walk compared to those who could not after injury

<table>
<thead>
<tr>
<th></th>
<th>Stable ankle fractures</th>
<th>Unstable ankle fractures</th>
<th>Positive Predictive Value=73%</th>
<th>Negative Predictive Value=77%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to fully weight-bear (positive test)</td>
<td>29</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unable to fully weight-bear (negative test)</td>
<td>19</td>
<td>62</td>
<td></td>
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</tr>
</tbody>
</table>

Sensitivity=60% Specificity=85%
Isolated fibula fracture cohort

- Odds ratio: 5.0 (95% CI: 1.8-15.1, \( P = 0.003 \))

<table>
<thead>
<tr>
<th></th>
<th>Stable ankle fractures</th>
<th>Unstable ankle fractures</th>
<th>Positive Predictive Value=82%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to fully weight-bear (positive test)</td>
<td>20</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Unable to fully weight-bear (negative test)</td>
<td>14</td>
<td>26</td>
<td>Negative Predictive Value=53%*</td>
</tr>
</tbody>
</table>

Sensitivity=59%  Specificity=79%

*Based on estimated prevalence of stable isolated fibular fractures=63%
### Apparent isolated fibula fracture with anatomic mortise cohort

- **Odds ratio:** 3.6 (95% CI: 0.9-14.7, \( P = 0.07 \))

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<th>Stable ankle fractures</th>
<th>Unstable ankle fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to fully weight-bear (positive test)</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Unable to fully weight-bear (negative test)</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

- **Positive Predictive Value:** 74%*
- **Negative Predictive Value:** 52%*

Sensitivity = 67%  
Specificity = 62%  

*Based on estimated prevalence of stable isolated fibular fractures = 63%
Conclusion

- Patient’s *self-reported ability to weight-bear* is a useful, specific and simple adjunct to assess stability across various ankle fractures
- However this alone does not preclude appropriate imaging and clinical judgment
- Limited by other variables not studied that may also affect weight-bearing ability
References