Distal fibular stress fractures as a result of progressive pes planus

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Disclosure

- The authors have no potential conflict of interest disclosure for this presentation.

- The senior author (WMG) is a consultant for Arthrex.
Distal fibular is a frequent site of stress fracture in the lower extremity.

There have been isolated reports of distal third fibular stress fractures in young and athletic patients related to overuse injuries.

However, there have been frequent clinical scenarios in which middle aged patients with adult acquired pes planus, develop a distal fibular stress fracture without increase or change in activity.
We examined six patients with planovalgus foot deformities and associated hindfoot valgus who presented with distal third fibular stress fracture.

We propose that this type of distal fibular stress fracture is a result of increased stress loading of the distal fibula at the superior margin of tibio-fibular interosseous ligaments.
Method

- Six consecutive patients from October 2015 to September 2016 with clinical and radiographic evidence of distal fibular stress fracture were included in the study.

- All patients had planovalgus OR worsening planovalgus deformities.
Radiographic analysis included

1. Lateral talo-calcaneal angle
2. Meary’s angle
3. Calcaneal inclination angle
4. AP tibio-talar angle
5. Distance of distal fibular stress fracture location to tip of lateral malleolus
6. Distance between medial cuneiform and 5th metatarsal

Single independent observer performed all measurements.
Results

- Six patients, all female

- avg age: 58 (45-64)

- All patient are non-athletes

- All had atraumatic and subacute onset of pain over distal fibula weeks prior to presentation

- 4 pts has osteoporosis or osteopenia from prior DEXA scan

- No obvious association with alcohol or tobacco use
Results

<table>
<thead>
<tr>
<th>Fracture to tip of malleolus distance</th>
<th>5.8cm (4.2-7)</th>
</tr>
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<tbody>
<tr>
<td>Tibio-talar angle</td>
<td>1.7° valgus</td>
</tr>
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</table>
### Results

<table>
<thead>
<tr>
<th>Meary’s angle</th>
<th>6.7° convex downward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral talo-calcaneal angle</td>
<td>39° (25-47)</td>
</tr>
<tr>
<td>Calcaneal inclination angle</td>
<td>19° (13-30)</td>
</tr>
<tr>
<td>Medial cuneiform to 5th metatarsal distance</td>
<td>8.7mm</td>
</tr>
</tbody>
</table>

*From top left to right to bottom left to right: pt MA, LB, YC, HH, TN, TT*
All fractures healed with immobilization on average of 6 weeks.

One patient underwent medial calcaneal osteotomy to correct the hindfoot valgus after recurrent fracture, with no further recurrent fractures.
The apex of the lateralized loading stress culminates in the lateral aspect of the fibula above the distal tibio-fibular ligament complex and results in a characteristic valgus fracture of the fibula.

The increased stress from the valgus deformity results in the fracture rather than increased load from exercise or other repetitive stress.

The significance of this proposition is that recognition of this type of fracture should lead the clinician to address the underlying planovalgus deformity in the treatment of this fracture type.


