Is a Flat Foot Associated with a Hallux Valgus Deformity?

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DISCLOSURE

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Nicholas A. Cheney is associated with:
Flower Orthopedics
BESPA Global

All other members have no potential conflicts with this presentation
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• Abstract
  – An arch collapse model has been described for a multitude of foot and ankle problems that is based on a gastrocnemius equinus contracture producing a predictable collapse that has been described in five distinct phases.
  – Previous studies have evaluated the presence of pes planovalgus in hallux valgus patients and concluded this is a rare occurrence.
  – The Grand Rapids arch collapse model reviews adult foot pathology and believes there is a link between bunions and flat feet.
  – Based on the arch collapse model, there should be a significant number of flat feet with an associated bunion deformity. Our goal was to evaluate patients with flat feet to see if this proved to be true.
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• Methods
  – We retrospectively reviewed the radiographs of patients diagnosed with a flat foot based on their ICD 9 and 10 codes in the senior author’s practice.
  – For each patient, we used standard antero-posterior and lateral foot radiographs obtained on all new patients.
  – Initially, we had 254 feet but had to exclude 93 feet due to inadequate radiographs, normal radiographs (normal Meary’s angle and talonavicular coverage angle) or patients who already had surgical procedures to the foot. This left 161 feet radiographs for review.
  – We then measured the Meary's angle on the lateral images and the talonavicular coverage angle, hallux valgus angle, intermetatarsal angle and sesamoid position on the antero-posterior radiographs.
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- Methods Cont’d
  - Method for measuring the severity of a flat foot via Meary's angle by comparing the long axis of the first metatarsal to the long axis of the talus. Normal is shown above with severely abnormal below. Refer to table for the grading scales.

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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</thead>
<tbody>
<tr>
<td>Meary's Angle</td>
<td>&lt;4</td>
<td>4–15</td>
<td>15–30</td>
<td>&gt;30</td>
</tr>
<tr>
<td>Sesamoid Position</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>HVA</td>
<td>&lt;15</td>
<td>15–25</td>
<td>25–40</td>
<td>&gt;40</td>
</tr>
<tr>
<td>IMA</td>
<td>&lt;9</td>
<td>9–13</td>
<td>13–15</td>
<td>&gt;15</td>
</tr>
</tbody>
</table>
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• Methods Cont’d

  – Method for measuring severity of a bunion via intermetatarsal angle (IMA) (top left), sesamoid position (bottom left), and hallux valgus angle (HVA) (bottom right). IMA was measured using the long axis of metatarsals one and two. HVA was measured using the long axis of the first phalanx and first metatarsal. Sesamoid position measurement is based on a medial sesamoid bone (blue circle) placement scale in relation to a line drawn longitudinally through the center of the first metatarsal. Figures show normal on the left compared to severely abnormal on the right. Refer to table on previous page for degrees of severity.
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• Results
  – Of the 161 flatfoot radiographs, there was radiographic evidence of a bunion in 154 cases. There was no sign of a bunion in only 7 cases.
  – As the grade of flat foot increases in severity (as measured by the Meary’s angle), there is a corresponding increase in bunion severity.
  – This increase in bunion severity with a worsening flat foot can be seen through all three methods of bunion measurement: sesamoid position, hallux valgus angle, and intermetatarsal angle.
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• Conclusion
  – Our findings would seem to fit with the Grand Rapids arch collapse model.
  – The hypermobility of the first ray that creates the bunion deformity then allows the arch to ultimately collapse.
  – It also does not seem to contradict what has been found previously. Earlier studies showed a low association between patients with bunions who also had flat feet. This would make sense as the deformity may not have progressed to the flat foot yet.
  – However, in our study the deformity has already progressed to a flat foot and almost all have some radiographic evidence of a bunion.
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• References