Is the diagnosis of 5th metatarsal fracture type consistent? An inter-observer reliability study.

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Introduction

Treatment pathways of 5th metatarsal fractures are commonly directed based on fracture classification, with Jones types for example, requiring closer observation and possibly more aggressive management. We sought to investigate the reliability of assessment of subtypes of 5th metatarsal fractures by different observers.

Methods

- **Retrospective Analysis**
  - 02/2016 to 07/2021

- **Data Extraction**
  - 2 independent observers
  - AP foot radiographs reviewed to classify
  - Image 1

- **Inclusion Criteria**
  - Suspected or confirmed 5th metatarsal fracture
  - Referred to our Virtual Fracture Clinic

- **Exclusion Criteria**
  - Neither observer able to identify a fracture
  - Images not available

- **Analysis**
  - Inter-observer reliability
    - Cohen's Kappa Co-efficient
    - Landis & Koch description (Table 1)
    - All data analysed with IBM SPSS v. 27.

Results

- **1360 patients met the criteria**
  - Mean age 48.1 (SD = 19.1)

<table>
<thead>
<tr>
<th>Kappa value range</th>
<th>Interpretation of Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.2</td>
<td>Slight</td>
</tr>
<tr>
<td>0.2 - 0.4</td>
<td>Fair</td>
</tr>
<tr>
<td>0.4 - 0.6</td>
<td>Moderate</td>
</tr>
<tr>
<td>0.6 - 0.8</td>
<td>Substantial</td>
</tr>
<tr>
<td>0.8 - 1.0</td>
<td>Almost Perfect</td>
</tr>
</tbody>
</table>

Table 1 – Landis & Koch Description of Inter-observer variability

<table>
<thead>
<tr>
<th>Zones</th>
<th>Kappa value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>0.838</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Zone 1.2</td>
<td>0.961</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Zone 2</td>
<td>0.915</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Zone 3</td>
<td>0.587</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Diaphyseal Shaft</td>
<td>0.595</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Head</td>
<td>0.558</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table 2 – Kappa values for all fracture regions achieving the moderate level of agreement

- Maximum level of agreement
  - Moderate (Table 2)

- ‘Fair Agreement’
  - Zone 1.2 (K = 0.308)
  - Distal Metaphyseal (K = 0.381)

- Adjacent Zonal Agreement
  - Fair
    - Diaphyseal shaft & distal metaphyseal
  - Slight
    - Next most proximal – 1.2, 1.3, Zone 3
    - Next most distal – 1.1, 1.2, 1.3, Zone 2, Zone 3, Distal Metaphyseal

Conclusion

The reliability of sub-categorising 5th metatarsal fractures using standardised instructions conveys moderate agreement in most cases.

Implications

If the region of the fracture is going to be used in an algorithm to guide a management plan and clinical follow up during a virtual clinic review, defining fractures of zones 1-3 needs careful consideration.