MSK Case Conference

August 21, 2015

Anthony Tadros, R3
• 21 year old male presenting with wrist pain.
Acute scaphoid waist fracture
No significant change
Non-united scaphoid waist fracture

Proximal pole sclerosis = ischemia
Non-united scaphoid waist fracture

Progressed sclerosis and cystic changes = ischemia
Humpback-like deformity

Dorsal intercalated segment instability

Dorsal tilting of the lunate
Proximal pole ischemia

Cortical step off

Radial styloid osseous proliferation

Joint space arrowing and cartilage loss between radial styloid and distal pole of scaphoid
Scaphoid Nonunion Advanced Collapse (SNAC)

- Failed union of scaphoid fracture
- Three stages of progressive arthrosis
- Dorsal intercalated segment instability (DISI)

Stages 1 & 2
- Radioscaphoid joint
  - Distal scaphoid

Spared
- Proximal scaphoid
- Distal radius

Stages 3
- Midcarpal joint

SNAC versus SLAC

Scaphoid nonunion advanced collapse (SNAC)
- Scaphoid fracture

- Abnormal joint kinematics
  - Lunate unrestrained by distal scaphoid
  - DISI - Degenerative arthritis
  - Radioscaphoid
  - Midcarpal

- Scapholunate advanced collapse (SLAC)
  - Scapholunate ligament injury
  - CPPD, RA, neuropathic disease, amyloid

Only Difference
- Sparing of proximal scaphoid-radius articulation

SNAC versus SLAC

Only Difference

- Unloaded proximal scaphoid pole
- Acts as extension of lunate through intact SL ligament

Scaphoid fracture

SNAC Classification

- Two classifications – widespread use for treating SNAC
  - Watson & Ballet
  - Vender
- Evaluate intra and interobserver agreement between two classifications for SNAC

**Watson & Ballet (1984)**
- 1 - Radial styloid – scaphoid
- 2 - Radioscaphoid fossa
- 3 - Midcarpal

**Vender (1987)**
- 1 – Radioscaphoid fossa – distal scaphoid
- 2 – Proximal scaphoid fragment – capitate
- 3 – Midcarpal
**SNAC Classifications**

- Forty-eight PA wrist XRs
  - Scaphoid nonunion
- Five observers
  - Hand surgeons/residents
  - Ortho surgeons/residents
- Unsatisfactory agreement:
  - Cohen’s Kappa < 0.5

**Conclusions**
- Unsatisfactory agreement for both classifications
- No clear correlation between expertise and kappa values

**Treatment relevant**
- Isolated radiocarpal
- Radiocarpal and midcarpal

**Table 3**

<table>
<thead>
<tr>
<th>Hand surgeons/residents</th>
<th>Vender et al.</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2</td>
<td>T1</td>
</tr>
<tr>
<td>0.225</td>
<td>0.093</td>
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<tr>
<td>0.140</td>
<td>0.220</td>
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<tr>
<td>0.108</td>
<td>0.192</td>
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<tr>
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<td>0.143</td>
<td>0.498</td>
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<tr>
<td>0.143</td>
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<tr>
<td>−0.039</td>
<td>0.020</td>
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<tr>
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<tr>
<td>−0.312</td>
<td>0.078</td>
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<tr>
<td>0.266</td>
<td>0.175</td>
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</tbody>
</table>

M2 = Hand surgeon 2; R2M = a last-year; R2O = orthopedic surgeon; R20 = second-year
# SNAC Management

<table>
<thead>
<tr>
<th>Stage</th>
<th>Severity of arthrosis</th>
<th>Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Arthrosis between radial styloid and distal fragment of scaphoid</td>
<td>Resection radial styloid and scaphoid reconstruction with bone graft and a screw</td>
</tr>
<tr>
<td>II</td>
<td>Arthrosis distal fragment of scaphoid and scaphoid fossa</td>
<td>Four-corner fusion with scaphoid excision</td>
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<tr>
<td></td>
<td></td>
<td>Resection of proximal carpal row</td>
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<td></td>
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<td>Lunocapitate fusion with scaphoid and triquetrum excision</td>
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<tr>
<td>III</td>
<td>Arthrosis midcarpal joint</td>
<td>Four-corner fusion with scaphoid excision</td>
</tr>
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<td></td>
<td></td>
<td>Lunocapitate fusion with scaphoid and triquetrum excision</td>
</tr>
</tbody>
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Scaphoid Nonunion Postoperative MRI

- Low signal intensity graft
- Diffuse enhancement
  - Normal healing
- Normal marrow crossing union sites