21 year old male, FOOSH injury in September while Skateboarding.
8 months later, persistent wrist pain.
8 months later, persistent wrist pain.
Normal
Humpback Deformity of the Scaphoid:

- Complication of scaphoid waist:
  - rotation and increased flexion of the DP wrt PP, with resultant “humpback”
  - Non-union/malunion, progressive collapse of scaphoid
  - High risk of AVN

- Altered wrist kinetics
  - DISI and arthrosis

- Operative management, with IF and bone graft
  - Standard non-vascular or vascularized bone graft.
Humpback Deformity of the Scaphoid:

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• Altered wrist kinetics
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  • Standard non-vascular or vascularized bone graft.
Identifying and quantifying HB deformity...

Figure 2. Intrascaphoid angle. A perpendicular line is drawn to the proximal and distal articular surfaces and the resulting angle is measured.

Figure 3. Dorsal cortical angle. A line is drawn along the dorsal cortex of the proximal and distal halves of the scaphoid and the angle between these lines is measured.

Figure 4. Height-to-length ratio. A baseline is drawn along the volar aspect of the scaphoid. The length of the scaphoid along the baseline is measured, as is the height of the scaphoid perpendicular to the baseline. The height-to-length ratio is recorded as a percentage.
Identifying and quantifying HB deformity...
Can we assess for viability of the proximal pole fragment on MRI?


Not well.
Assessment for Scaphoid Viability or MRI:  *Traditional thinking... (and mine until last night)*

\[
\begin{array}{ccc}
\downarrow T1 & \downarrow T2 \text{ (STIR/T2-FS)} & \text{No Gd-CE} = \text{AVN}
\end{array}
\]

Gold Standard: punctate bleeding with probing during surgery...
Assessment for Scaphoid Viability or MRI: *How does this hold up?*

<table>
<thead>
<tr>
<th>↓T1</th>
<th>↓T2 (STIR/T2-FS)</th>
<th>No Gd-CE</th>
<th>AVN</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>

- $<=$ skeletal muscle
- Mummification of fat in necrosis
- TG breakdown, FFA’s.
Assessment for Scaphoid Viability or MRI:  *

<table>
<thead>
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<th>↓T1</th>
<th>↓T2 (STIR/T2-FS)</th>
<th>No Gd-CE = AVN</th>
</tr>
</thead>
</table>

- Converse not true.
- BM “Edema”
- \(?imply some intact vascularity
- Reparative bone
- Ischemia
- Cystic necrosis
Assessment for Scaphoid Viability or MRI: *How does this hold up?*

<table>
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</table>

- Conventional vs. Dynamic
- Late vascular phase:
- FV ingrowth
- Diffusion through cortex from ST’s
- Reproducibility of DCE.
### Assessment for Scaphoid Viability or MRI: How does this hold up?

<table>
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</tr>
</thead>
</table>

- Not an “All or Nothing” event
- Histology is heterogenous.
- Patchy distribution of viable bone, necrotic bone and callus formation...
Assessment for Scaphoid Viability or MRI:

• No optimal imaging approach.
• T1 probably most useful
  • less invasive/time intensive
  • more reproducible.
• Combination → low vs. high risk of AVN
  • may be sufficient.
• Time lapse b/w imaging and surgery
  • research and for practical reasons