19-Year-Old Male Rugby Player with a Non-Displaced Scaphoid Fracture: Open Reduction Internal Fixation Dorsal vs Volar Approach

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Scaphoid Fractures

- 10-20% involve the proximal third
- 70-80% involve the body or waist
- Small number of tuberosity fractures
Scaphoid Nonunions

• 5-15% nonunion rate despite treatment
  – tenuous blood supply
Fracture Location an important issue!!!

- Vascular supply enters distal pole and runs retrograde to the proximal scaphoid
- The more proximal the fracture, the more likely are healing complications
Fracture Location an important issue!!!

- Osteonecrosis develops in approximately 3%
- Significantly higher risk in proximal third fractures
Diagnosis of Scaphoid Fractures

X-rays: AP + Lateral + Oblique views

if negative & still suspicion

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MRI
Treatment Options

• **Non-operative**
  
  Short arm thumb spica cast

• **Operative**
  
  Open vs Percutaneous fixation
  
  +/- arthroscopic assistance
Non-operative Treatment

Indications

• Distal pole fractures

• Acute, stable, hairline middle third fractures
Operative Treatment

Indications for Percutaneous Fixation:

- nondisplaced stable fractures
- high performance athletes
- patients desiring early return to work
Operative Treatment

Indications for internal fixation

- Unstable Scaphoid Fracture
  - displacement > 1 mm
  - radiolunate angle > 15°
  - scapholunate angle > 60°
  - intrascaphoid angle > 45°
Operative Treatment

General Guidelines

- Volar open or percutaneous fixation
  Scaphoid distal 2/3 Fractures

- Dorsal open or percutaneous fixation
  Scaphoid Proximal Pole Fractures
Volar Percutaneous Technique

- Indicated for distal 2/3
- Hyperextension & ulnar deviation of the wrist
- Advance a guide pin from the radial side of the distal pole to the center of the proximal pole

Venouziou AI, Sotereanos DG. Scaphoid Fractures 2013
Volar Percutaneous Technique

- Advance an anti-rotation wire
- Ream under fluoro
- Select appropriate screw length (5mm shorter) & insert the desired screw
Dorsal Percutaneous Technique

- Indicated for proximal pole fx
- Flexion & pronation of the wrist
- Proximal & distal poles should overlap radiographically
- The center of the “ring” circle is the central axis of the scaphoid

Slade et al, JBJS 2002
Venouziou Al, Sotereanos DG. Scaphoid Fractures 2013
Dorsal Percutaneous Technique

- Determine the entry point (center of the ring circle)

- Advance the guidewire aiming for the base of the thumb
Dorsal Percutaneous Technique

- Extend the wrist & confirm central pin placement w/ fluoro
- Advance an anti-rotation wire
- Place screw in the center of the scaphoid
Open Volar Repair

• Indication:
  
  *unstable* fractures of the distal 2/3
Open Volar Repair

- Hockey- stick incision
- FCR tendon is landmark
- Protect:
  - radial artery
  - median n. palmar cutaneous branch
  - superficial radial nerves
Open Volar Repair

- Open FCR sheath
- Expose & open the capsule longitudinally
- Preserve long RL and RSC lig. for later repair

Venouziou AI, Sotereanos DG. Scaphoid Fractures 2013
Open Volar Repair

- Reduce the fracture
- Extend the wrist
- Place the guidewire in the center of proximal & distal pole
- If necessary remove portion of trapezium volar ridge to achieve central wire placement
Open Volar Repair

- Place an anti-rotational wire to prevent rotational displacement of the fracture
- Measure screw length and select a 5 mm shorter screw
Open Volar Repair

- Insert the screw over the guide pin inspecting for fracture rotation or gapping.
- Check fracture stability with wrist motion & live fluoroscopy.
Central placement of the screw in the proximal fragment of the scaphoid had **superior results** compared with those of eccentric positioning

- Greater stiffness
- Greater resistance to failure under bending loads

*McCallister WV, Knight J, Kaliappan R, Trumble TE*  *JBJS Am* 2003  
*Hart A, Mansuri A, Harvey EJ, Martineau P*  *JHS Am* 2013
Open Dorsal Repair

- Proximal pole fractures
- Scaphoid fxs associated w/ perilunate dislocation
Open Dorsal Repair

- Dorsal longitudinal approach
- EPL is retracted radially
- Open the dorsal capsule with caution to avoid injury to the SLIL
Open Dorsal Repair

- Reduce the fracture
- Hyperflex the wrist & advance a guidewire, centered in the proximal pole & aim distally for the thumb base
- Place an antirotational wire
Open Dorsal Repair

- Place screw over the guide wire
Summary

Indicated procedure is based on fracture location & amount of displacement.
Thank You