Scaphoid Fractures

Lisa Tourret
Consultant Upper Limb Surgeon
Sunderland Royal Hospital
Scaphoid fractures

- 2nd commonest fracture of upper extremity
- Only distal Radius fractures more frequent
- 60-80% of all Carpal fractures
The Scaphoid

- 5 articulating surfaces
- Radius, Lunate, Capitate, Trapezium, Trapezoid
- Almost entirely covered in articular cartilage
- Flexes in Radial deviation
- Extends in Ulnar deviation
- Fracture under compression/ torsion
Diagnosis

- Plain X-rays have limitations
- Bone scan 100% sensitive 93% specific
- MRI reports vary but some suggest 100%
- Radiation/cost implications?
- Duration in cast awaiting confirmation?
Herbert and Russe classification

TYPE A:
STABLE ACUTE FRACTURES

A1
FRACTURE OF TUBERCLE

A2
INCOMPLETE FRACTURE THROUGH WAIST

TYPE B:
UNSTABLE ACUTE FRACTURES

B1
DISTAL OBLIQUE FRACTURE

B2
COMPLETE FRACTURE OF WAIST

B3
PROXIMAL POLE FRACTURE

B4
TRANS-SCAPHOID-PERILUNATE FRACTURE DISLOCATION OF CARPUS

TYPE C:
DELAYED UNION

C
DELAYED UNION

TYPE D:
ESTABLISHED NONUNION

D1
FIBROUS UNION

D2
PSEUDARTHROSIS

HO
T
VO
Blood supply to the Scaphoid
Surgical approaches

- Percutaneous
  - Volar
  - Dorsal

- Volar – FCR bed

- Dorsal – Mini-capsulotomy
Percutaneous
Volar Percutaneous
Dorsal Percutaneous
Displaced Fractures
Percutaneous technique
Arthroscopically assisted
Volar
Dorsal
Non-Union Surgery

- Volar Wedge Graft
- (Cortico)cancellous graft
- Vascular pedicle graft
- Dorsal inlay graft
- Percutaneous grafting
- Consider supplementary temporary stabilisation
Volar – opening wedge graft
Dorsal Inlay Graft

• In a proximal pole fracture non-union, a dorsal inlay graft is most appropriate.
• Remove fibrous tissue from the non-union site with curettes.
• With a high-speed burr, prepare a slot that spans the fracture site to receive the bone graft.
Cancellous Graft

- Dorsal approach provides a well-visualized reduction and alignment attainment.
- Leave exposed cancellous bone between the proximal and distal poles.
- Operate early rather than late, although malunions greater than 5 years can heal with grafting 60% of the time.
- Avoid compression screws in cases where cortical contact is contraindicated because of shortening.
- Do not use high-speed drills or burrs in forming cavities.
Supplementary Fixation Combinations
Vascularised Pedicle Graft

- Pedicled bone grafts based on the 1,2 ICSRA are useful for most scaphoid nonunions.
- Single dorsal approach for both graft harvest and exposure of the scaphoid.
- Elevate so vessels not empty
- Protect Superficial Radial nerve
- Open the first and second dorsal extensor compartments to either side of the bone graft site, creating a cuff of retinaculum that includes the 1,2 ICSRA.
- Center the graft approximately 1.5 cm proximal to the radiocarpal joint to include the nutrient vessels.
- Before elevating the bone graft, make a transverse dorsal–radial capsulotomy to expose the scaphoid nonunion site.
Biomechanical considerations

• Scaphoid waist fractures
  – Central axis placement to allow longest screw
• Biomechanical strength are equal - Dorsal or volar screw implantation
• Proximal pole scaphoid fractures
  – Dorsal screw best compression
  – Need a minimum of four threads across fracture site
  – Pull-out strength drops with decreasing number of threads
• Strength is equal to number of threads
• Large core diameter screw increases strength
• Use monobloc screws
• Scaphoid is long lever arm
  – Fixation must balance these forces
  – Unstable fixation requires addition construct to transfer forces away from the fracture site
  – Locking mid-carpal joint with miniscrew or 0.062-inch Kirschner-wire between distal pole and capitate
• Stabilize the proximal pole with wires or screw between the proximal pole and lunate
Absolute Indications for Fixation

- Displaced fractures
- Lateral intrascaphoid angle more than 35 degrees
- Bone loss or comminution
- Perilunate fracture
- Dorsal intercalated segmental instability (DISI) alignment
- Proximal pole fractures
- Fractures with delayed presentation (>4 weeks)
Relative Indications

- Stable, nondisplaced scaphoid fractures in patients desiring an early return to work or hobby
- Combined injuries of the scaphoid, including the distal radius or other carpal bones
Contraindication for Fixation

- Degenerative change Radiocarpal joint
- Degenerative change Midcarpal joint
- Salvage resection/partial fusion indicated in these cases
Summary

• Complex range of considerations in planning management
• Significant non-union rate
• Attention to detail and solid fixation at first surgery gives highest success rate of union
• Salvage procedures complex and experience required – consider early referral
Concluding statements

• Do not sit and wait
• If you cannot decide what to do refer on to someone who does
• Age is not a reason to not operate
• Other factors are more important
• Know the approaches for the exam
• Know about shift in current opinion