

Scaphoid nonunion

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Definition

When is a *delayed* union a *non* union?

Satisfactory appearances

Impending union

Impending non union

Unsatisfactory appearance

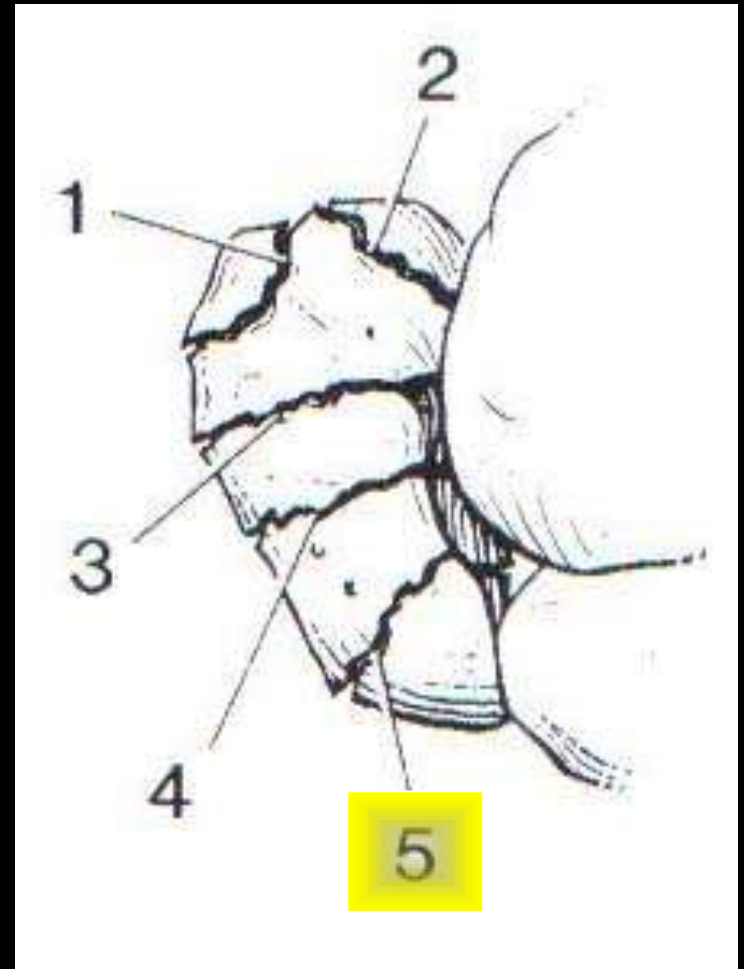
Dias 2001

Risk factors

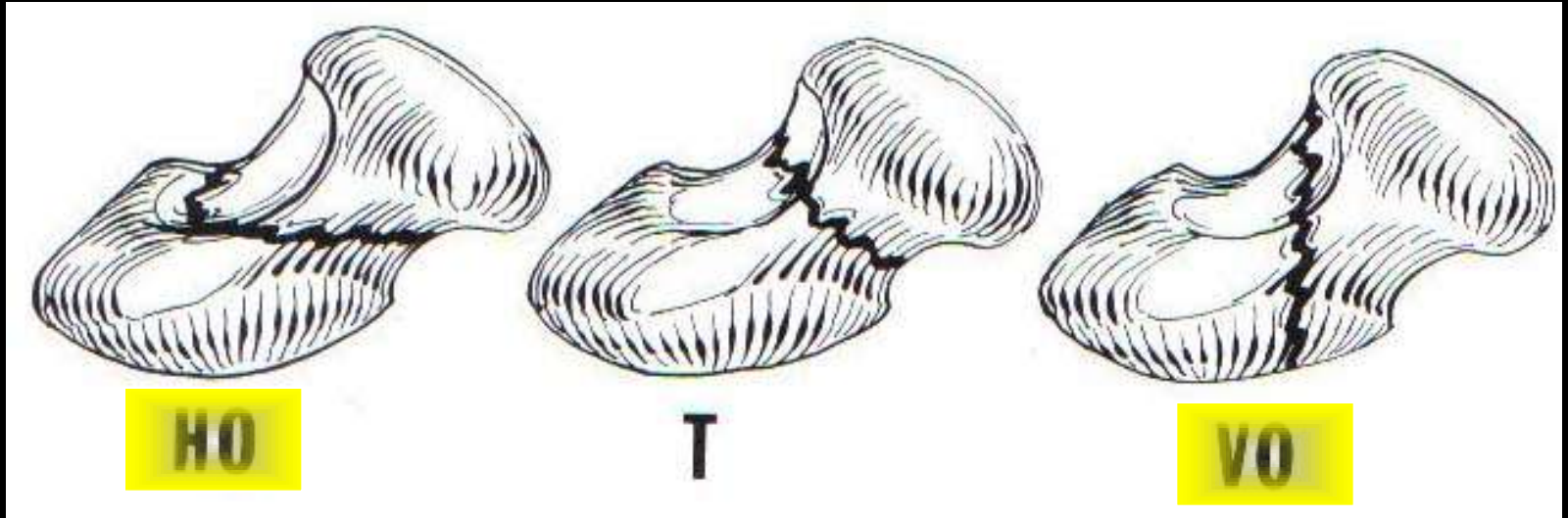
- Fracture site
- Displacement > 1mm
- Comminution
- Delay in treatment > 4 wks
- Smoker

Risk factors

Mayo Classification

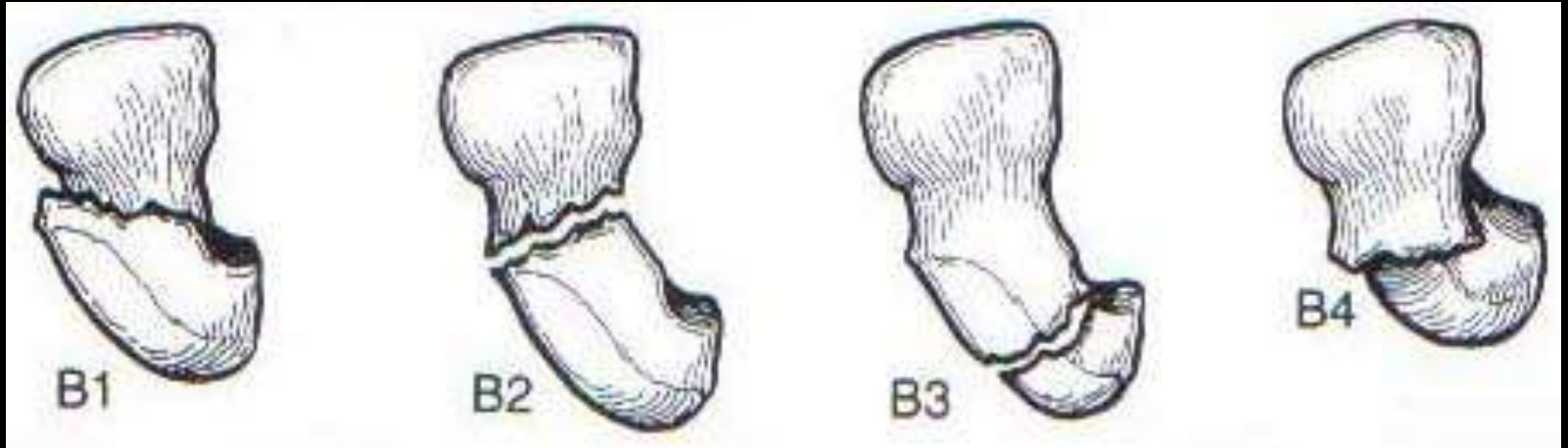


Risk factors



Russe
Classification

Risk factors



B1
Distal
oblique

B2
Complete
waist

B3
Proximal
pole

B4
Trans
scaphoid
PLI

Herbert
Classification

Diagnosis

- Radiographs
- Tomography
- CT scan
- MRI scan
- Radioisotope scan
- Arthroscopy

Diagnosis

Patient 1

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Notoriously unreliable

Avascularity

Radiographic appearance
of proximal pole has only a
50% predictive value

Cooney et al 1984

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Patient 1

MRI findings correlate with vascularity

Imaeda et al 1992

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Effects

- 80% radiographic arthritis if untreated for > 5 years
- ? symptomatic

Mack et al 1984

Ruby and Leslie 1987

Staging

Predictable pattern of degeneration

- I. Radioscaphoid changes
- II. Scaphocapitate changes
- III. DISI deformity & carpal collapse

Watson & Ballet 1984

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Staging important in choosing treatment options

Watson & Ballet 1984

SNAC wrist

Scaphoid Nonunion Advanced Collapse

Decision making

- Patient - characteristics & wishes
- Symptoms - type & severity
- Surgeon - experience
- Future protection from OA

There is no 'correct' decision

Age

And

Stage

Treatment

- Reassurance and explanation
- Splintage and analgesia
- Wrist denervation
- Bone grafting and stabilisation
- Electromagnetic pulsed field
- Excision +/- prosthesis
- Salvage

Bone grafting

Non vascularised

- Iliac crest/distal radius
- 80-85% union
- 8-10 weeks in cast
- Dead bone
- Osseoconductive
- Needs live bed

Vascularised

- Pedicled distal radial
- 90+% union*
- 6 weeks in cast
- Live bone
- Osseoconductive
AND osseoinductive

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**except Straw et al 2002*

Technique

- Choice of approach
- Excision of non union
- Assessment of vascularity
- Harvest graft
- Insert graft
- Stabilise

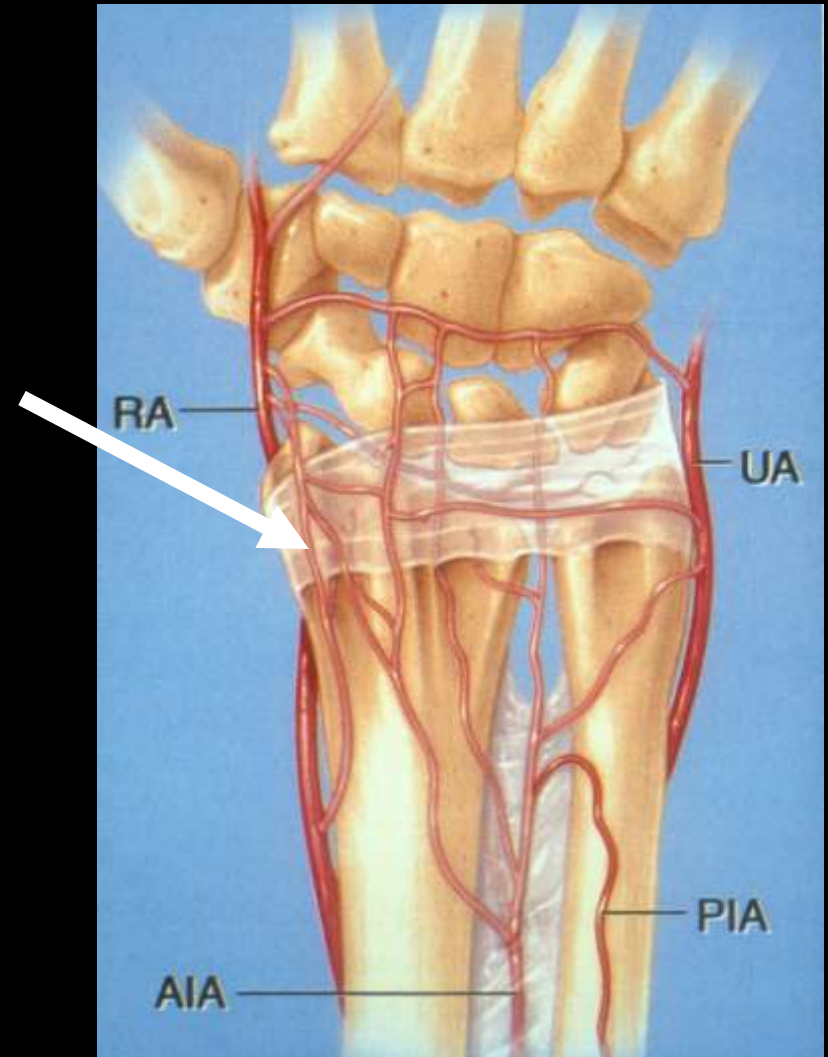
Vascularised grafts

- Pedicled pronator quadratus
- Pedicled distal radial
 - Dorsal
 - Palmar

Dorsal vascularised graft

Based on 1,2 ICSRA
(1,2 Inter compartmental supra retinacular artery)

Zaidenberg et al 1991



Dorsal vascularised graft

- 11 cases
- 100% union
- Average 6.2 weeks in cast

Zaidenberg et al 1991

Palmar vascularised graft

- Logical - corrects humpback
- Based on palmar radial carpal artery
- Described by Kuhlmann (1987)
- Popularised by Mathoulin and Merle (1996)

Palmar vascularised graft

Palmar radial carpal artery

Anastomosis between radial artery
and anterior interosseous artery

Outcome

	<u>Union rate</u>
• Untreated non union	Rare
• Non vascularised graft*	80% - 85%
• Vascularised graft	68% - 100%
• 'Recalcitrant' non union with vasc grafts	55%

*No difference in union rates between radial and iliac crest graft

Tambe et al 2006

Untreated 'non' union

9 months later – probably 'delayed' union

Untreated 'non' union

LESSON:

Always repeat x-rays prior to surgery

Always assess clinically before surgery

Salvage

- Vascularised graft
- Denervation
- Limited arthrodesis
- Proximal row carpectomy
- Wrist arthrodesis

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Salvage

Scaphoidectomy and prosthesis

Inevitable carpal collapse +/- particulate
synovitis

Smith, Atkinson and Jupiter 1985

Complications

- Persistent non union
- Stiffness
- Carpal collapse
- Secondary arthrosis
- Chondral damage
- Malunion

Thanks for your attention

Any questions?