Acute scaphoid fractures and nonunions

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Mechanism

Fall onto hand

75%

Violent twisting injury

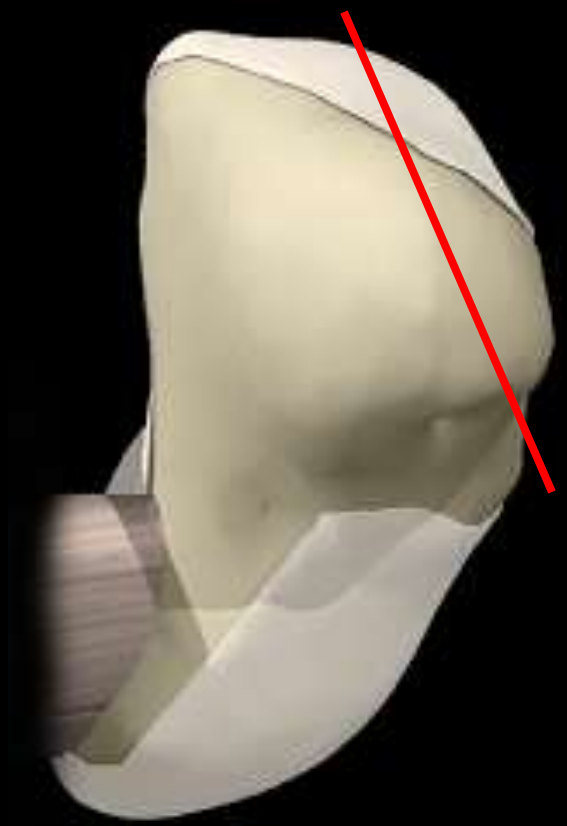
15%

Mechanism

Commonest wrist injury in the working man

Site

- Tuberosity 10%
- Distal third 11%
- Waist 72%
- Proximal pole 7%



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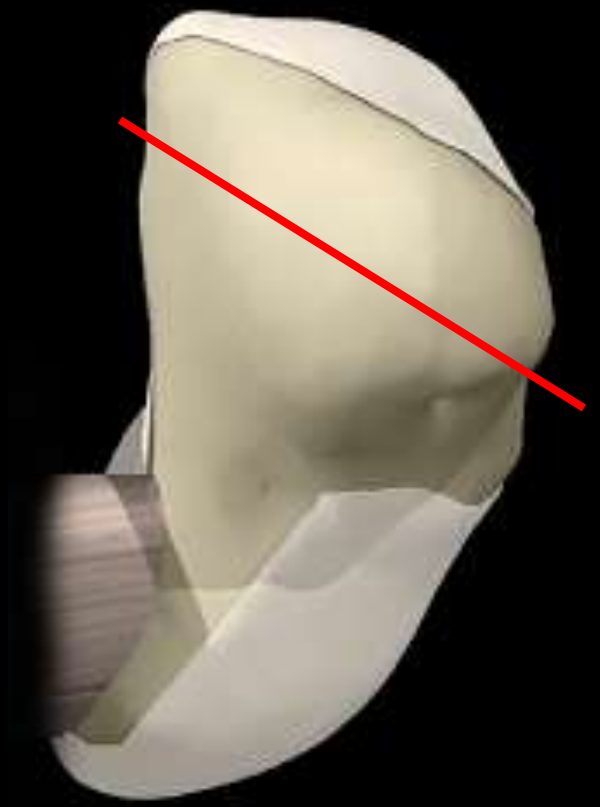

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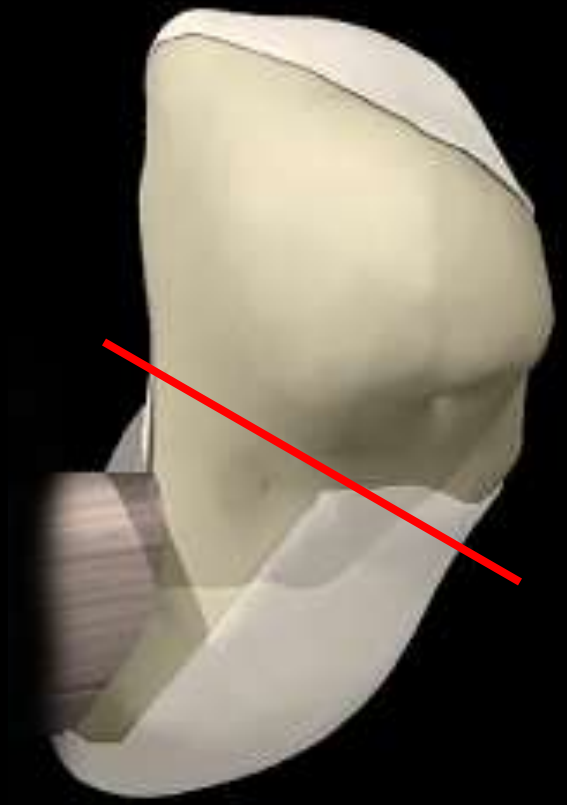

Site

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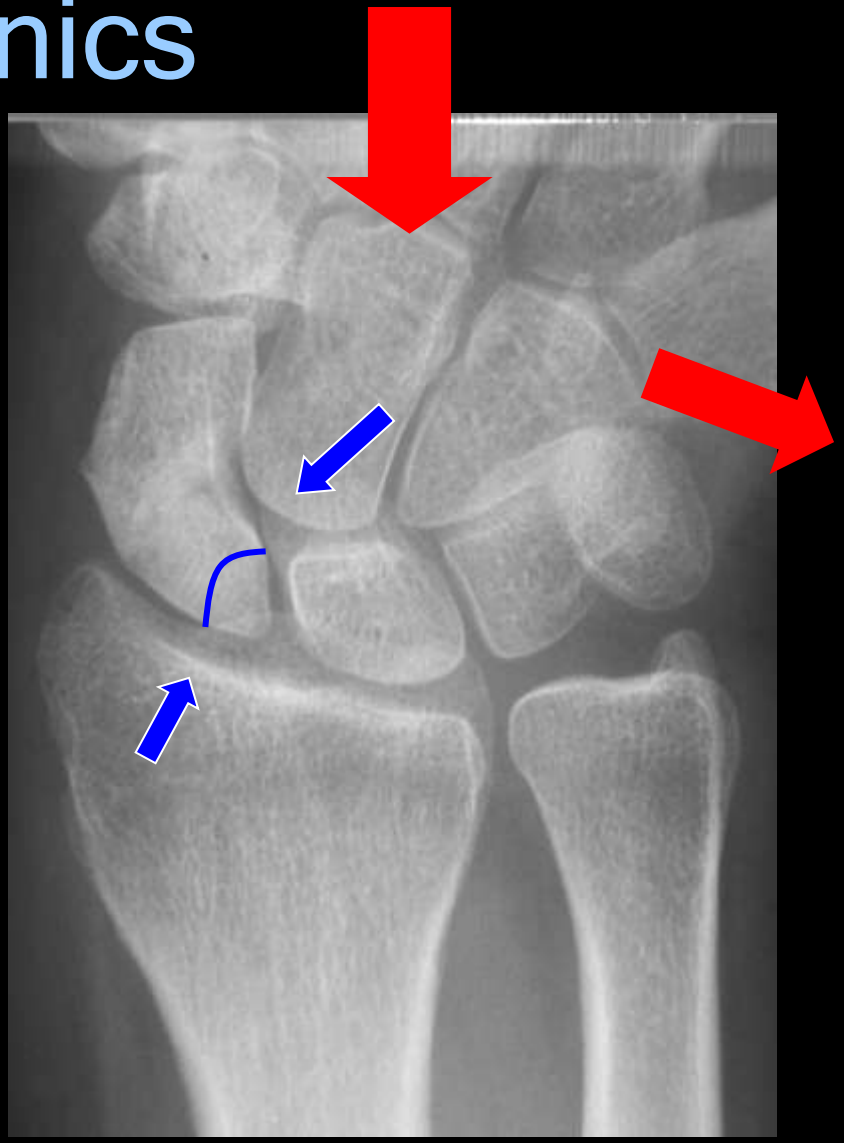
Mechanics

- Ulnar deviation
- Loading
- PP trapped between capitate & radius



Mechanics

- Fall
- Twist whilst gripping

Scaphoid Fractures

- Tuberosity 10%
- Distal third 11%
- Waist 72%
- Proximal pole 7%

Mechanism dictates injury pattern

Blood supply

- Tubercle ligaments
  (20 - 30%)
- Dorsal surface ligaments
  (70 - 80%)

1/3 people have no arterial foramina in the proximal half of the bone

Diagnosis

- History
- Pain
- Tenderness
- X-ray

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Diagnosis

- ASB Tenderness
- Axial thumb compression
- Loss of range of motion
- Painful grip

No reliable signs

Waizenegger et al 1994

Diagnosis

Radiographs + Clinical suspicion

Diagnosis

AP

45º

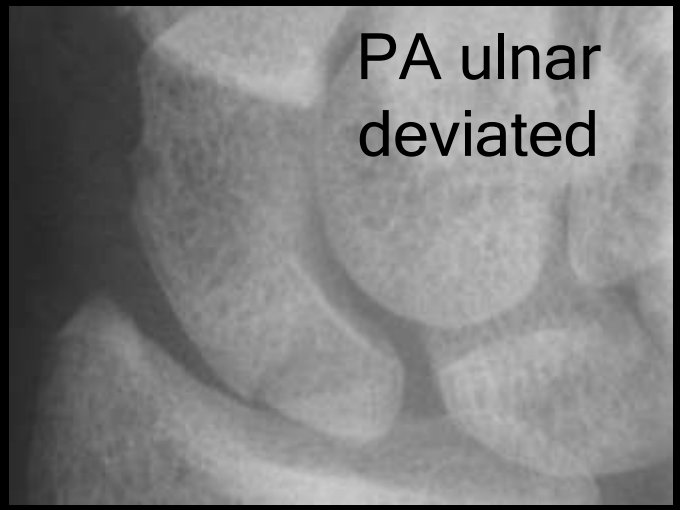
Will spot at least 95% of fractures

Lateral

Long axis

(Extension & ulnar deviation)

Diagnosis



113 scaphoid fractures

Cheung et al 2006

2 most reliable views

Diagnosis

Early diagnostic means are often unreliable

If suspicion persists further examination is necessary at around 2 weeks

Diagnosis

Radioisotope – sensitive but not specific

Diagnosis

CT scan – reliable at *negative* diagnosis

Adey et al JHS 2007

Diagnosis

MRI – 95% sensitive and specific

Also gives prognostic information on vascularity

Imaeda et al 1992, Sakuma et al 1995

Behaviour

- Relates to vascularity

‘The issue of vascularity in fractures and non unions of the scaphoid’

Buchler and Nagy 1995

JHS (Br); 20B: 726-735

Vascularity

Distal
- Lateral Palmar Group
- Dorsal Group (70-80%)
- Distal Palmar Group

Vascularity

Variability

Proximal to waist

0 = 13%

1 = 20%

>2 = 67%

Obletz & Halbstein 1938

Proximal to waist

27%

At the waist

59%

Distal to waist

14%

Gelberman & Menon 1980

Vascularity

Travaglini (1959)
Via SLIL

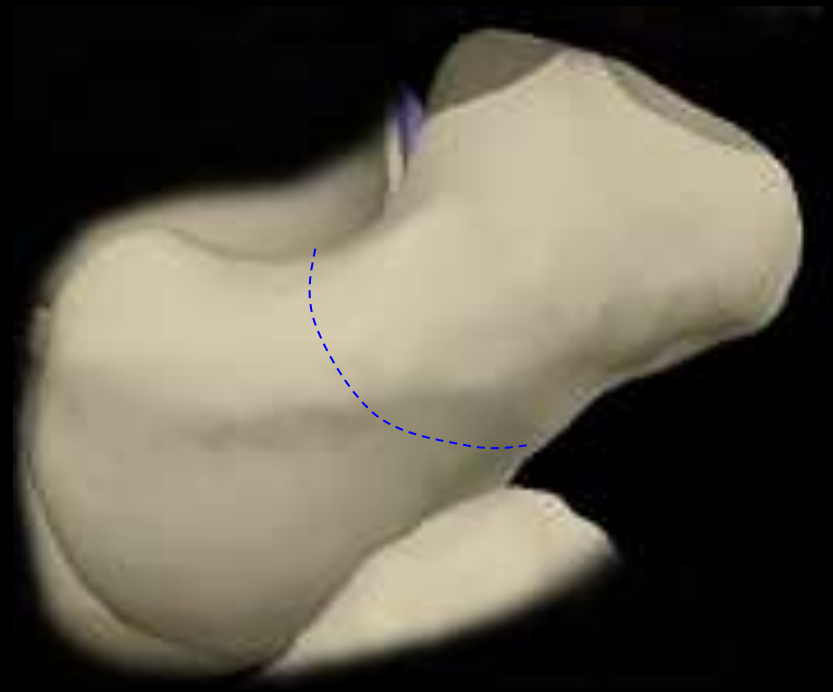
Gelberman & Menon (1980)
Deep RSL

Kuhlmann & Guerin-Surville (1981)
only in 40%

Kauer (1993)
confirmed this

Vascularity

- Distal to proximal
- Variable pattern
- 2 distinct regions



Vascularity

- Proximal pole supply variable and unreliable
- Proximal pole fractures lead to vascular disruption
- Lack of periosteum deprives bone of blood flow
- Many other factors contribute to avascularity

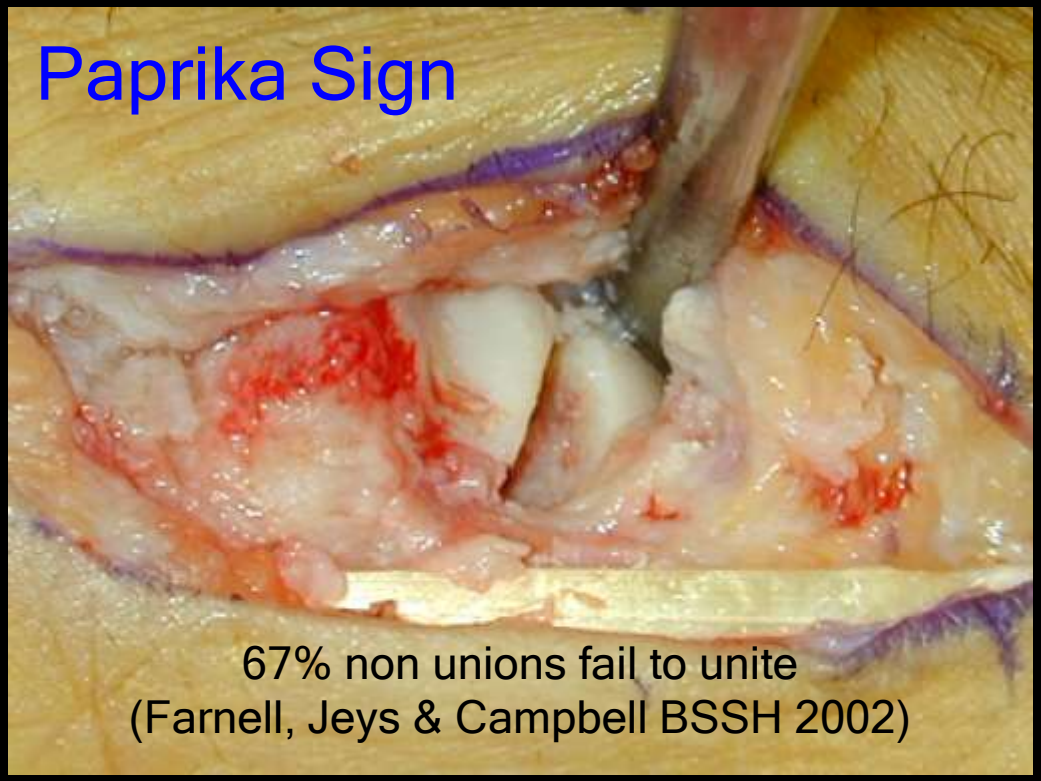
Vascularity

Assessment

- Plain x-rays are not reliable

  Downing et al 2002

- MRI
- Direct inspection



Scaphoid fractures

- > 85% undisplaced fractures will heal
- Average healing time 9-10 weeks
- Immobilisation time varies with site
- Many different types of cast

Leslie & Dickson 1981

When has union occurred?

Xrays are unreliable

When has union occurred?

1. Satisfactory appearances
2. Impending union
3. Impending non union
4. Unsatisfactory appearance

Dias 2001

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Dias 2001

Avascularity

The ‘dense’ proximal pole on x-ray is NOT a sign of avascularity

Avascularity

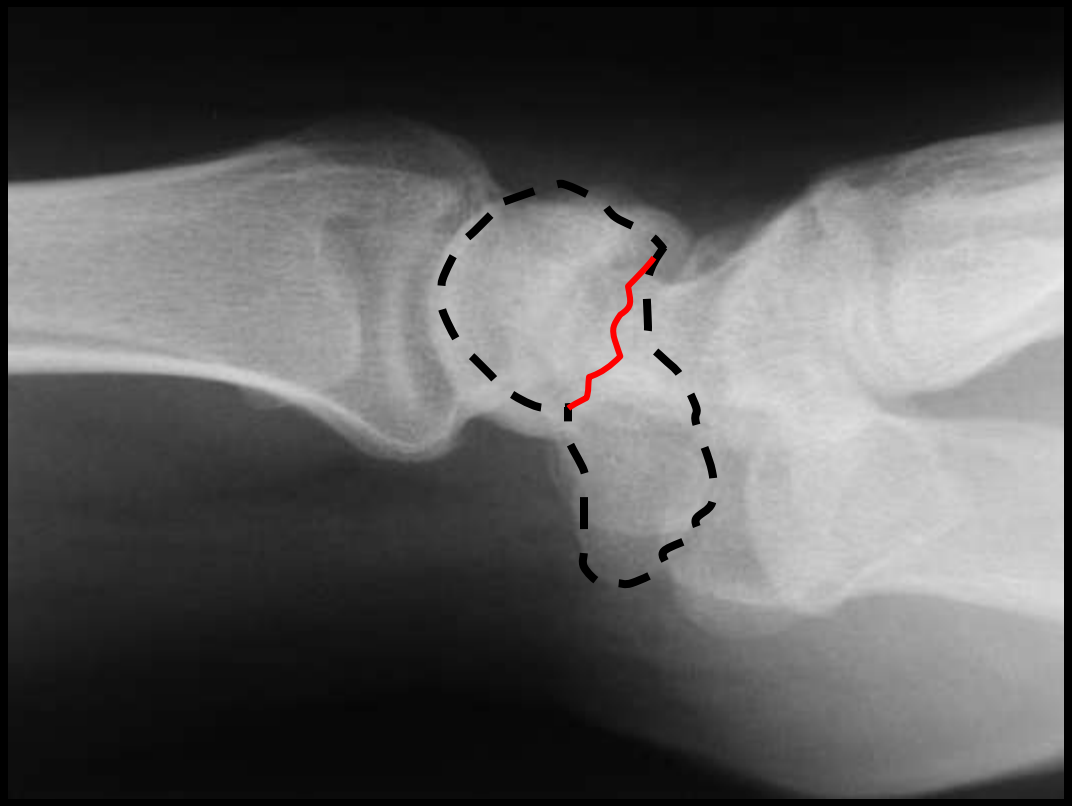
The ‘dense’ proximal pole on x-ray is NOT a sign of avascularity

MRI is reliable

Risks of non union

- Fracture site
- Fracture displacement
- Delay in treatment
- Fracture collapse

Humpback deformity



Management

- ‘Special fracture’
- Dictated by vascularity threat
- No consensus view

Nonoperative

- (Prolonged) period in cast
- Include thumb?
- Long or short?

  Gellman et al 1989

- Add Pulsed em stimulation?

Frykman et al 1986

Operative

- Open/Percutaneous
- Dorsal approach
- Cannulated screw
- Mini C-arm
- ?Graft if comminuted

Trumble & Vo 2001

Percutaneous fixation

- Undisplaced waist fractures
- Proximal pole fractures
- No cast required
- Allows early movement
- Few long term differences

Percutaneous fixation

- 4 - 5 mm scar
- Regional anaesthetic
- Fluoroscopy control
- No cast

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Percutaneous fixation

- 100% union
- 80 - 90% ROM at 8 weeks
- 75% grip strength

Yip et al 2002

ORIF

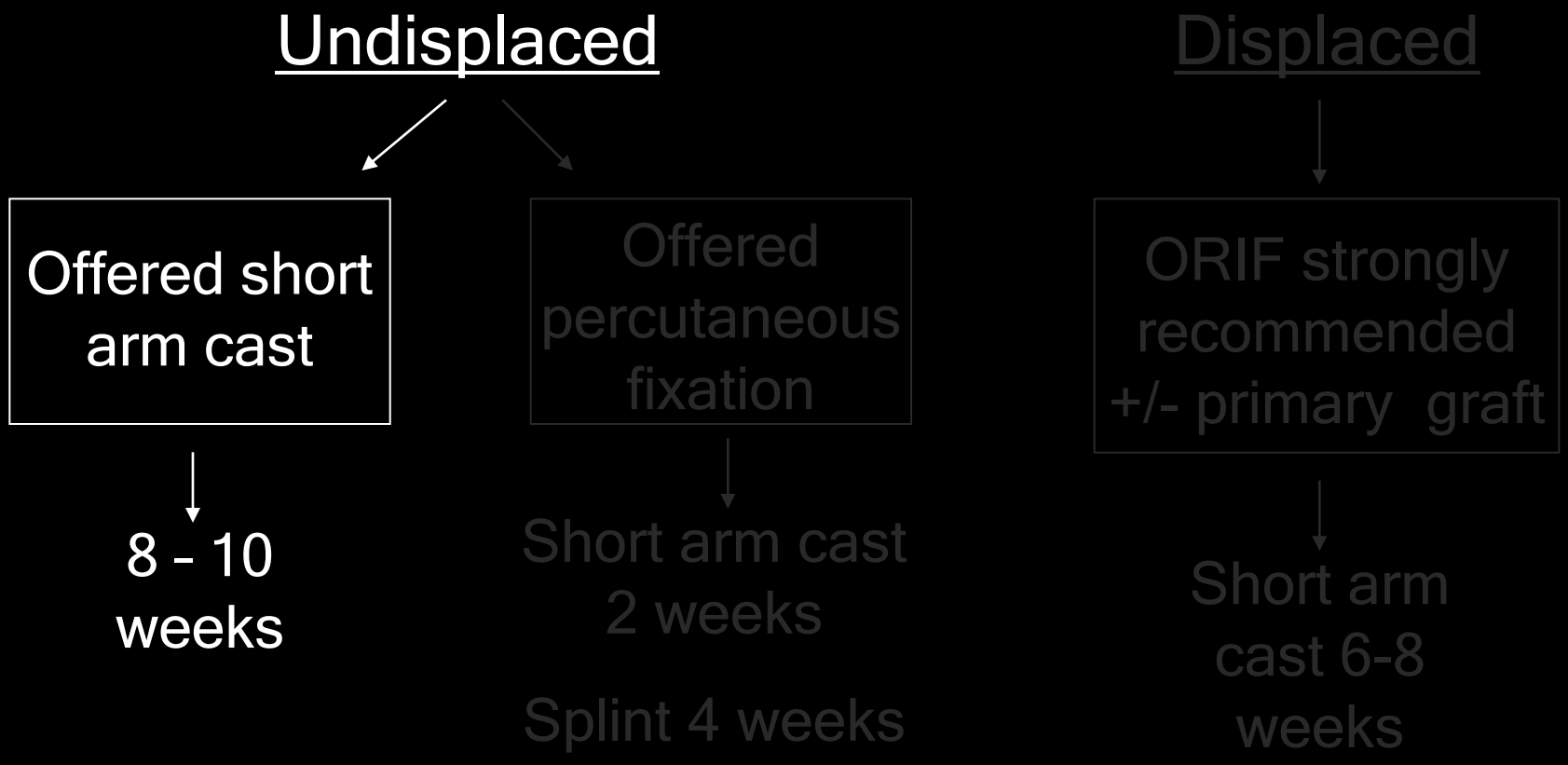
- Displaced acute fractures
- Trans scaphoid PLI

ORIF

- Displaced acute fractures
- Trans scaphoid PLI
- Notable non union risk

Personal View

Proximal pole fractures



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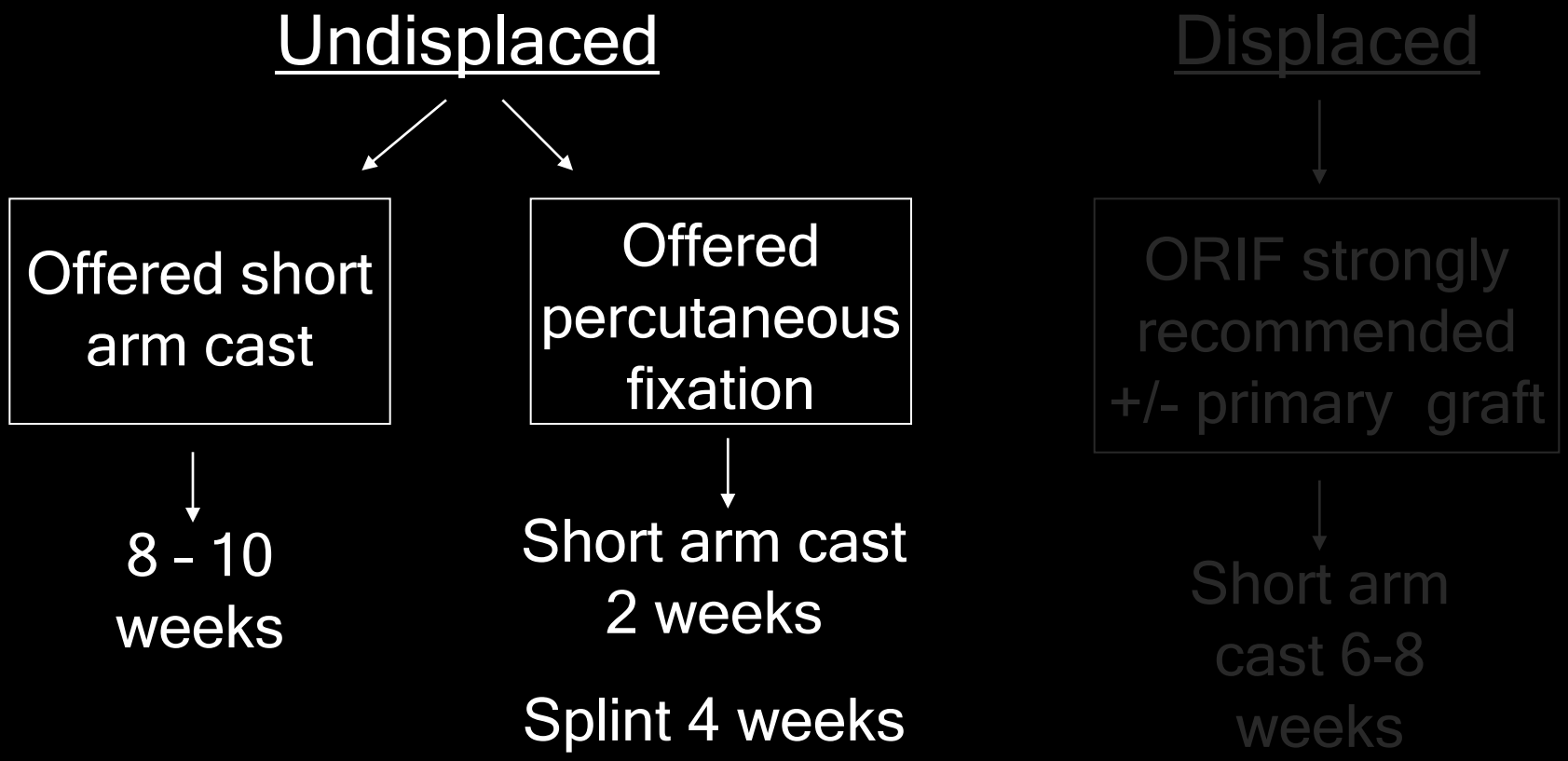
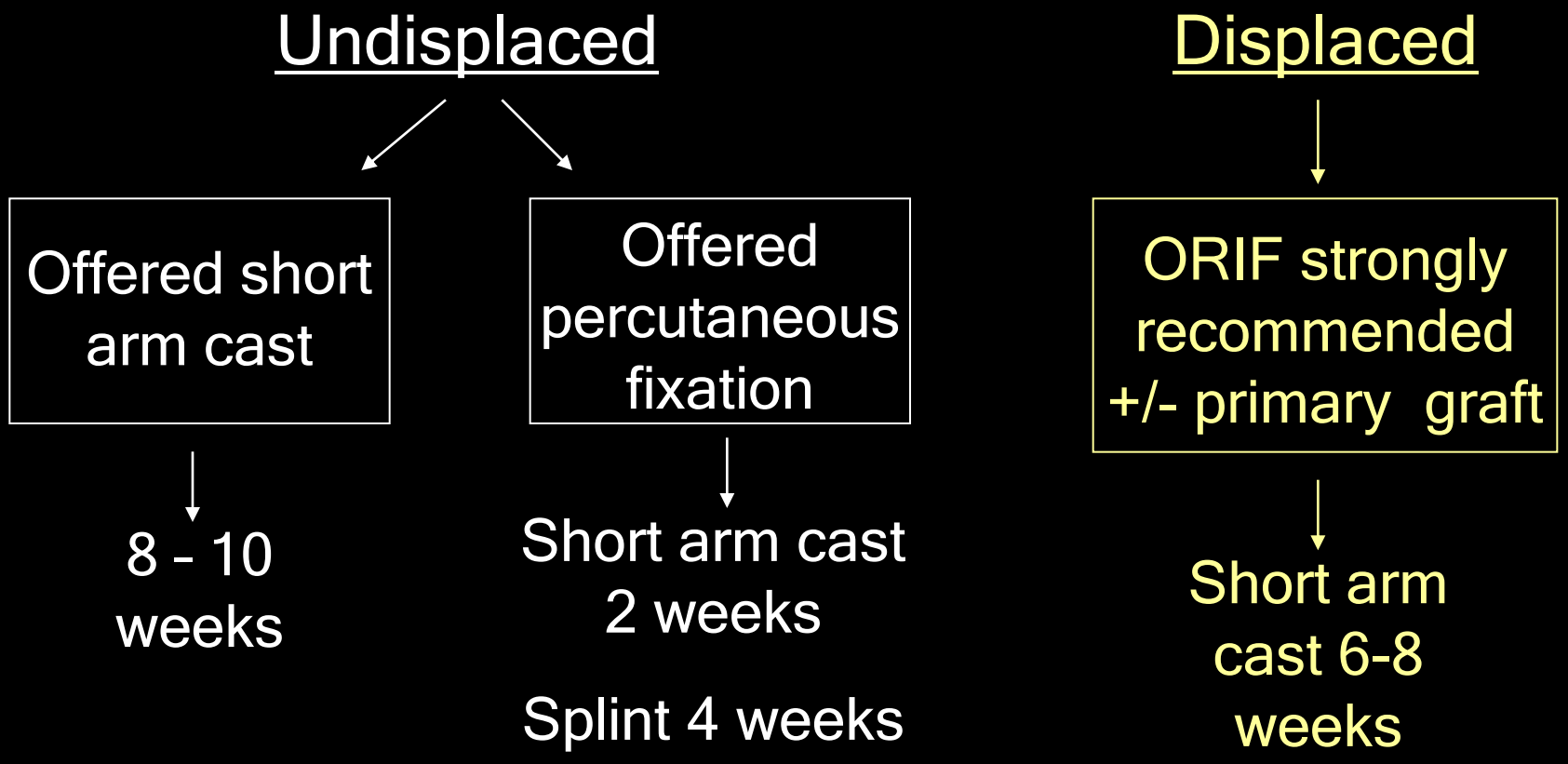
Proximal pole fractures



Personal View

Proximal pole fractures



Outcome

- Assessment of union unreliable with plain x-rays
- Signs of ‘non-union’ are clear
- Signs of ‘union’ are not

This leads to difficulty in stating when a fracture has united

Summary

- Good outcome… if treated
- Be suspicious
- Investigate early
- Offer aggressive treatment
- If it’s a non union, say it’s a non union