Kienbock's disease

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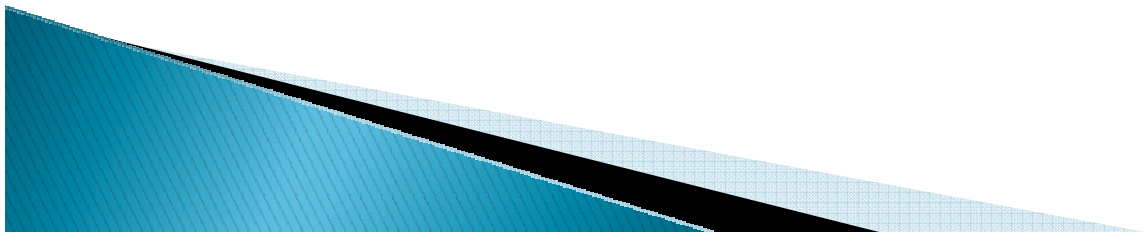
Yr 4 SpR

Outline

- Introduction
- Aetiology
- Classification
- Treatment

Introduction

- First described by Peste in 1843
- Described as lunatomalacia by Kienbock (1910)
- Traumatic rupture of the ligaments and vessels around the lunate produced lunate fracture with subsequent collapse.



Introduction

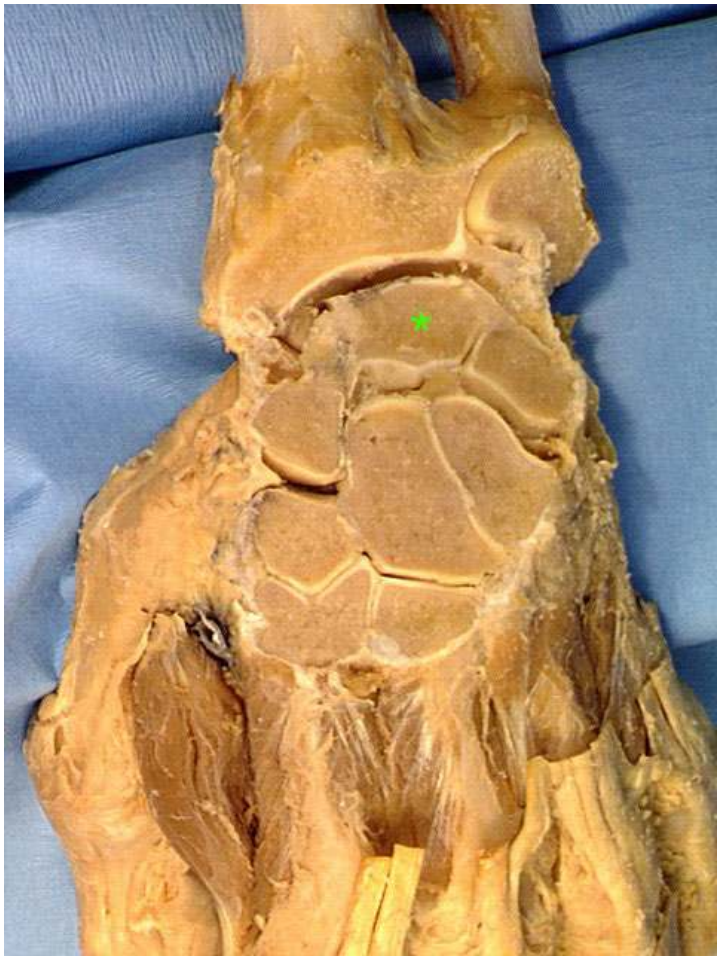
- Condition characterised by wrist pain, weakness and loss of motion secondary to osteonecrosis of the lunate

Anatomy

- Proximally articulates with radius and TFCC

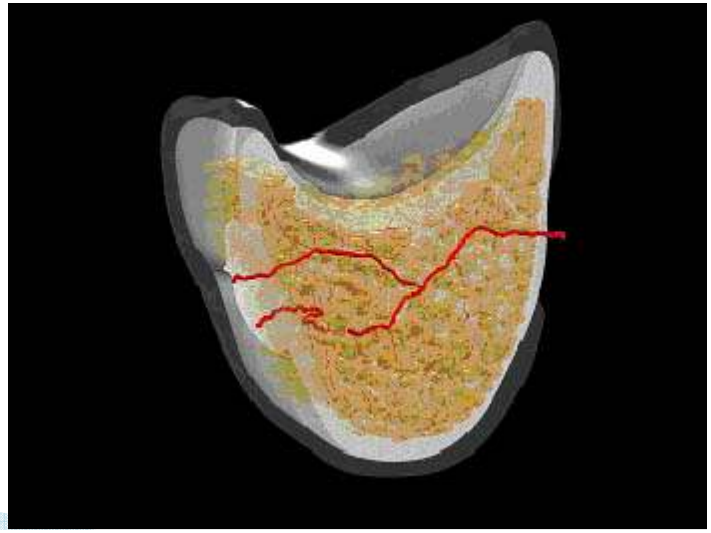
- Distally articulates with capitate alone in 1/3 of cases

- In the rest, articulates with the hamate as well



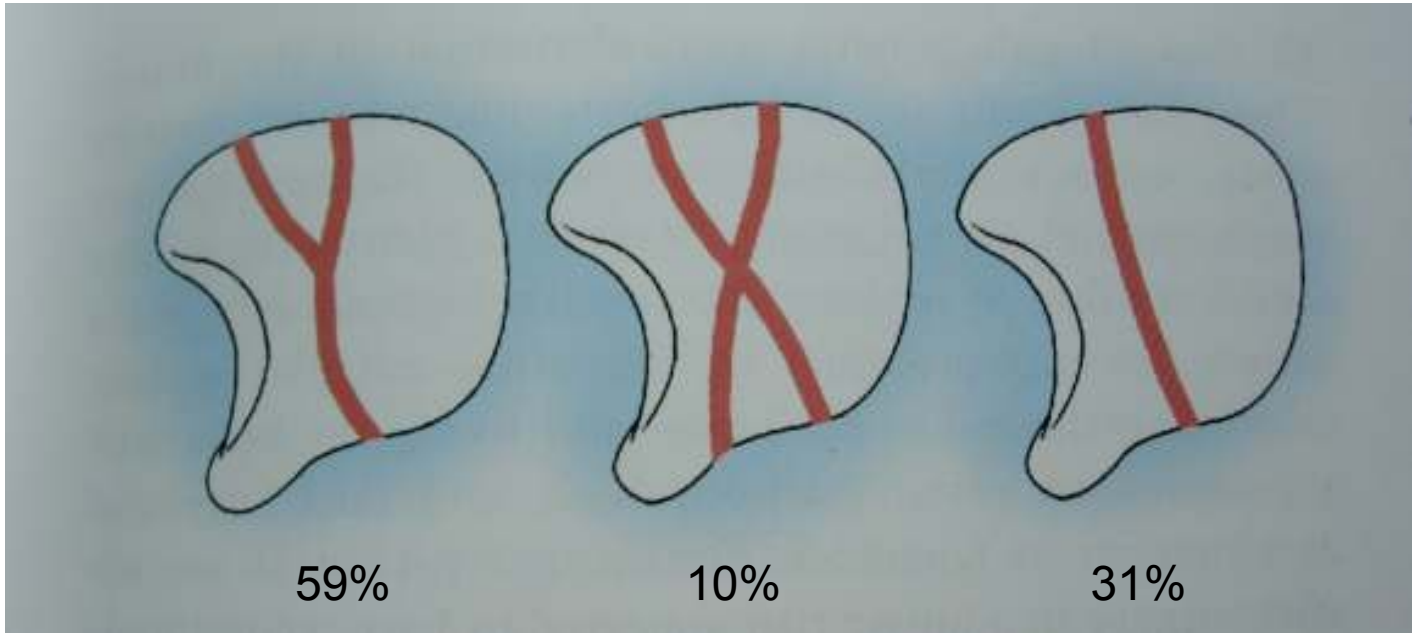
Blood supply

- Extraosseous blood supply
  - Single volar/ dorsal vessel - 26%
  - Multiple volar/ dorsal vessels without central anastomosis - 8%
  - Multiple vessels with anastomosis - 66%
  - Lee ML, Acta Orthop Scand, 1963



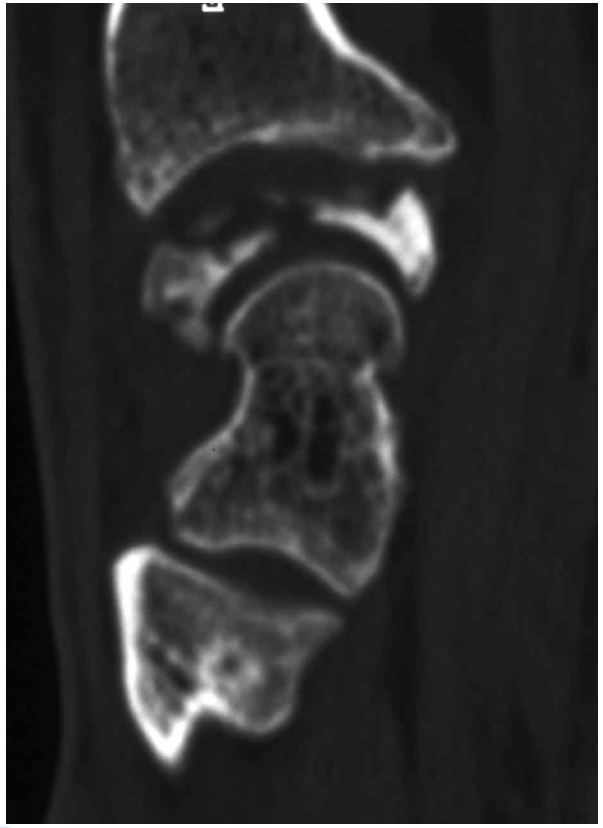
Blood supply

- Intraosseous blood supply



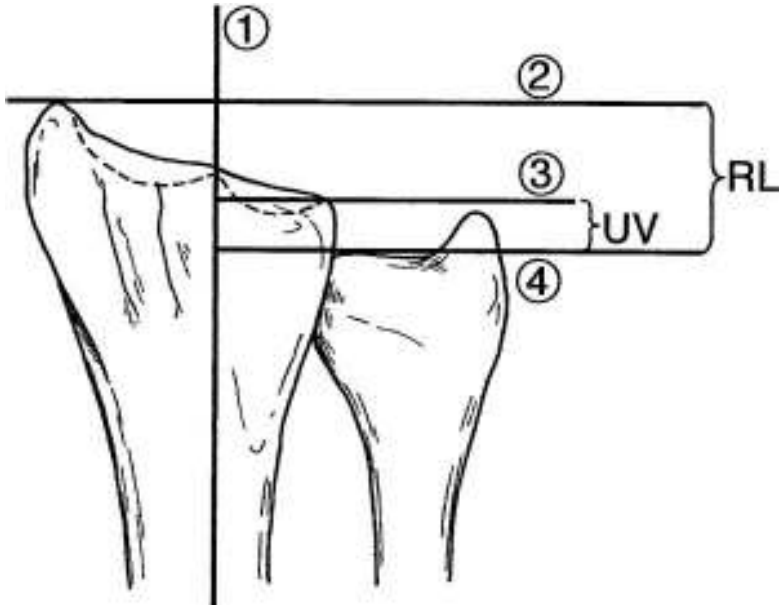
Blood supply

- Least vascular area of the lunate: subchondral bone adjacent to the radius



Ulnar variance

- Relationship of the distal articular surfaces of the ulna and the radius seen on a PA X-ray of the wrist



Ulnar variance

Ulnar variance

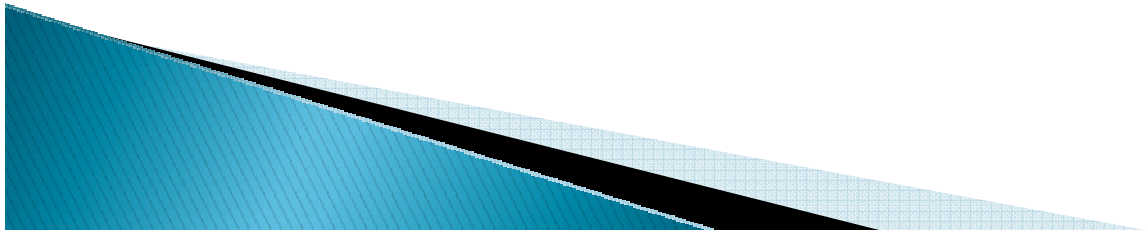
- Hulten noted that 74% of patients with Kienbock's had negative ulnar variance

In a normal population:

61% neutral ulnar variance

23% negative

16% positive



Ulnar variance

- However
  - More normal subjects with positive ulnar variance in asian and black populations
  - Kienbock's disease has been reported in those with positive ulnar variance

Biomechanics

- 90.3% of the radio-ulno-carpal force is transmitted to the radius:
  - 61% through radioscaphoid joint and
  - 39% through radiolunate joint

- 9.7% through TFCC

Biomechanics

- Load through the lunate depends on:
  - Amount of bone that is not covered by distal radius and
  - Ulnar variance

Schuind et al J Biomechanics, 1995

Biomechanics

- Nutcracker effect
  - Lunate articulates with the rigid capitate and radius on one side and the elastic TFCC on the other

Lunate at risk

- Ulnar negative variance
- Single extra-osseous nutrient vessel
- Poor intra-osseous anastomosis

Aetiology

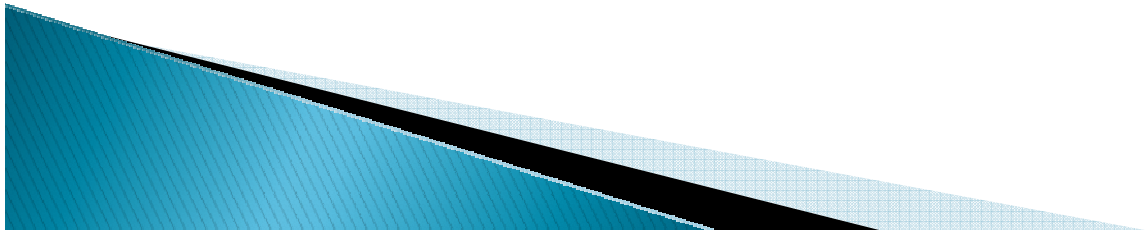
- Vascular theory
  - Primary circulatory problems,
    e.g. Sickle cell disease/ raised venous pressure

- Mechanical theory
  - Excessive mechanical loads cause repeated microfractures and collapse

  - Role of trauma

Clinical presentation

- More common in men
- Peak incidence: 18-40 yrs
- Most patients are involved in heavy manual labour
- Typically unilateral



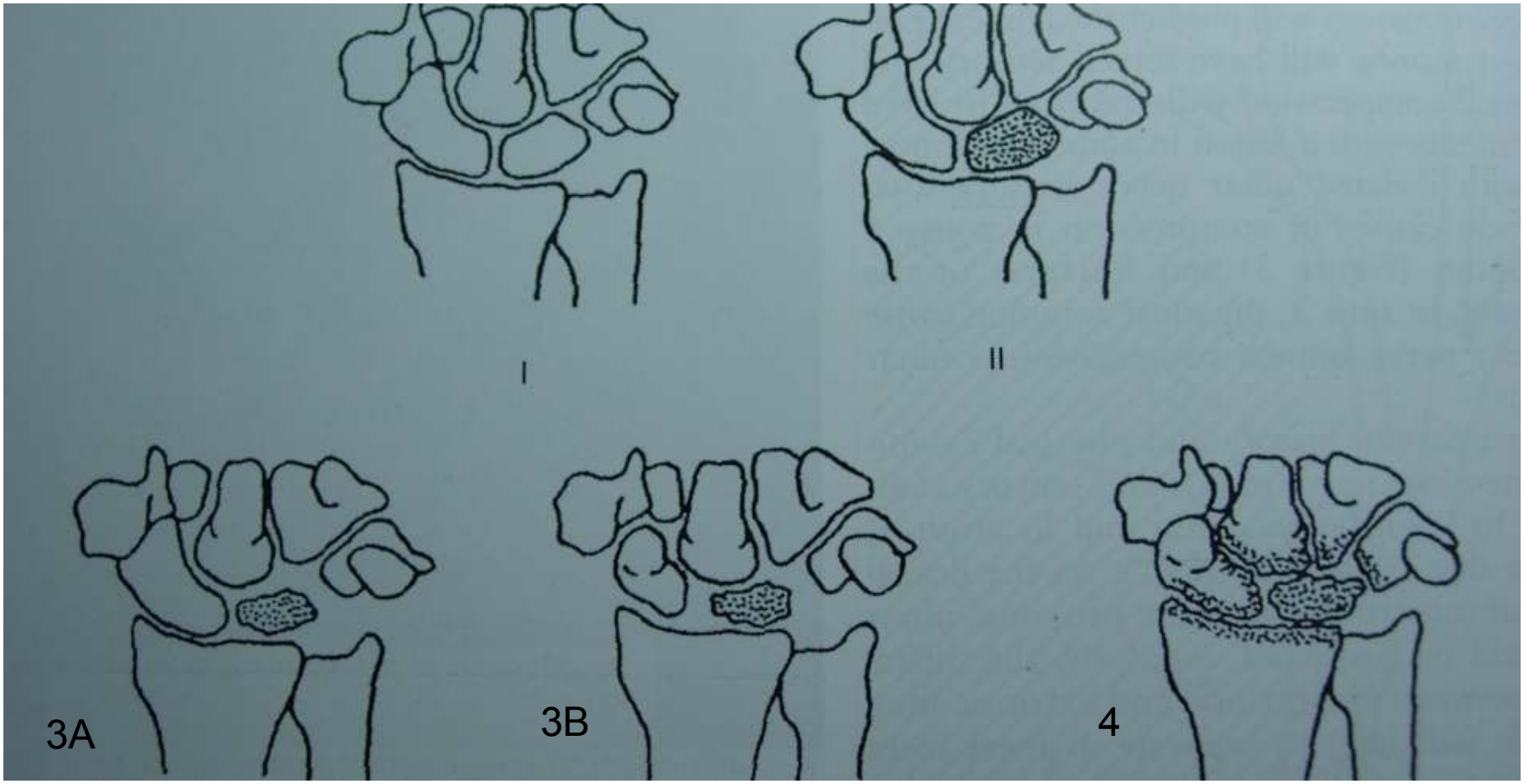
Clinical presentation

- Insidious onset wrist pain
- *Beware of making a diagnosis of wrist sprain*
- Pain is aggravated with activity, relieved with rest
- Weakened grip strength
- Slightly reduced flexion and extension

Imaging

- PA Xray
- MRI
- CT

Lichtman classification



Treatment

Primum non nocere
First, do no harm !

"The greatest danger the world is facing from health professionals is the pressure to investigate,prescribe and intervene in non existing or futile clinical disorders and diseases"

Primum non nocere , has now distorted

Now it seems to suggest

"We can do as much harm, as long as it is scientific"

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Treatment

- Little evidence for any particular form of surgical treatment and for its superiority over conservative treatment
  - Schuind et al, JBJS 2008, 90 B:188-89

Treatment

- Stage 1: Immobilisation in a plaster cast
  - If symptoms persist at 2-4 months, one may consider surgery

Stage 2 and 3A

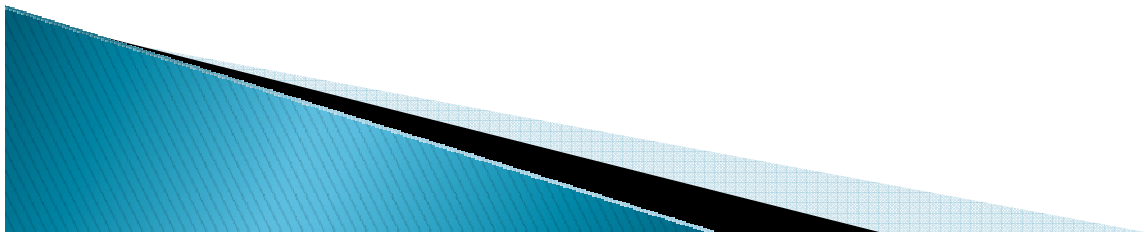
- Negative ulnar variance:
  - Joint levelling procedures
  - Radial shortening or ulnar lengthening osteotomy

Radial shortening osteotomy

- Performed via volar approach
- Avoid excessive shortening (not >4mm)
- Better than ulnar lengthening- higher rate of union

Radial shortening osteotomy

- Best results in patients less than 30
- May lead to revascularisation in younger patients
- May delay the progress of the disease

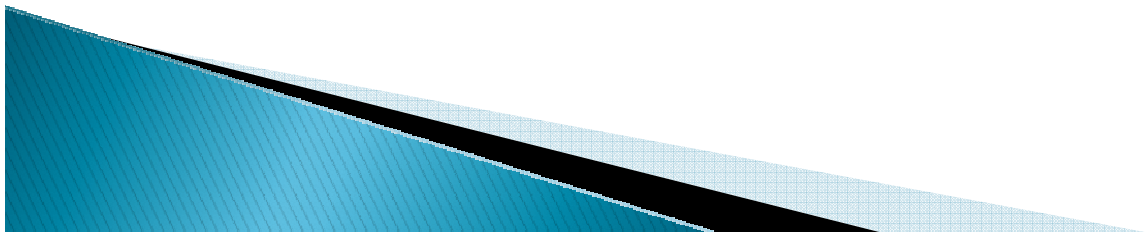


Radial shortening vs conservative treatment

- Salmon et al, JBJS Br 2000
- 18 pts treated nonoperatively vs 15 treated with radial shortening (stage 2-3)
- Patients treated with radial shortening had less pain and better grip
- Radial shortening slowed the process of carpal collapse

Stage 2 neutral ulnar variance

- Revascularisation procedures
  - Implantation of metacarpal arteriovenous pedicle into the lunate
  - Vascularised bone graft from dorsal radius using the 4,5th intercompartmental supraretinacular artery (4,5 ICSRA)
- Revascularisation may precipitate lunate collapse



Stage 2 neutral variance

- Radial closing wedge osteotomy: Decreases radial inclination and shifts load from the lunate to the scaphoid
- Not universally accepted
- Possibly enables better coverage of the lunate

Symptomatic stage 3b

- Goals of treatment
  - Preserve carpal height
  - Maintain scaphoid in its proper position and alignment

Stage 3B

- Options: Conventional procedures
  - Lunate excision and intercarpal fusion
  - Lunate excision
  - Other (weird) procedures
  - Lunate replacement
  - Lunate excision with osteotomy of the capitate
  - Lunate excision and lengthening of capitate

Lunate excision and triscaphe fusion

- Reduces strain across radiolunate joint but increases strain across radioscaphoid joint

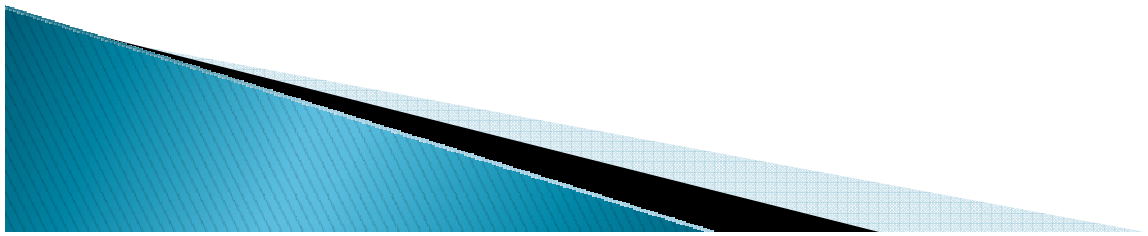
- Not a popular procedure because of complications and poor results

Luntae excision and scapho capitate

- Achieves the objective of preventing further carpal collapse and reduces strain across radiolunate joint

Scapho-capitate fusion

- Technically easier
- Fusion across one joint
- 14pts, 31 month follow up, 12 were satisfied; all returned to work (Mansat et al, 2007)

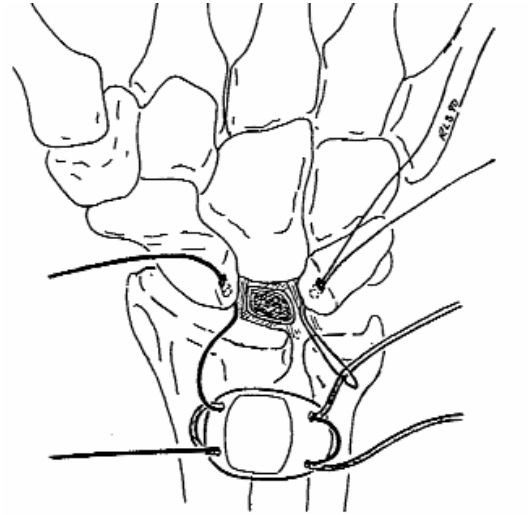


Lunate excision alone

- Kawai et al published long term results:
  - 12 year follow up of 14 patients
  - Carpal collapse progressed with time
  - Patients had satisfactory range of motion
  - All could carry out daily activities and 2 could do strenuous work
  - JBJS Br 1988 70: 287-92

Lunate replacement

- Silicone replacement:
  - No longer favoured – silicon synovitis, subluxation/ dislocation
- Titanium implants



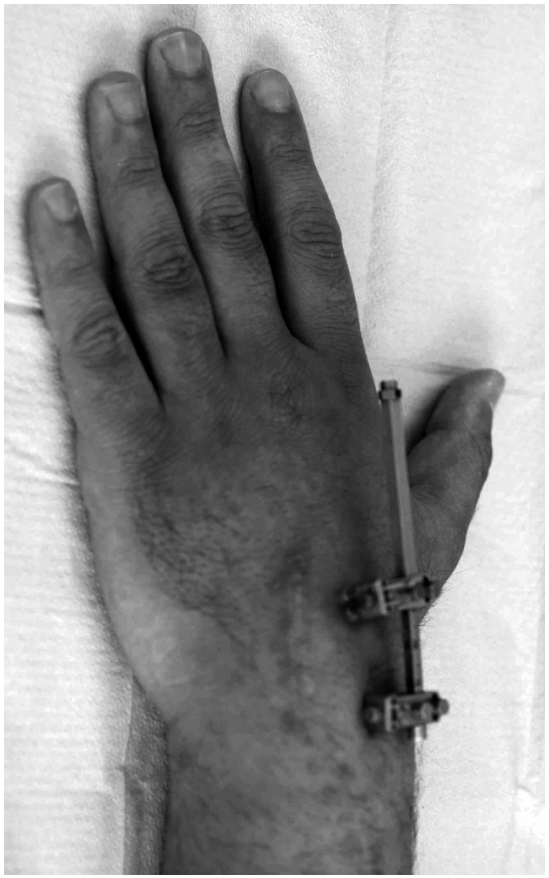
Lunate excision and capitate osteotomy

- Moidified Graner procedure
  - Lunate excision
  - Osteotomy of capitate
  - Curette the articular surfaces of all intercarpal joints except triquetrum and pisiform + bone grafting

Modified Graner procedure

- 15 patients; 80 month follow up
- Results: good in eleven of the patients, fair in two, and poor in two.
- Grip strength 80% of normal
- Radiographic OA changes developed in all patients
  - Takase et al JBJS Am 2001, 83:177

Capitate lengthening



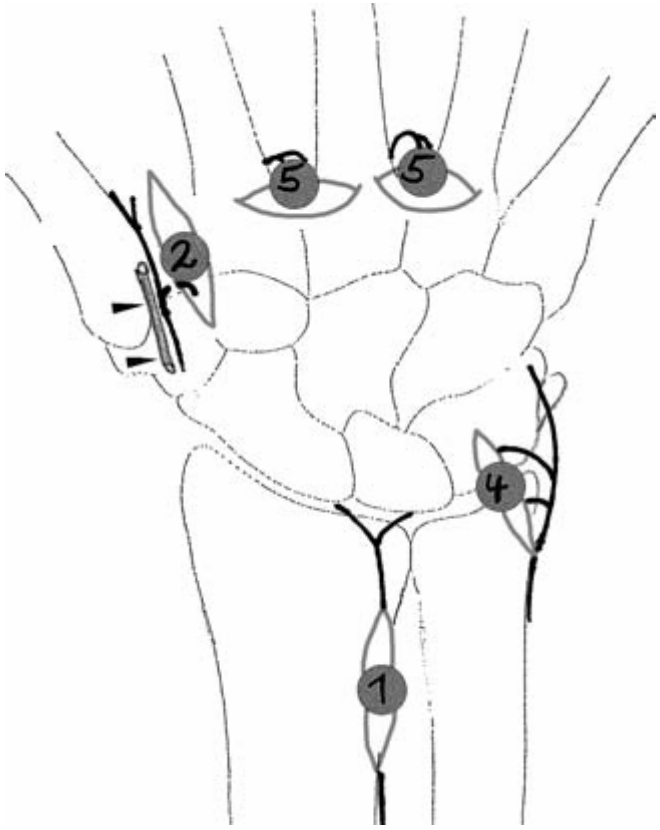
Stage 4

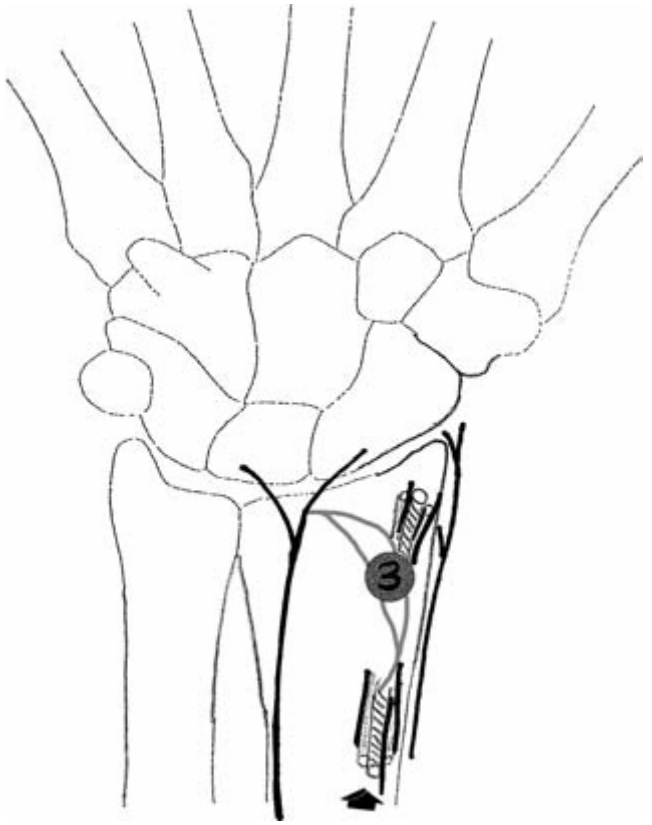
- Salvage procedures
  - Proximal row carpectomy
  - Wrist denervation
  - Wrist fusion

Proximal row carpectomy

- Retains 65% movement at the wrist and 85% of the grip strength
- Articular surfaces of radius and capitate should be satisfactory

Wrist denervation





Dorsum

Wrist fusion

- Better outcome if offered early in some patients with stage 3b and 4
  - Tambe et al, Int Ortho 2005

Summary of treatment

- Stage1: Immobilisation
- Stage 2 and 3A: Radial shortening OR revascularisation
- Stage 3B: Lunate excision with or without scapho capitate fusion
  May consider PRC/ fusion
- Stage 4: Wrist fusion


Any questions?