

Kienbock's disease treatment by lunate revascularization:

- Place of Arthroscopy
- Preferred procedure

Ch. Mathoulin

Kienbock's Disease

History

Place of Arthroscopy ?????

Watanabe 1995
(articular surface and IO lig)

Menth-Chiari 1999
(Debridement of necrotic bone)

Mathoulin 2001
(articular surface)

Bain 2006
(classification-surgical indications)



Classification

Lichtman 1977

Stage 1

(normal lunate and bone density)

Stage 2

(altered shape of lunate, increased density)

Stage 3A

(fragmentation of lunate, shape +/- normal)

Stage 3B

(disrupted architecture, carpal collapsus)

Stage 4

(generalized carpal degeneration)



Classification

Bain 2006

Grade 0

(all articular surfaces functional)

Grade 1

(one nonfunctional articular surface)

Grade 2

A and B (two nonfunctional surfaces)

Grade 3

(three nonfunctional surfaces)

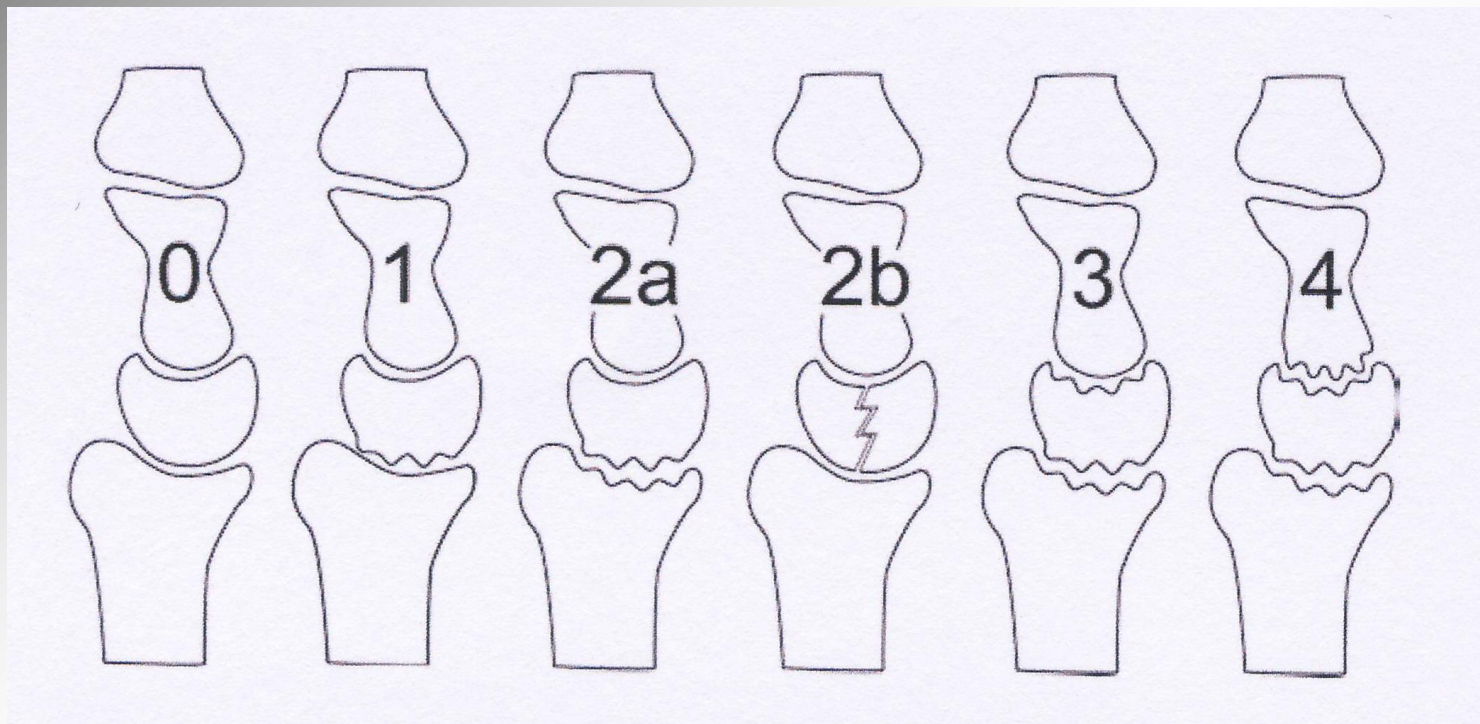
Grade 4

(all four surfaces nonfunctional)



Classification

Bain 2006



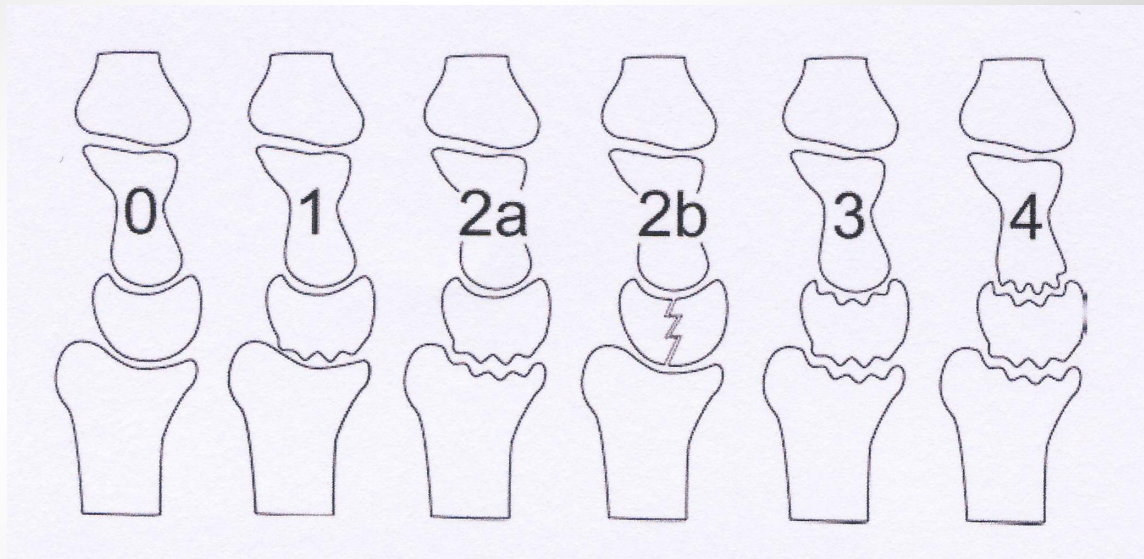
Classification

Comparison Lichtman/Bain

Stage 1 Lichtman = Grade 0 Bain

Stage 3B Lichtman = Grade 1 to 3 Bain

Stage 4 Lichtman = Grade 4 Bain



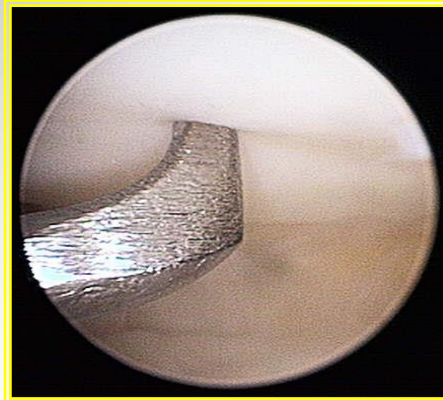
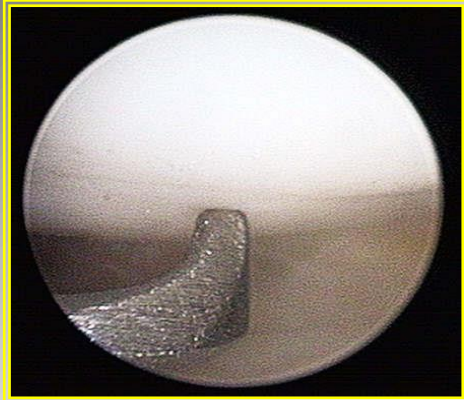
Mathoulin' proposition



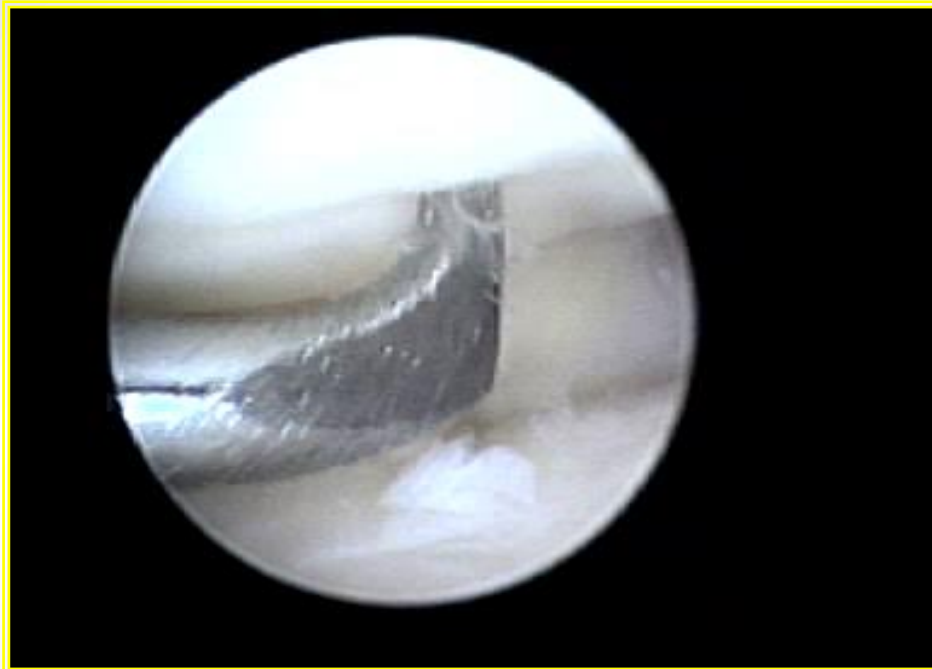
Lichtman 3B, Bain??



Mathoulin' proposition



**Lichtman 3B,
Bain 0 !!!!!!!**

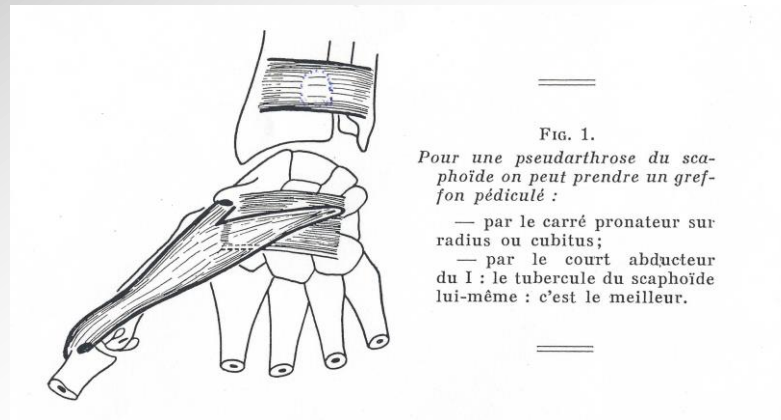


HISTORY, ANATOMY

VOLAR CARPAL ARTERY

Robert Judet (1964-65)

Mencke (1970)



Braun (1987) Kulhman (1987)

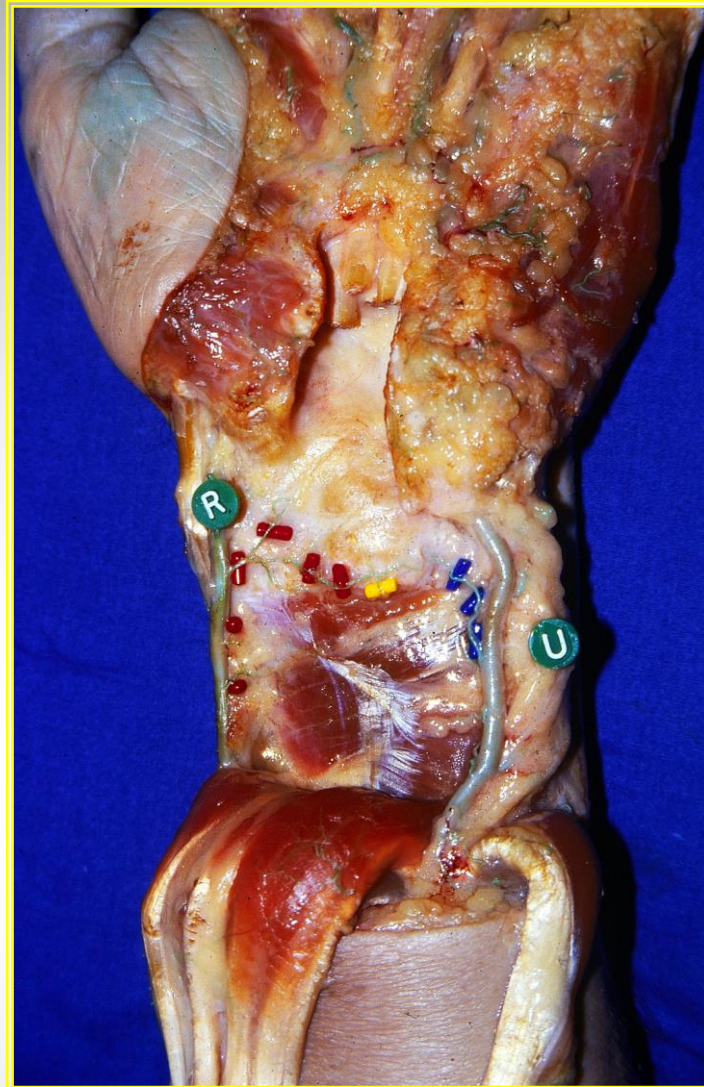
Kawai (1988)

Anatomical background :

Haerle, Mathoulin (1995)

HISTORY, ANATOMY

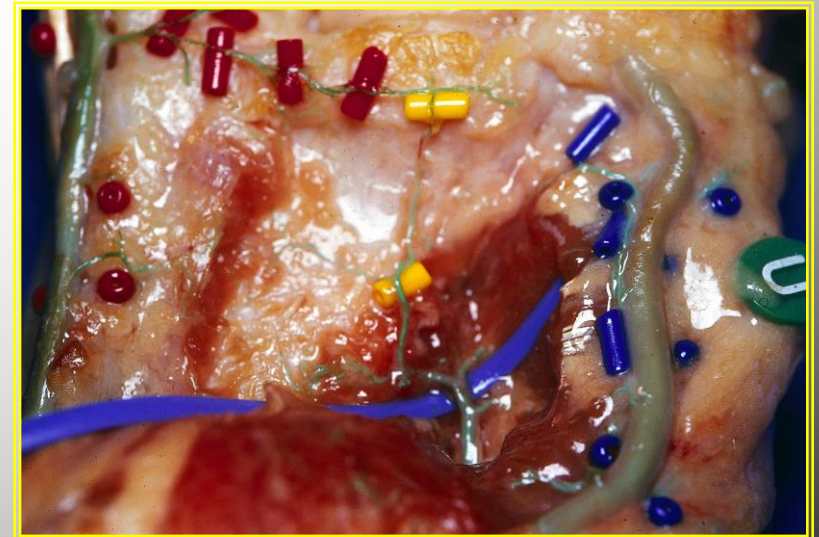
VOLAR



HISTORY, ANATOMY

Volar carpal artery arises from the radial artery and runs along the volar aspect of the radius

It branches on the palmar side of DRUJ forming anastomoses with a branch of interosseus artery and a branch of ulnar artery



HISTORY, ANATOMY

Radial branch of the volar carpal artery was always predominant

Many small branches vascularize the medial part of the distal radius epiphysis



Technique

- Local-regional anaesthesia
- Tourniquet
- Outpatient surgery
- Palmar approach

QUARTERLY ASSIL MEMBER

TECHNIQUE: VASCULARIZED BONE GRAFTS FROM THE VOLAR DISTAL RADIUS TO TREAT SCAPHOID NONUNION

BY CHRISTOPHE L. MATHOULIN, MD, AND MAX HAERLE, MD

The use of vascularized bone grafts to treat scaphoid nonunion has been proposed by various investigators. We examined the blood supply to the palmar surface of the distal radius in 40 fresh cadavers that were injected with a colored latex solution and determined that the radial portion of the palmar carpal arterial arch can serve as a pedicle for vascularized grafts. Scaphoid nonunions with a humpback deformity can be corrected by harvesting a wedge of vascularized bone from the palmar cortex of the distal radius, providing easier access to the scaphoid deformity compared with the use of dorsal distal radius vascularized grafts. We also review our series of 72 patients treated by this technique.

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Nonvascularized autogenous bone grafts combined with internal fixation have become the preferred treatment for scaphoid nonunions for many surgeons. In 1965 Judet and Roy-Camille¹ suggested using a bone graft harvested from the palmar aspect of the radius with a vascular supply from fibers of the pronator quadratus muscle. Braun² and Kawai and Yamamoto³ reported excellent results in treating scaphoid nonunions by using this source of vascularized bone. Other vascularized grafts from the radial and dorsal aspects of the wrist and hand have been described, with similarly encouraging results.⁴⁻¹¹ In this review, we describe the technical aspects of the vascular supply to the palmar aspect of the radius based on cadaver dissections and report on our experience using a vascularized palmar graft in a series of patients with scaphoid nonunions.

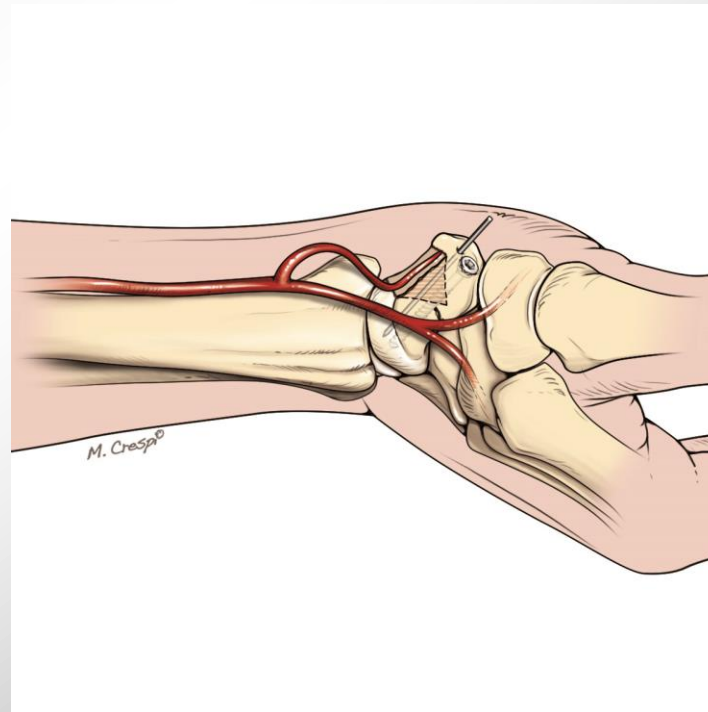
ANATOMIC BASIS FOR VOLAR VASCULARIZED BONE GRAFTS

Inspired by the work of Kuhlman et al,¹² we describe a vascularized graft harvested from the anterior aspect of the radius based on the volar carpal artery.¹³ This pedicle is long enough to reach the

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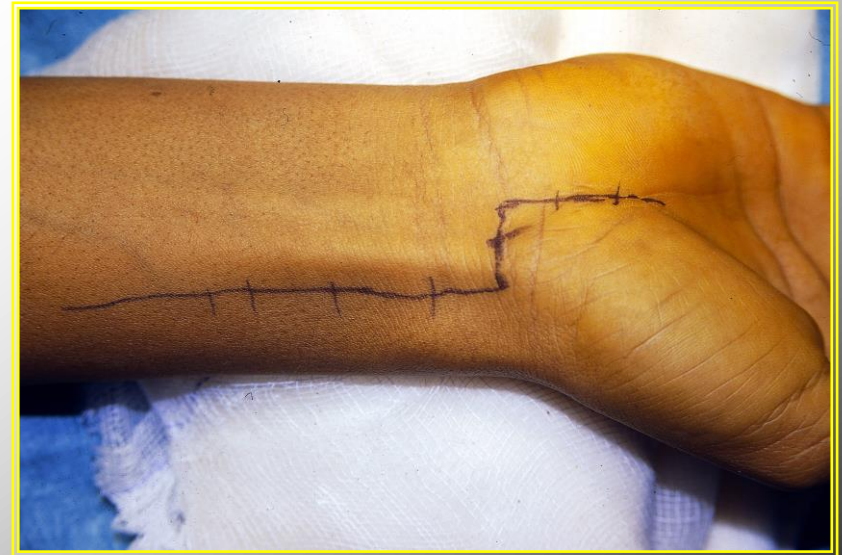
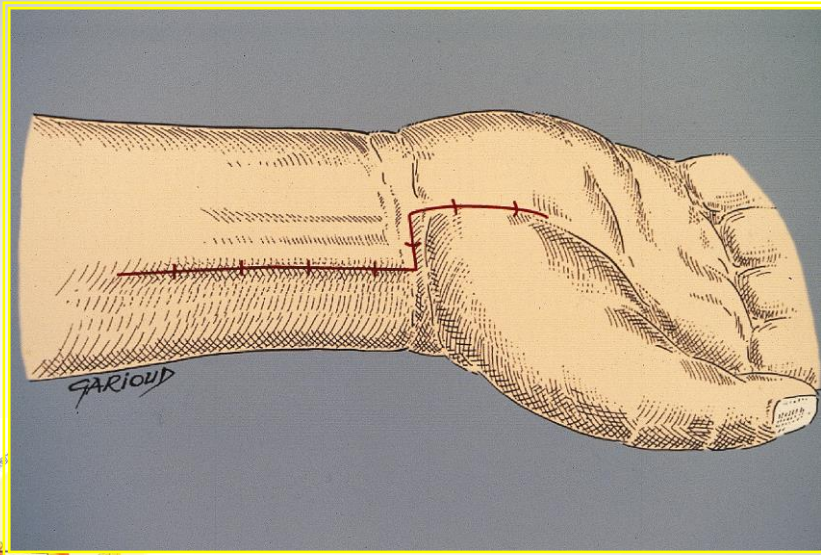
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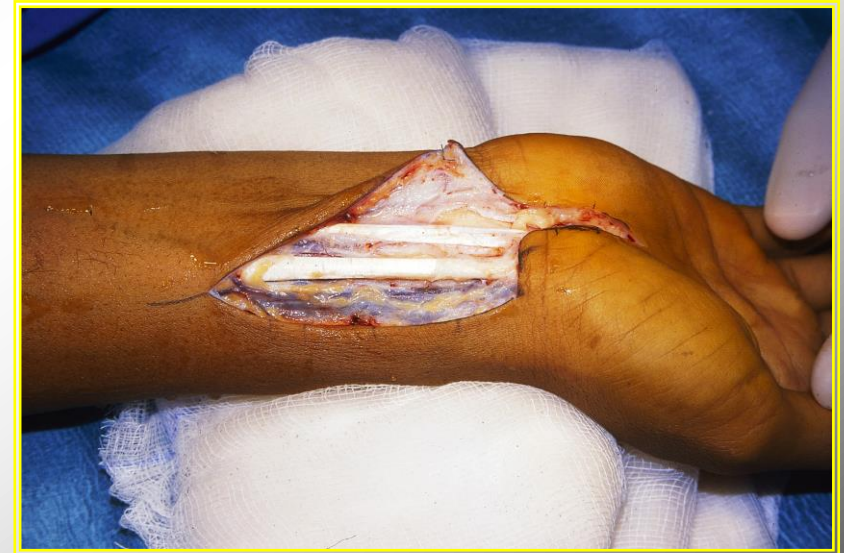
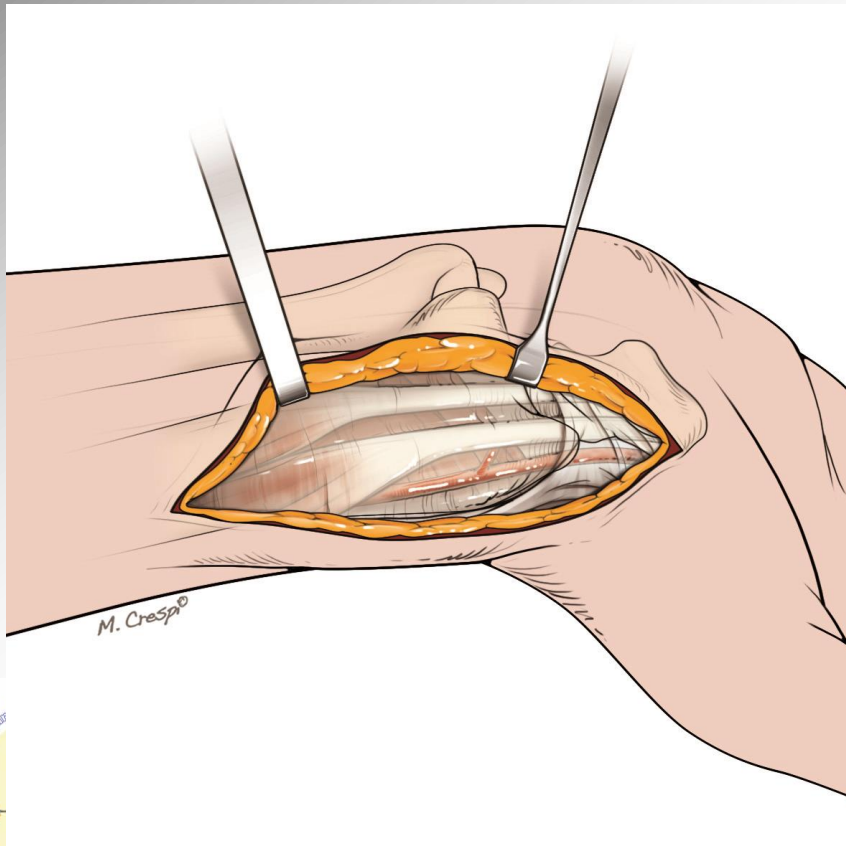
Technique

- Local-regional anaesthesia
- Tourniquet
- Outpatient surgery
- Palmar approach



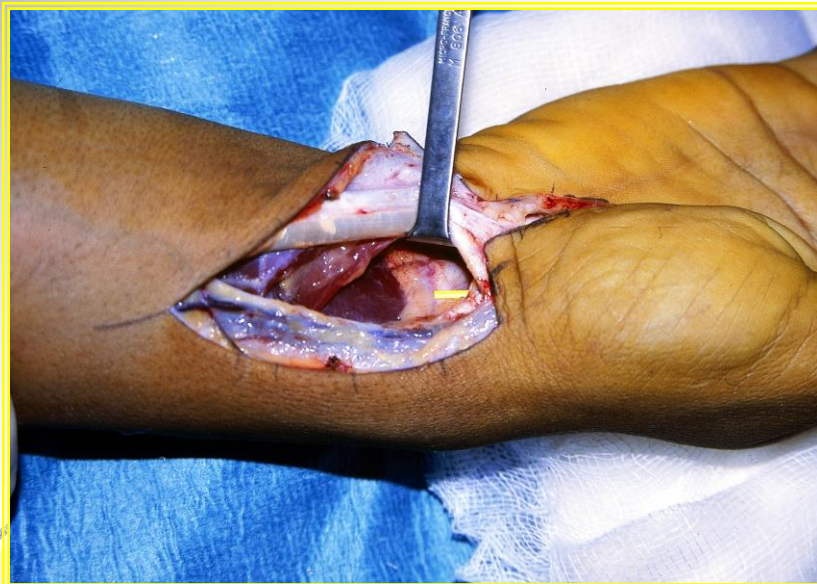
Technique

- First spotting of F.C.R. and radial artery



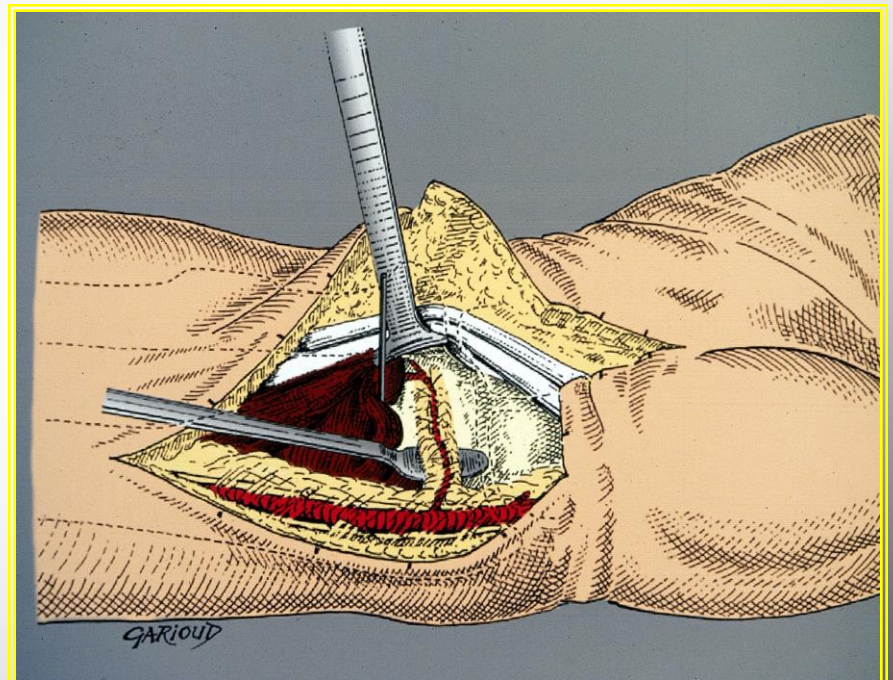
Technique

- Flexing the wrist to release tension of FCR and FPL
- Volar carpal artery is always in front of the superficial aponeurosis of Pronator Quadratus and above the volar radial periosteum



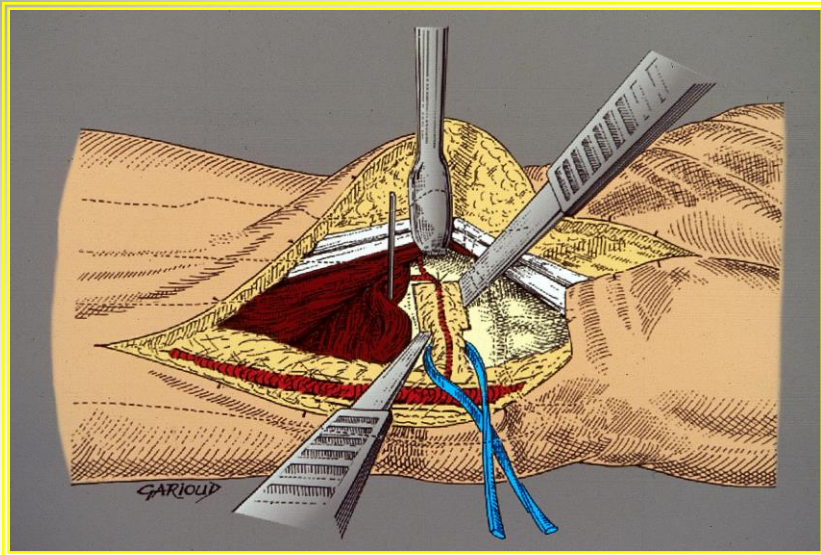
Technique

- Temporary proximal retraction of PQ
- Lateral half of pedicle subperiosteally dissected



Technique

- Harvesting of graft with a chisel
- Medial half of pedicle attached to the graft was not detached



Technique

- **Harvesting of graft with a chisel**
- **Medial half of pedicle attached to the graft was not detached**



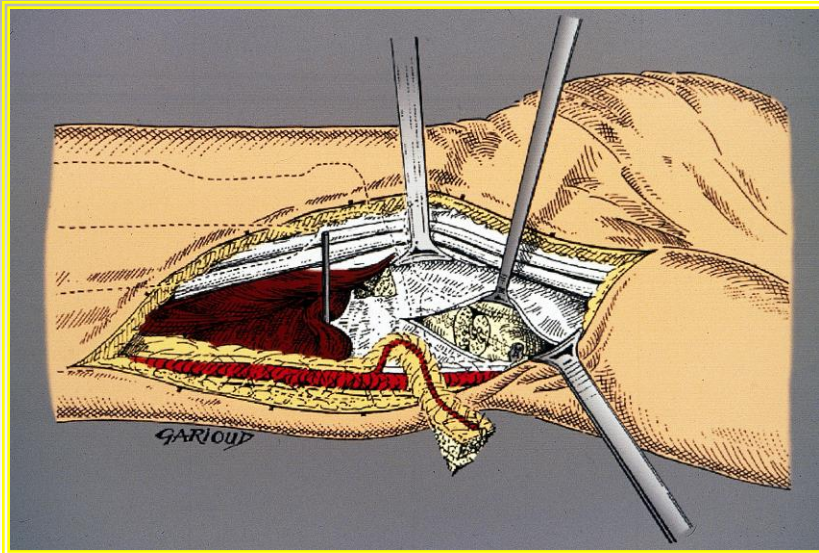
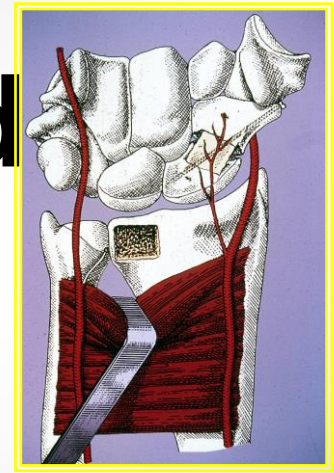
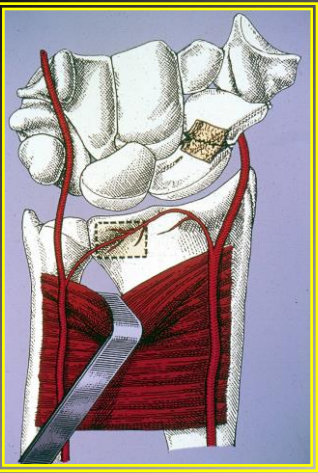
Technique

- Graft and pedicle were dissected back to the radial artery
- Then the tourniquet is released



Technique-Scaphoid

- Opening fracture site
- Freshening the bone ends
- Scaphoid osteosynthesis with screw



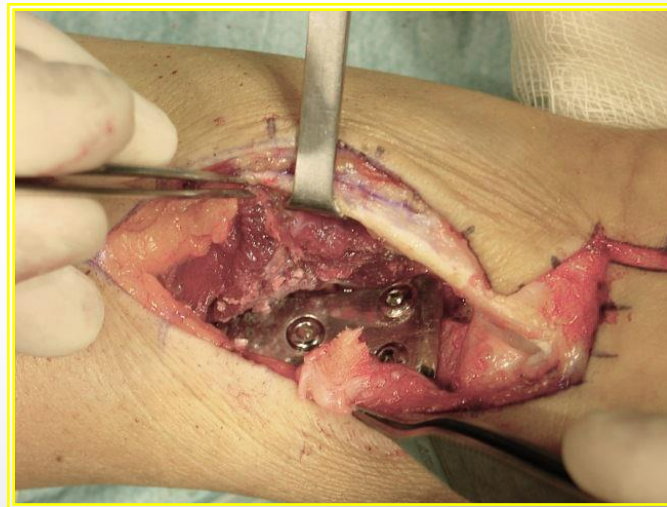
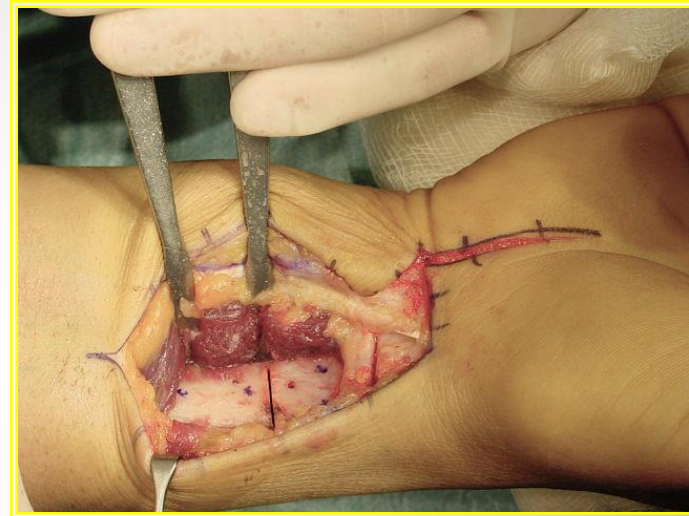
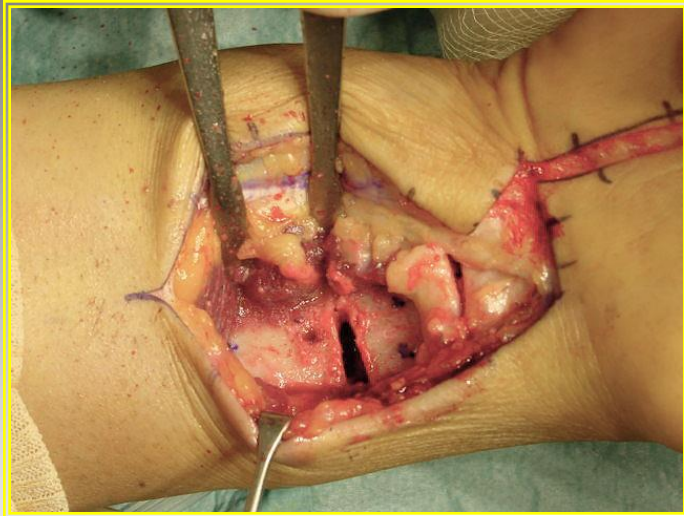
Technique-Scaphoid

- Graft placed at the anterior site of bone loss
- Scaphoid osteosynthesis with screw
- Graft fixed by 10 mm K-wire parallel to screw



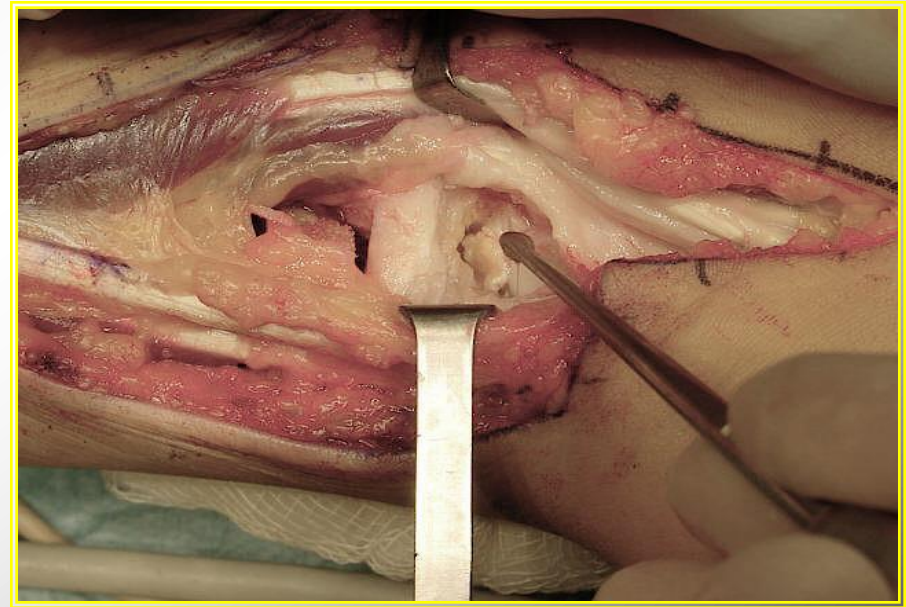
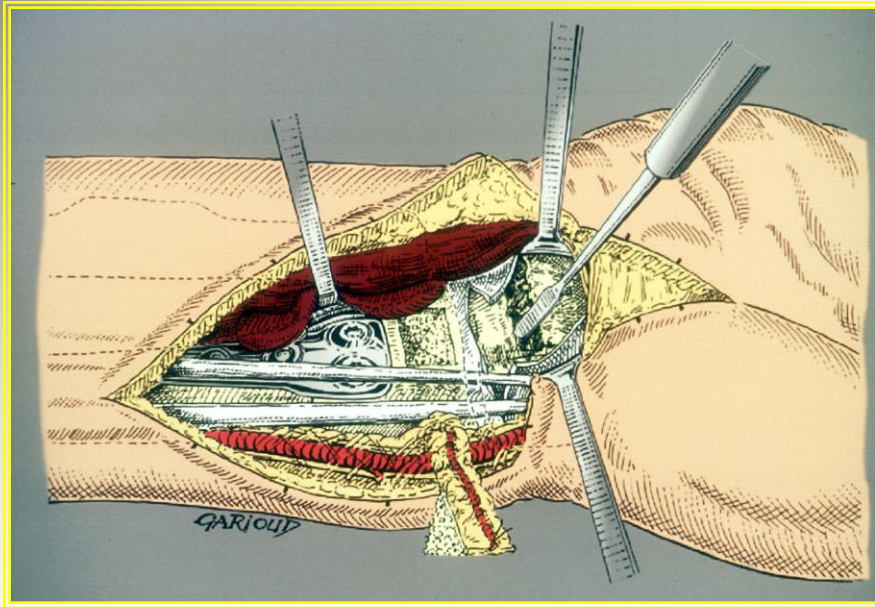
Technique-Kienbock

Shortening radius osteotomy



Technique-Kienbock

- Opening articular capsule
- Lunate is emptied with a curette



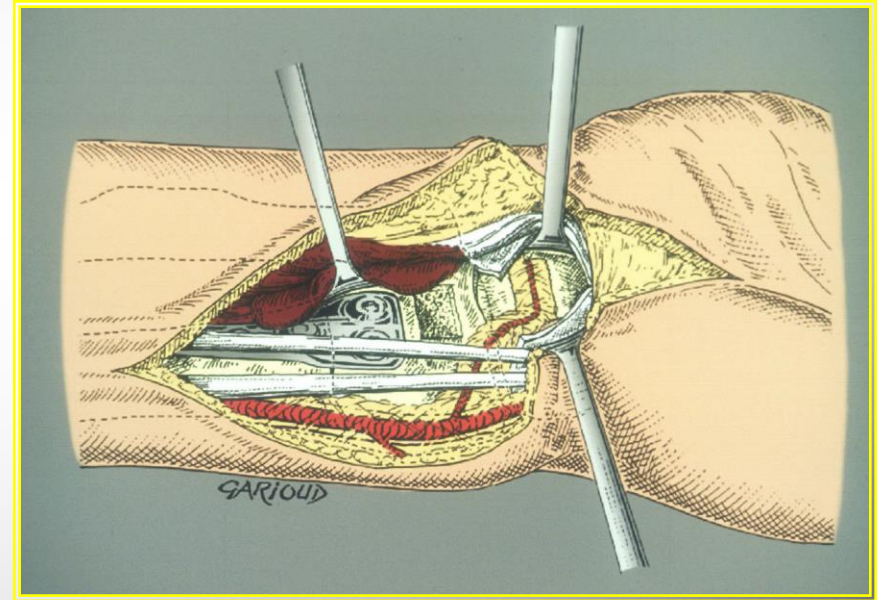
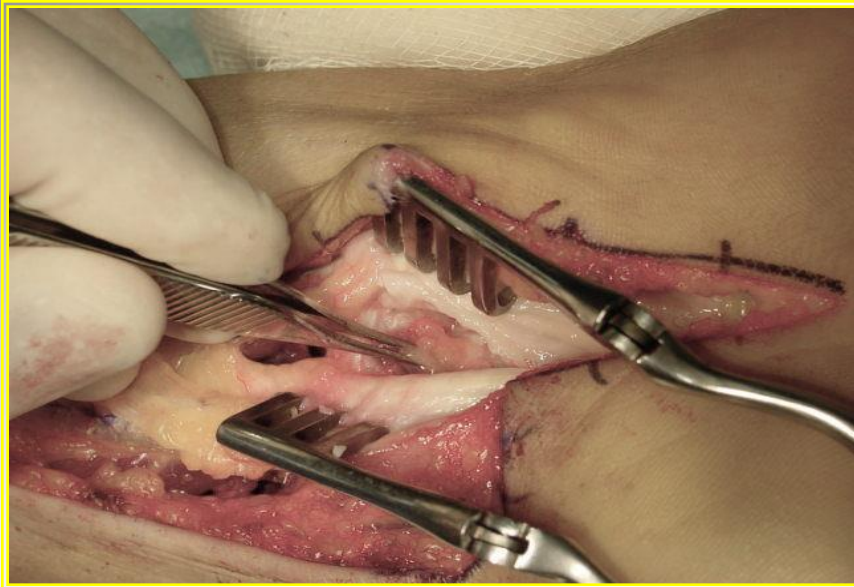
Technique-Kienbock

- Opening articular capsule
- Lunate is emptied with a curette



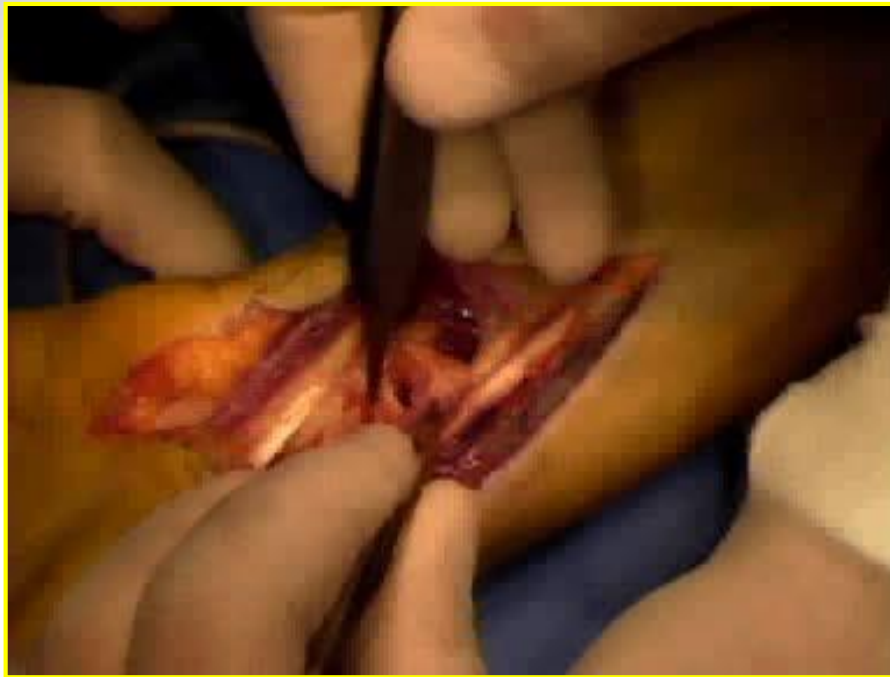
Technique-Kienbock

Graft fitted into the lunate



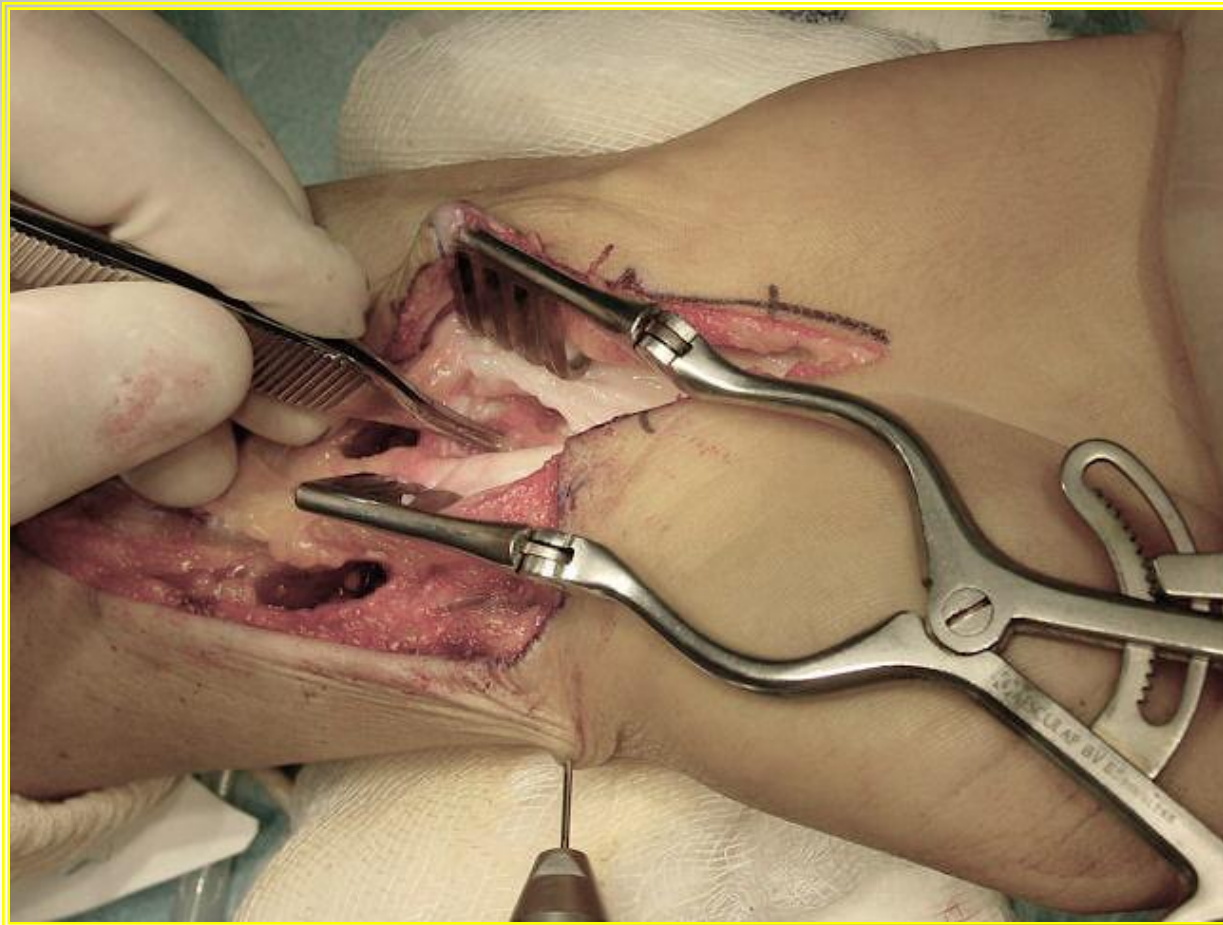
Technique-Kienbock

Graft fitted into the lunate



Technique-Kienbock

Temporary radio lunate
or scapho lunate pin



Material-Kienbock

22 patients (1994-2000)

8 females 14 males

Mean age : 31,4 y.o. (range 18 to 63)

Pre operative MRI in all cases



Material-Kienbock

Lichtman's classification

Stage II : 8 cases

Stage III A : 10 cases

Stage III B : 4 cases



Material-Kienbock

Pain in all cases, permanent, incapacitating in 19 cases

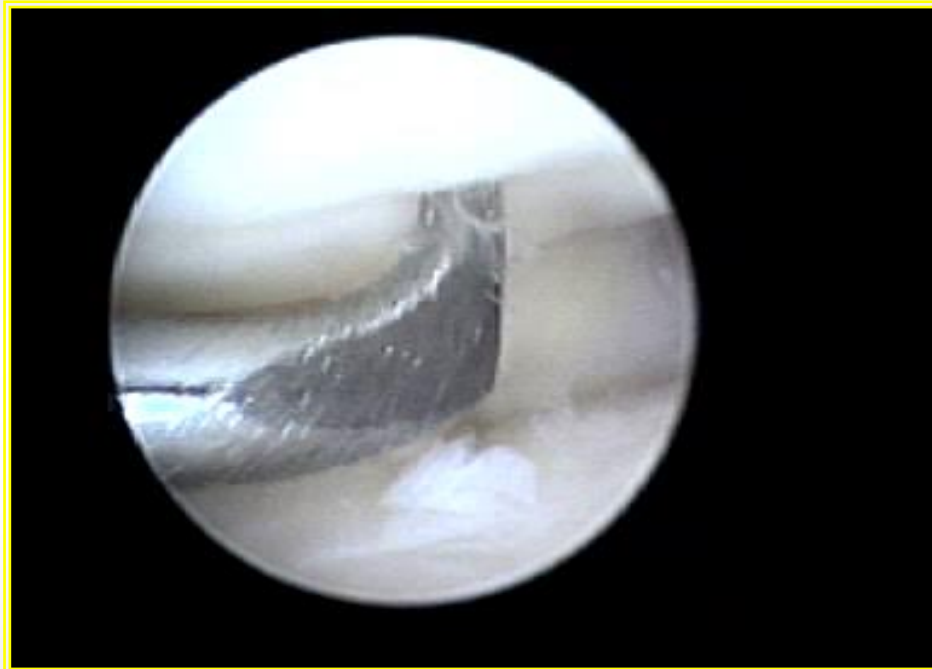
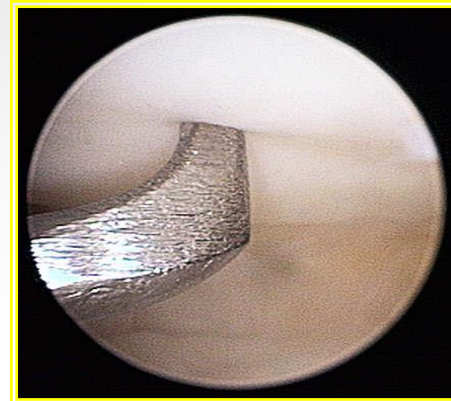
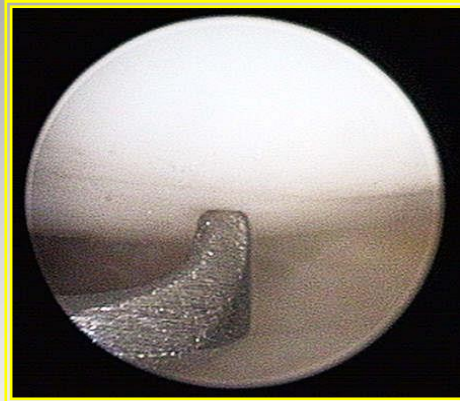
Active range of motion decreased : 46°

Strength decreased : 50 % comparative to the opposite side



Material-Kienbock

Wrist arthroscopy in 5 cases



Clinical case-Kienbock

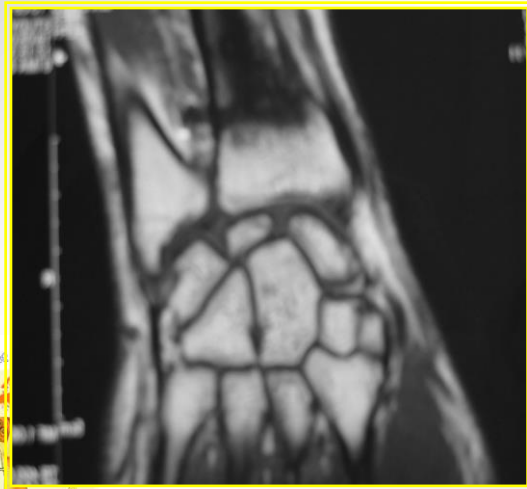
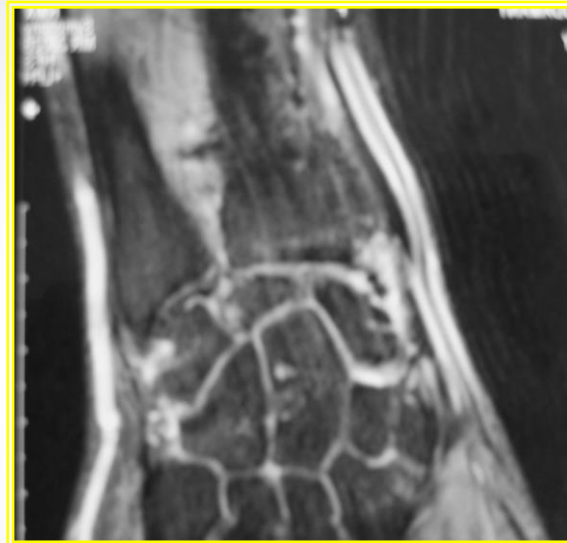


Clinical case-Kienbock

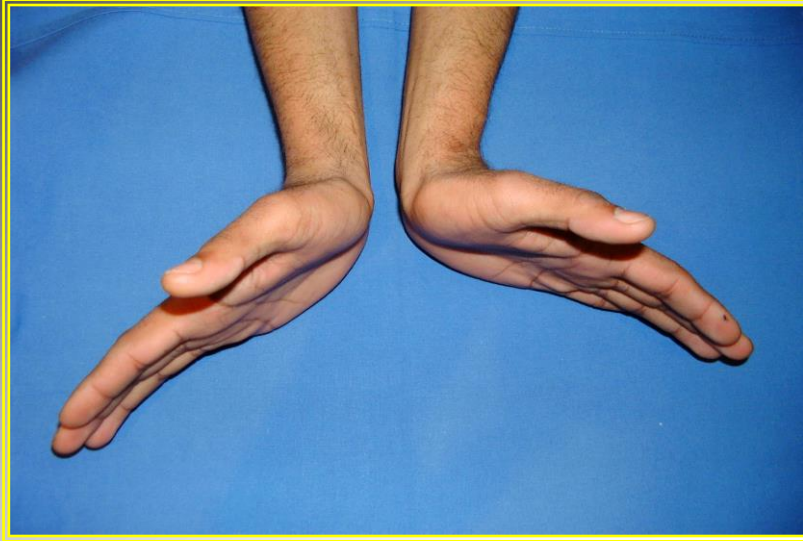


Clinical case

D + 12 years



Clinical case



Results-Kienbock

Average follow-up : 93 months (96-168)

No pain in 20 cases, moderate in 2 cases

Increase of active R.O.M. : 71°

**Increase of strength : 75 % comparative
to the opposite side**

Average period for return to work : 3,5 months



Results-Kienbock

Post operative MRI in 22 cases

Healing in 17 cases

(8 stage II, 8 stage IIIA and 1 stage IIIB)

Stabilization in 3 cases (1 stage IIIA, 2 stage IIIB)

(2 Stage IIIA : D+5Y = 1 healing + 1 failure !!!!)

Failure in 2 cases (stage IIIA and IIIB) : secondary wrist arthrodesis, first row carpectomy



Complications-Kienbock

- Stabilization...!?
- 5 years of follow-up
- Unchanged X-Rays, unchanged MRI
- No pain, but what future ?



- Late union of radius osteotomy : 4 cases
- Südeck's dystrophy : 1 case

Clinical case



Clinical case



Clinical case

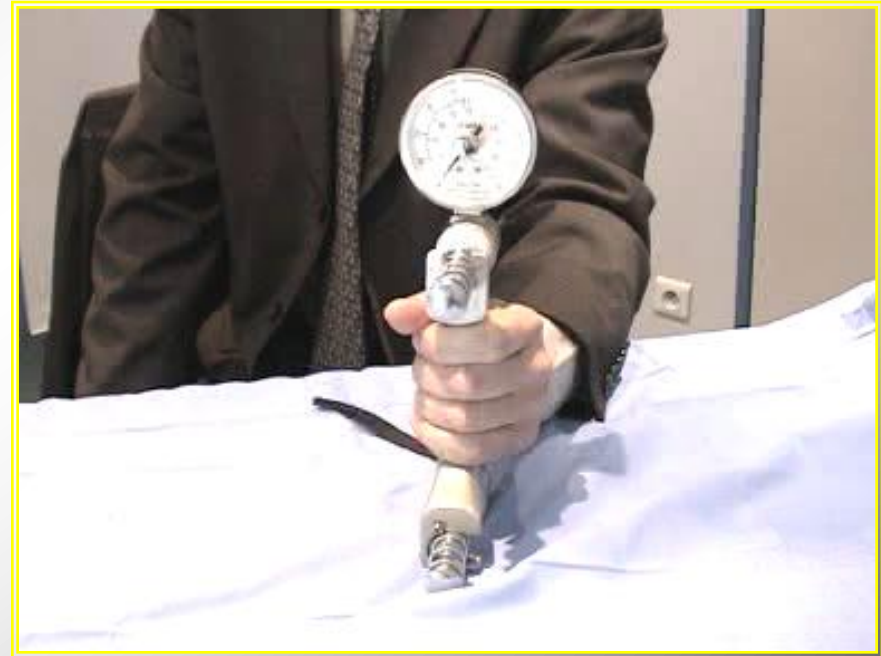


Clinical case



D+ 14 years

Clinical case



D+ 14 years



CONCLUSION-Kienbock

The use of a vascularized bone graft for revascularization of lunate in Kienböck's disease associated to a radius shortening osteotomy seems a safe and reliable procedure.

The graft vascularized by palmar artery needs only one approach. A long follow-up is necessary to confirm the outcomes in future.

