Arhtroscopy of the wrist joint: Setup, instrumentation, anatomy & indications

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Aims of the lesson

Setup, portals and instrumentation

Surgical technique

Arthroscopic anatomy

Indications

Basic arthroscopic procedures

Beneficial role of arthroscopy in wrist disorders

Historical preview

First wrist arthroscopy has described by Chen in 1979

In 1988 Roth et al. presented an “Instructional Course Lecture” on wrist arthroscopy at AAOS

Chen YC. Arthroscopy of the wrist and finger joints. Orthop Clin North Am 1979;10:723-733.

Roth JH, Poehling GG, Whipple TL. Arthroscopic surgery of the wrist. Instr Course Lect 1988;37:183-194.

New Advances in Wrist Arthroscopy

Gregory I. Bain, M.B.B.S., F.R.A.C.S., F.A.(Ortho)A., Justin Munt, M.B.B.S., and Perry C. Turner, M.B.Ch.B., F.R.A.C.S.(Ortho)

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 24, No 3 (March), 2008: pp 355-367

With the ever-expanding list of indications and procedures that can be performed with this technique, it exists as an essential diagnostic and therapeutic tool for the orthopaedic surgeon.

Set up

Patient supine

General/regional anaesthesia

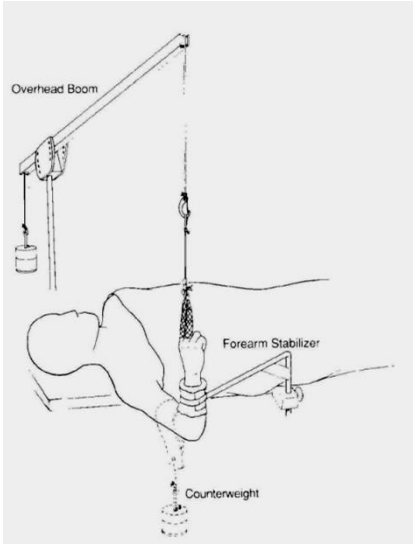
Tourniquet (250 mm Hg)

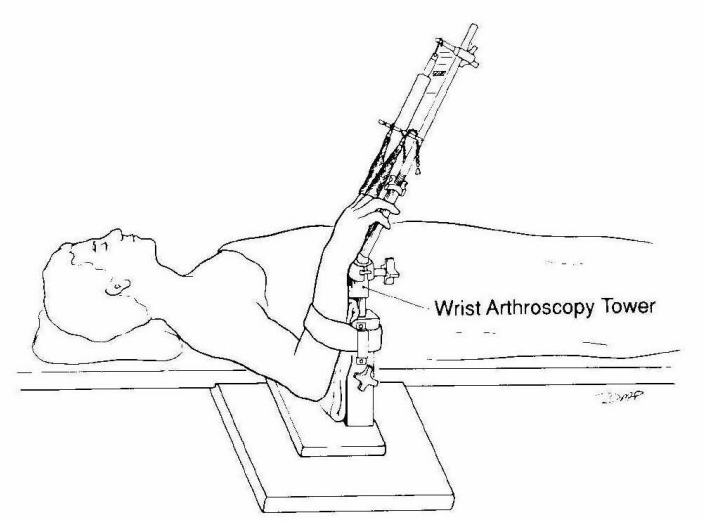
Finger traps

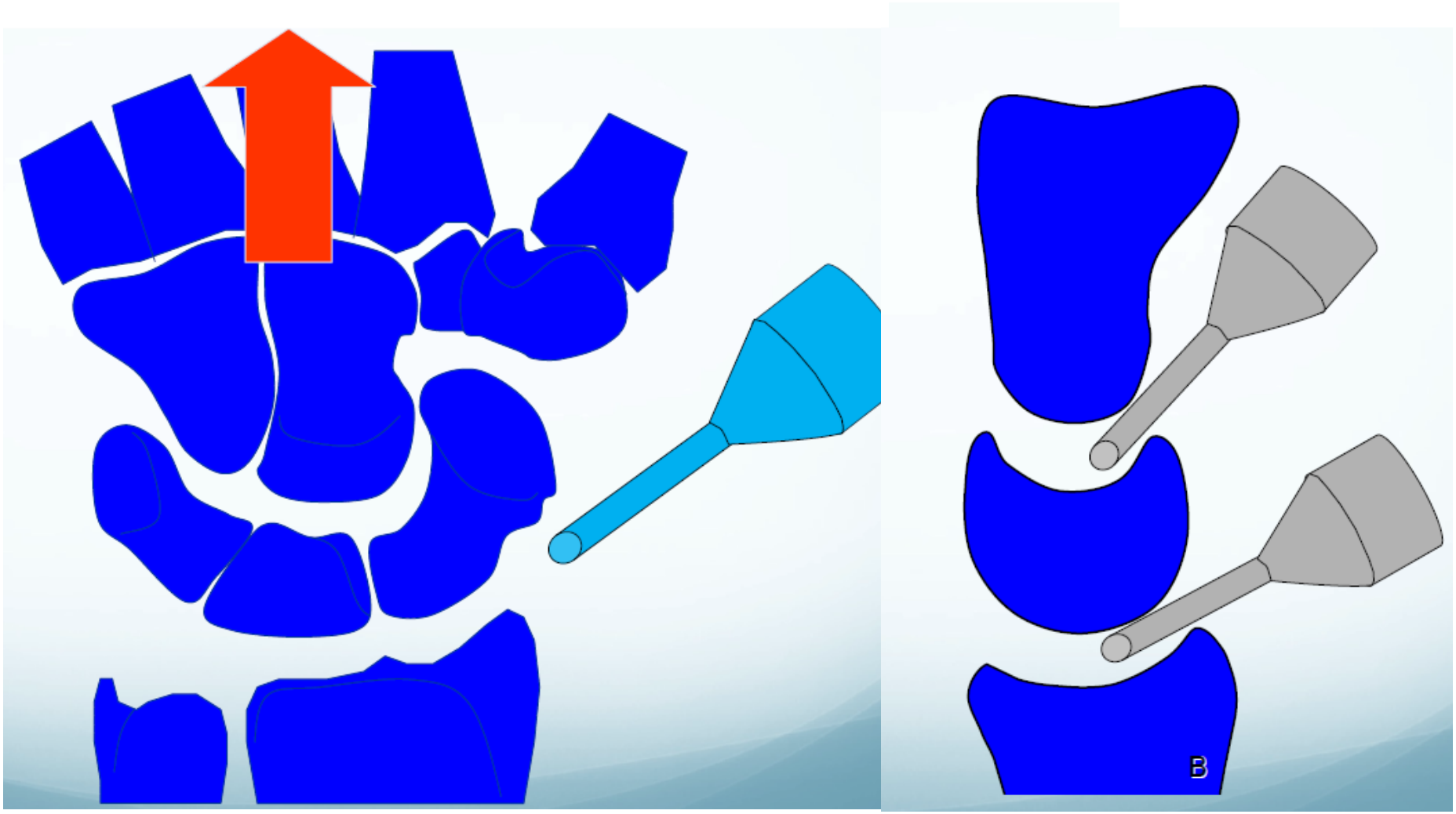
5+ Kg weight

tower / suspension system

Gravity fed inflow


Overhead Boom
Forearm Stabilizer
Counterweight


Wrist Arthroscopy Tower



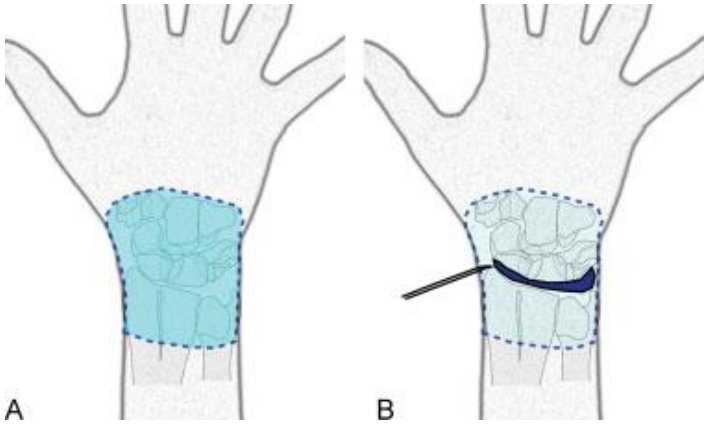
Wrist distraction is necessary to create adequate space for introduction of instruments

Wide-Awake Wrist Arthroscopy and Open TFCC Repair

J Wrist Surg 2012;1:55–60.

Elisabet Hagert, M.D., Ph.D.[1] Donald H. Lalonde, M.D.[2]

- lidocaine with epinephrine
- 30 to 50 min wait before surgery
- 20 ml to block the sensory branches of radial, ulnar, and PI nerves.
- additional 5 mL into the radiocarpal joint



Prep & drape

un-dyed prep solution

sterile finger traps (multi-use)

waterproof drapes

top sterile drape

Basic instrumentation

marking pen

15 blade

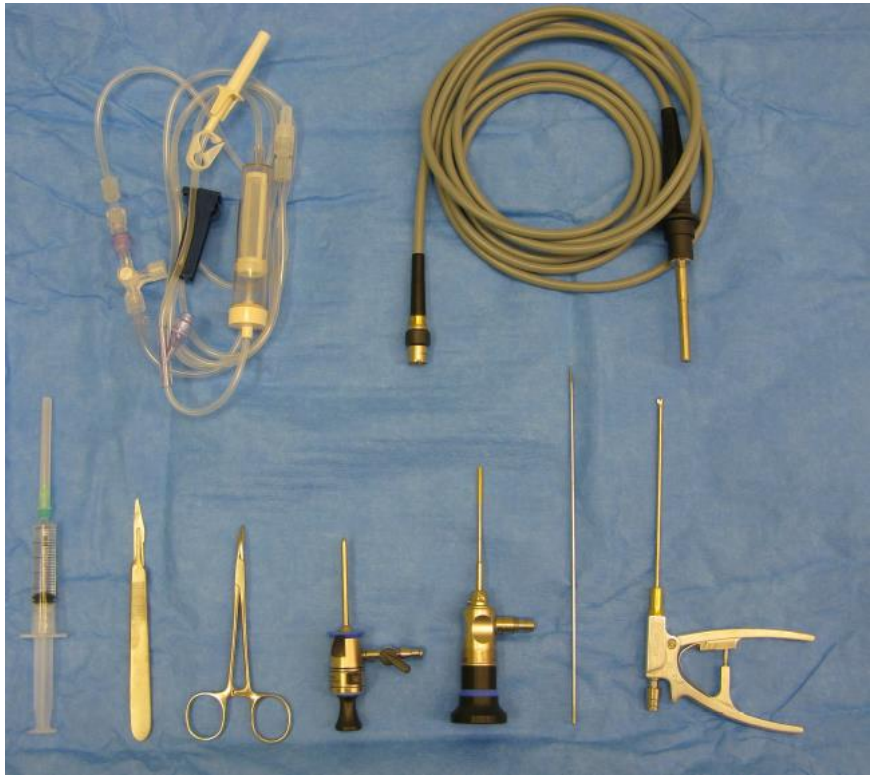
20 ml syringe

green needles

small straight clip

2.5mm, 30^{o} small joint scope

probe (1.5mm tip)



Portals

Dorsal

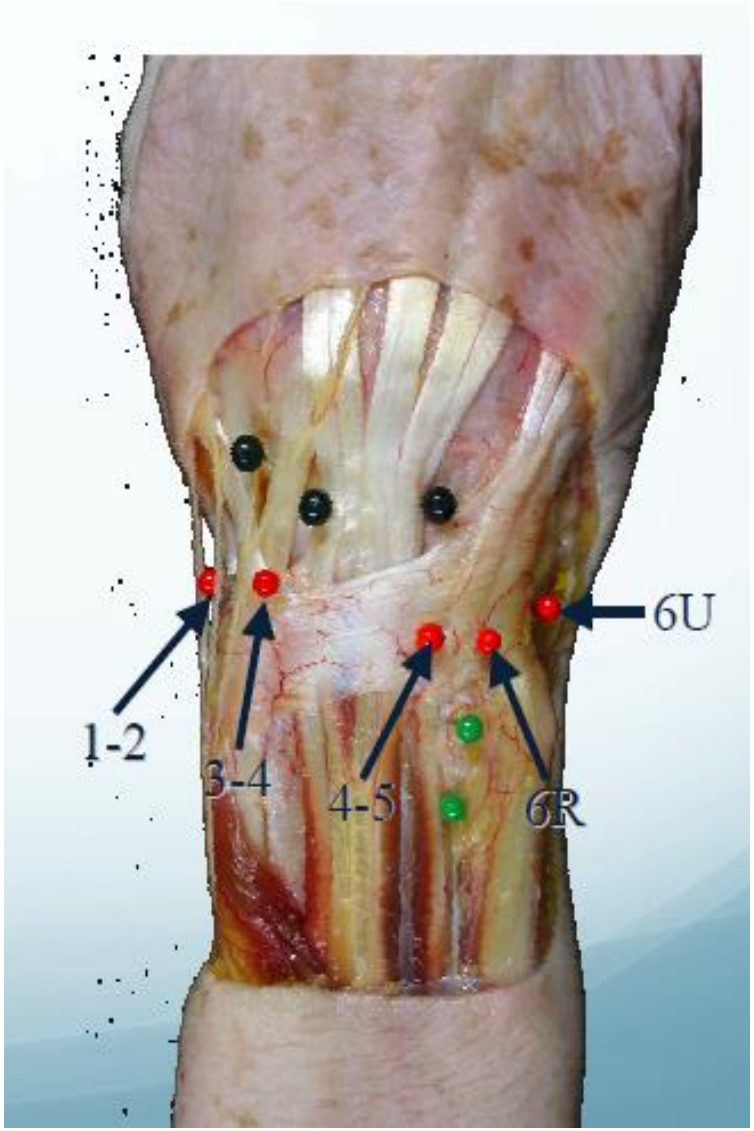
1-2, 3-4, 4-5, 6R, 6U, **DRJU**

Midcarpal

MCR, MCU, STT

Volar

VR, VU, DRUJ



Dorsal portals

Main working portals

3-4: 1cm distal to Lister's tubercle

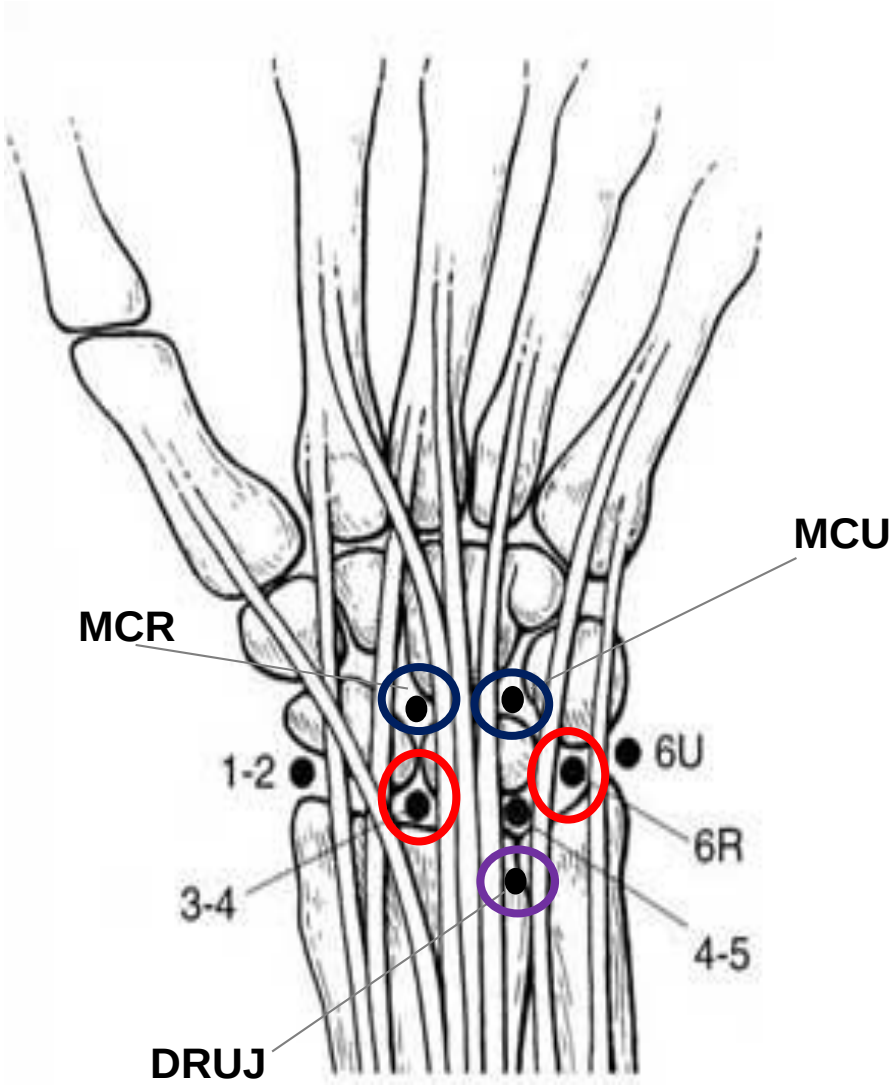
6R: radial to the ECU tendon

Midcarpal

MCR: 1 cm distal to the 3-4 portal

MCU: 1 cm distal to the 4-5 portal

DRUJ: Forearm supinated, between radius and ulna underneath the TFCC



Volar portals

VR portal:

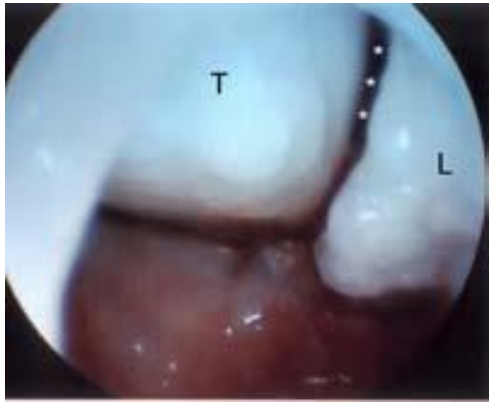
- Dorsal Radiocarpal ligament (DRCL) and volar part of Scapholunate ligament (SCL)

- arthroscopic reduction of intra-articular fractures of the distal radius fractures (dorsal rim fragments)

- 2 cm incision over the FCR at the proximal crease of the wrist

The median nerve lies 8 mm ulnar to the VR portal & the palmar cutaneous branch 4 mm but always ulnar to the FCR

VR portal



Volar portals

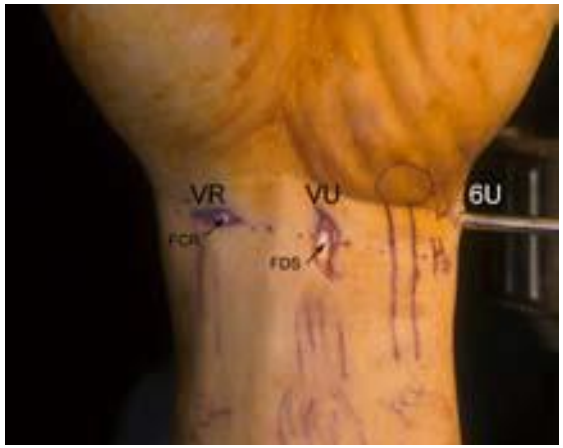
VU portal

- more technically demanding
- volar tears of the lunotriquetral ligament (LTT)
- repair or debridement of dorsal TFC tears

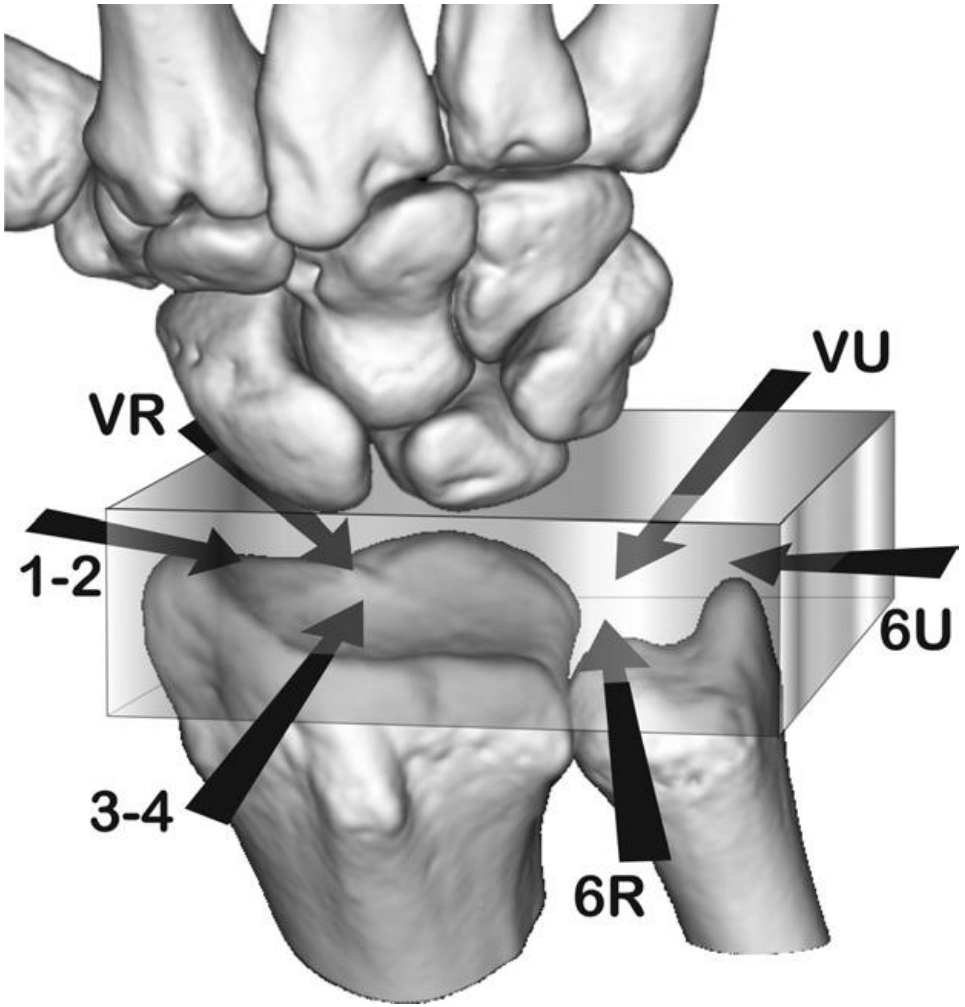
- 2 cm incision over the finger flexor tendons centered at the proximal wrist crease

ulnar nerve and artery are usually more than 5 mm apart from the portal

VU portal



The box concept



Surgical technique

18-gauge needle is inserted first & angled 10° volar

Joint distention with 5 to 7 mL of NS

Skin incision only

Blunt disection with forceps

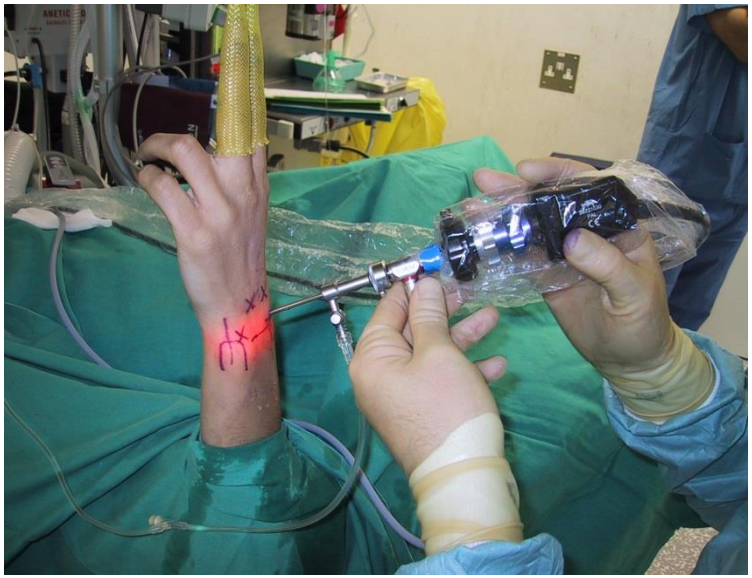
Arthroscope insertion, blunt trocar

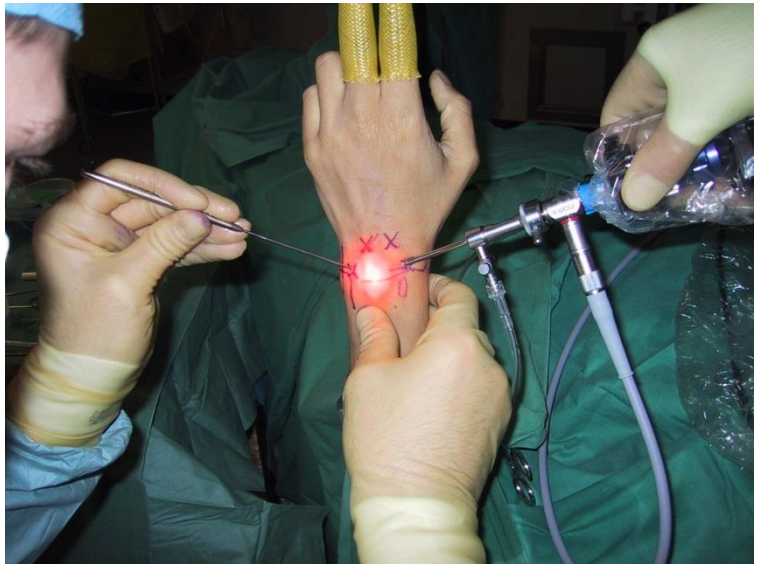
Surgical technique

establishment of 6R portal

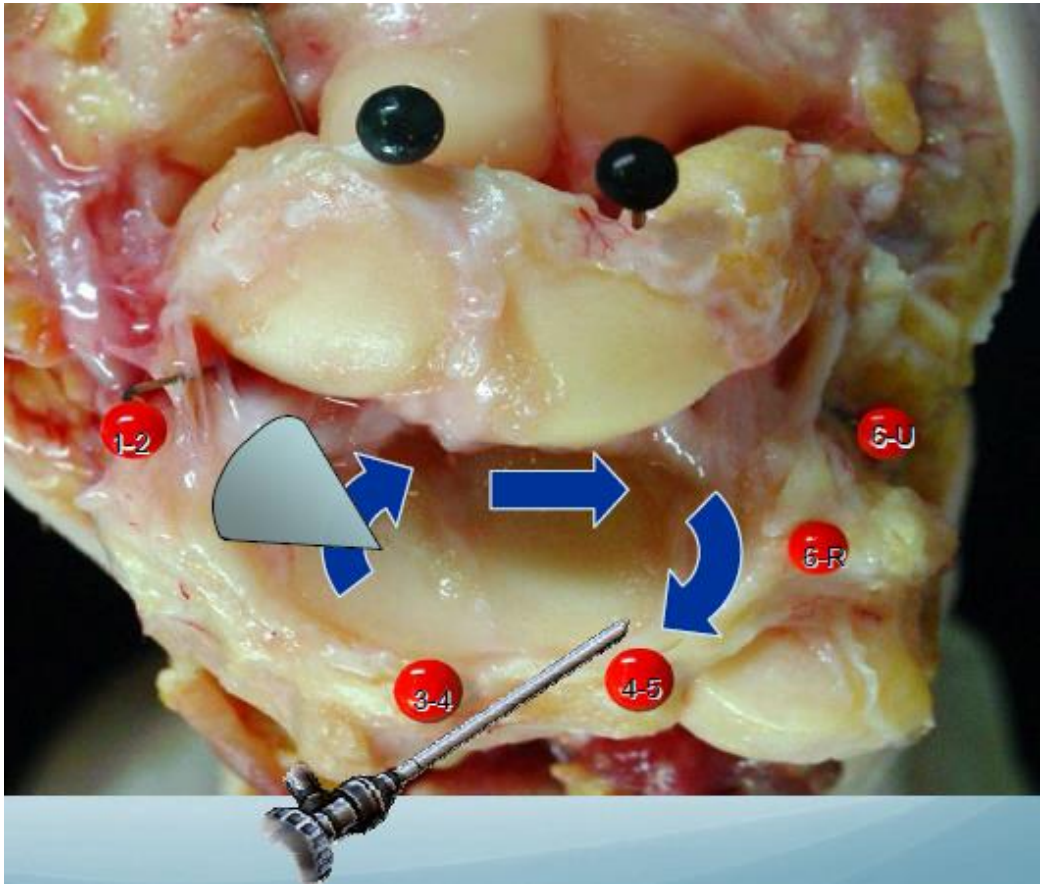
Trans-illumination technique

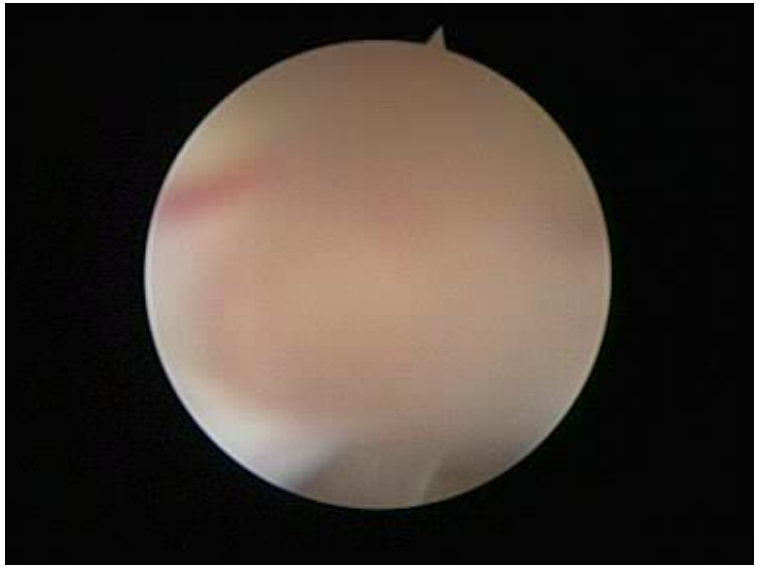
introduction of the needle radial to ECU and distal to the TFCC



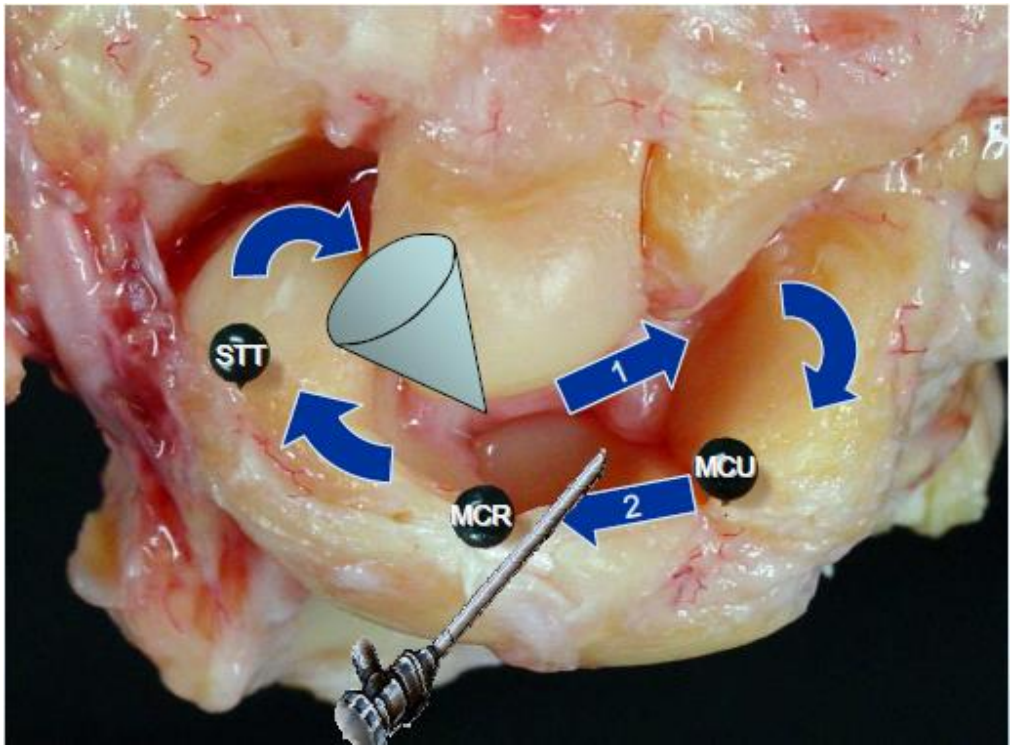


Arthroscopic anatomy - radiocarpal





Arthroscopic anatomy - midcarpal



Diagnostic arthroscopy

Systematic approach

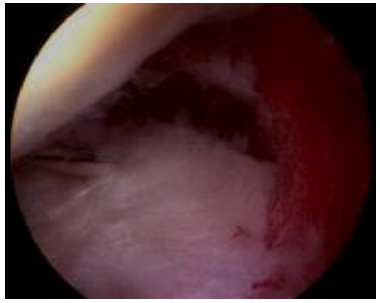
Viewing of all chondral surfaces and ligamentous structures

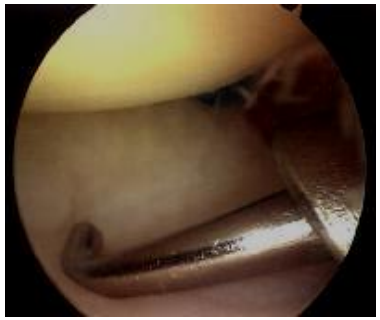
Debridement of tissues to improve visualization

Disease specific instrumentation and approach

Indications

- diacnostic arthroscopy
- “ectomy” procedures
- tissue shrinkage
- surgical release
- repair procedures
- reconstructive procedures



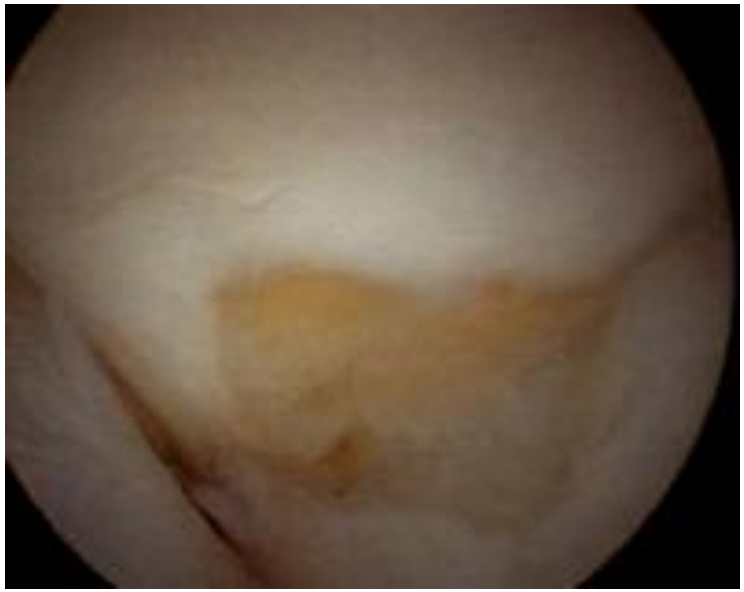


For soft tissue or bone pathology

- diacnostic arthroscopy
- “ectomy” procedures
- tissue shrinkage
- surgical release
- repair procedures
- reconstructive procedures

Wrist pain of unknown origin
Synovial biopsy

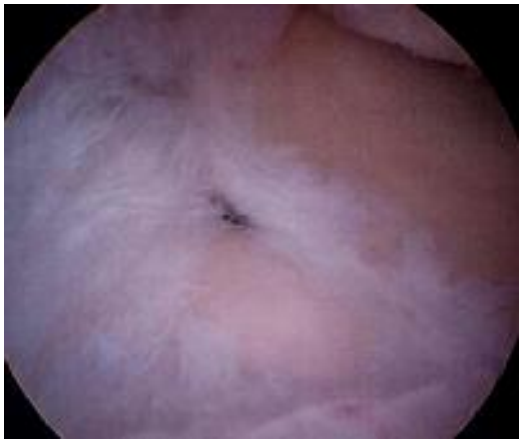
Assessment of instability
Staging (Kienböck’s disease)



- diacnostic arthroscopy
- “ectomy” procedures
- tissue shrinkage
- surgical release
- repair procedures
- reconstructive procedures

Dorsal and volar ganglia
Intraosseous ligaments
Synovectomy
TFCC tears

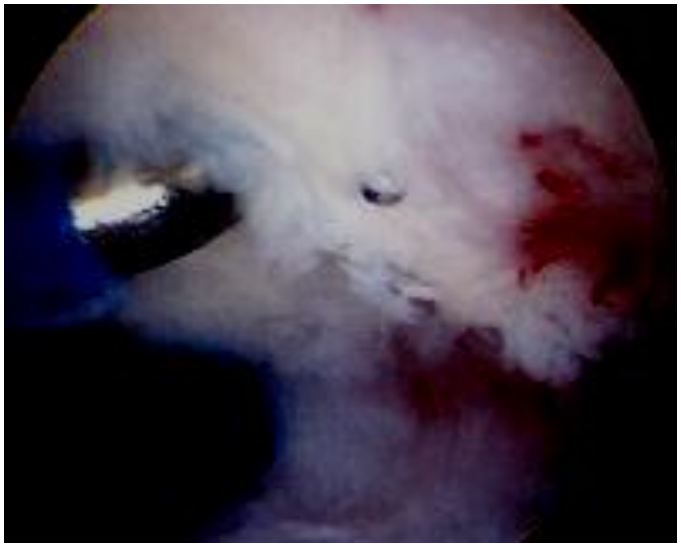
Articular cartilage lesions
Scaphoid, Hamate, Lunate, Pisiform
Distal ulnar (wafer procedure)
Proximal-row carpectomy
Ulnar styloid



- diacnostic arthroscopy
- “ectomy” procedures
- tissue shrinkage
- surgical release
- repair procedures
- reconstructive procedures

Capsule or **ligament shrinkage**

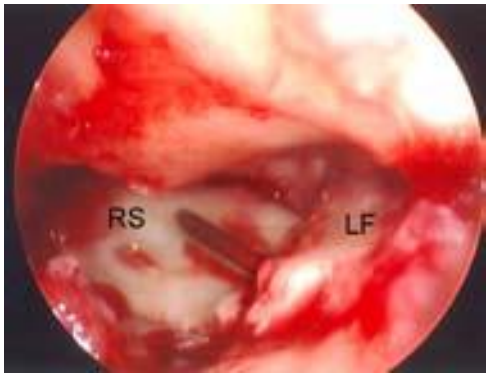
Volar capsular release
Dorsal capsular release



- diacnostic arthroscopy
- “ectomy” procedures
- tissue shrinkage
- surgical release
- repair procedures
- reconstructive procedures

Dorsal radiocarpal ligament
Lunotriquetral instability
Scapholunate instability
TFCC suture

Distal radius fractures
Peri-lunate dislocation
Scaphoid fractures
Scapholunate instability



- diacnostic arthroscopy
- “ectomy” procedures
- tissue shrinkage
- surgical release
- repair procedures
- reconstructive procedures

Scapholunate ligament reconstruction
Distal radioulnar joint stabilization

Bone graft to scaphoid nonunion
Limited wrist fusion
Full wrist fusion

Common simple? procedures

Assessment of instability

TFCC Tears

Radial Styloidectomy

Wafer Resection (distal ulna)

Release of Wrist Contractures

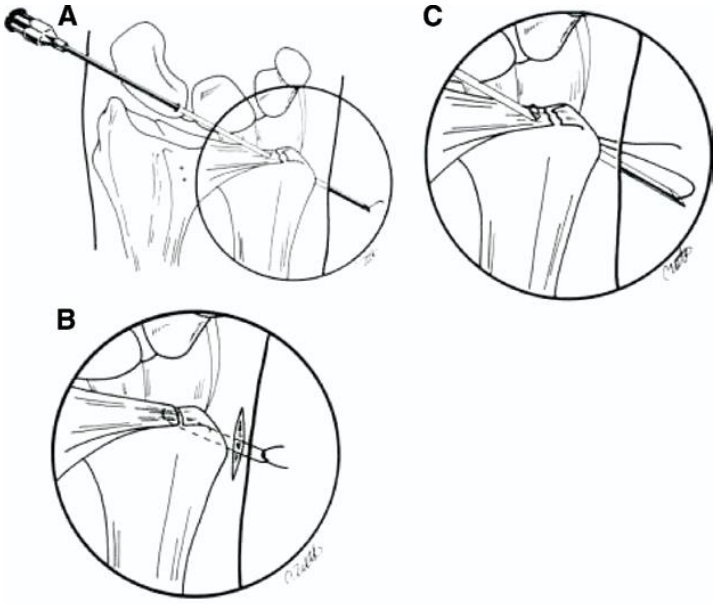
Staging of Kienböck's disease

Arthroscopic Assisted Fixation

of fractures (distal radius and scaphoid)

TFCC tears

- debridement
- inside-out repair
  (type 1B- 1C lesions)



Palmer classification

TABLE 3. *TFCC Injuries: Classification and Management*[18]

Type of Tear	Description of Tear	Authors' Management
Traumatic		
1A	Tear in horizontal or central portion of disk, often with an unstable flap	Initial splinting with or without steroid injection; arthroscopic debridement of central torn portion
1B	Tear from distal ulna insertion with or without ulnar styloid fracture	Arthroscopic repair; inside-out technique; with or without ECU sheath open repair
1C	Tear with ulnocarpal ligaments disrupted (ulnolunate and ulnotriquetral ligaments)	Arthroscopic-augmented repair by use of a mini-open approach with or without FCU augmentation
1D	Tear from insertion at radius	Debridement of torn portion or reattachment to sigmoid notch
Degenerative		
2A	TFCC wear but no perforation	Diagnostic arthroscopy followed by open diaphyseal ulna shortening
2B	TFCC wear but no perforation Chondromalacia of lunate or ulnar head	
2C	Central perforation of TFCC Chondromalacia of lunate or ulnar head	Arthroscopic TFCC debridement plus arthroscopic wafer procedure or open diaphyseal ulna shortening
2D	Central perforation of TFCC Chondromalacia of lunate or ulnar head Perforation of LT ligament	
2E	Central perforation of TFCC Perforation of LT ligament Ulnocarpal arthritis	

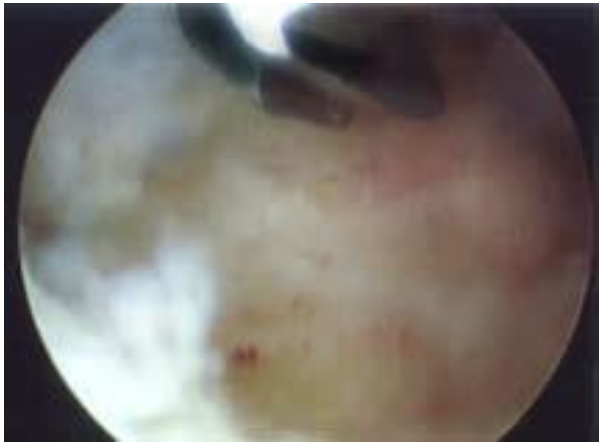
Abbreviations: FCU, flexor carpi ulnaris; LT, lunotriquetral.

Radial styloidectomy

Impingement due to scaphoid nonunion or SCL dissociation

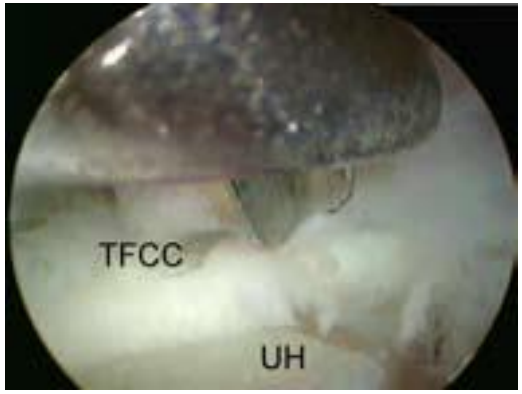
1-2, VR, and 3-4 portals

Up to 4 mm of resection
(ulnar translocation of the carpus)



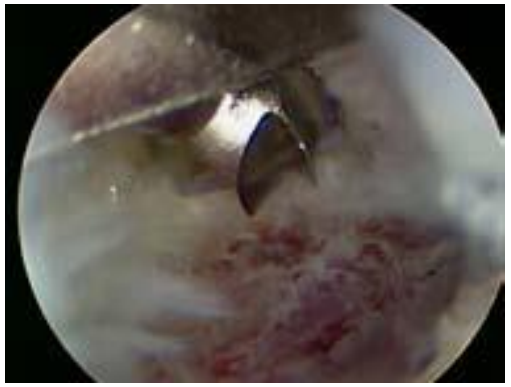
Wafer Resection of the Distal Ulna

ulna impaction syndrome
triad of LT ligament tear, a TFCC tear and neutral or ulnar positive variance



4-5, 6R and 6U portals

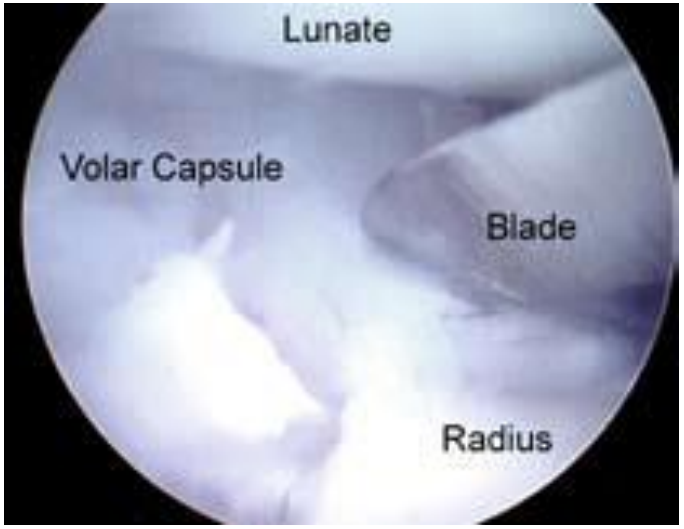
2.9 mm burr is n used to resect 2–3 mm of the ulnar head



Release of Wrist Contractures

Volar capsulotomies to regain wrist extension

Dorsal capsulotomies for wrist flexion but they may require use of a volar arthroscopy and are technically more difficult.



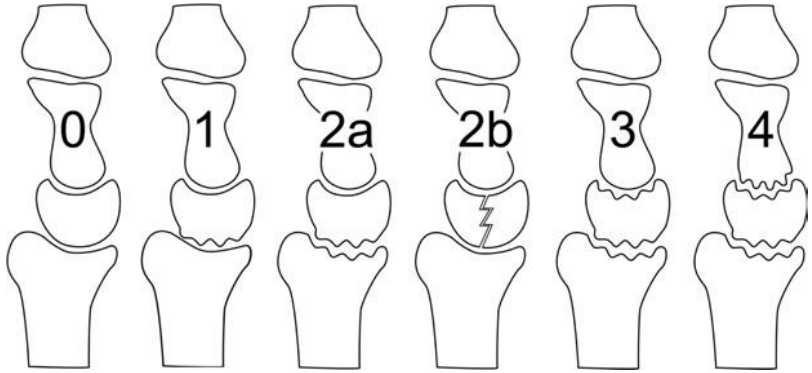
Staging of Kienböck's disease

grade 0: extra-articular procedure, (joint-leveling procedure or lunate revascularization)

grade 1 or 2a: radio-scapho-lunate fusion

grade 2b: proximal-row carpectomy

grade 3 or 4: salvage procedures (wrist arthrodesis or arthroplasty)



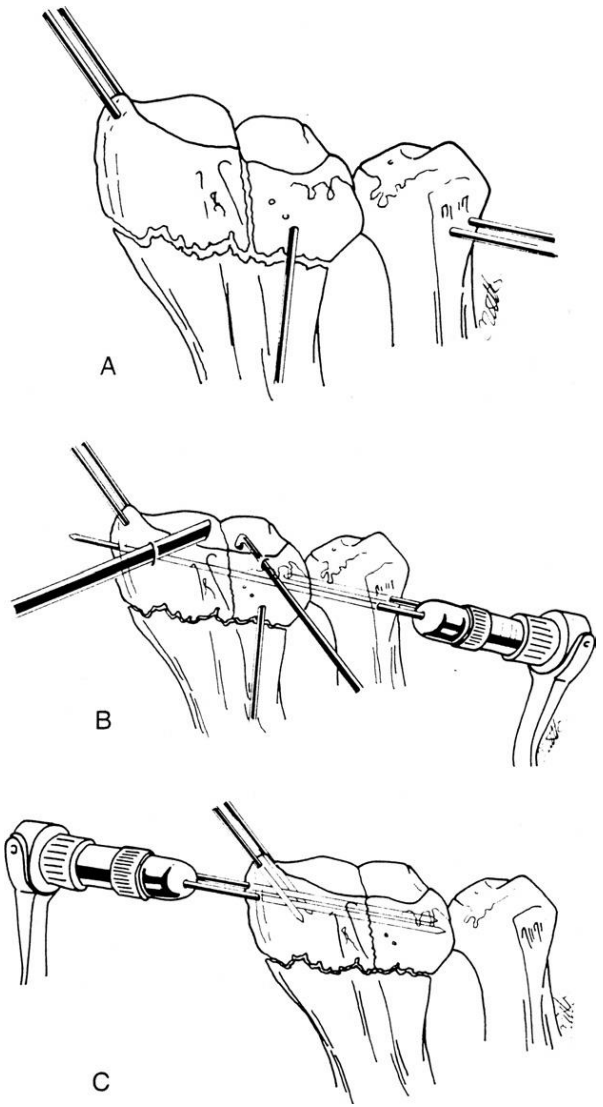
Assisted fixation of fractures

superior to fluoroscopy and x-rays, need for KW and ex-fix

superior clinical outcomes, better range of motion and improved radiologic variables

Preferable today fixed-angled plates, (arthroscopy can assess possible screw penetration)

Best indication: 2-part radial styloid fractures reduction and assessment of SCL

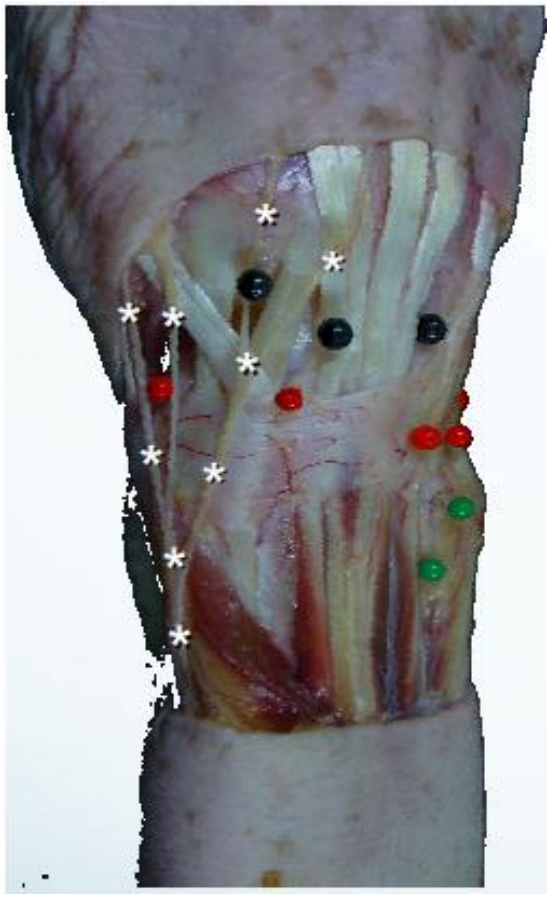


London technique

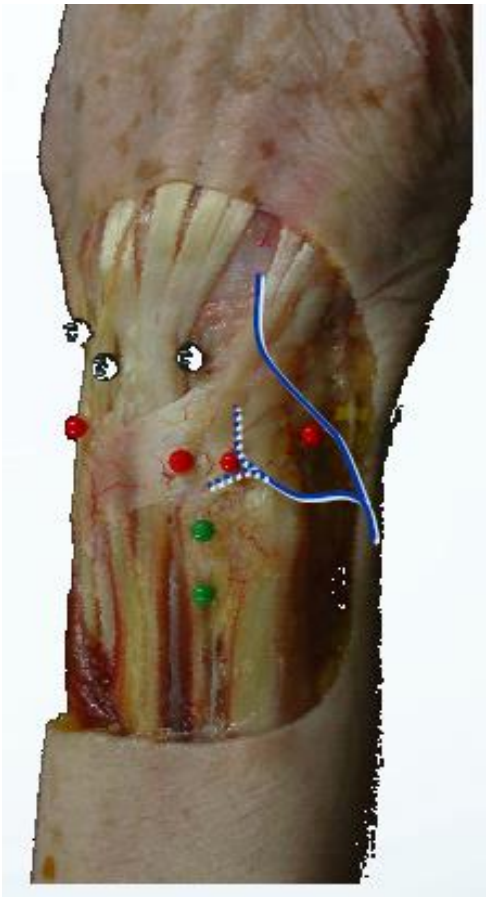
Complications

Uncommon (reporting rates 2%)
Most related to the size of instrumentation
Care with creation of portals
EPL is the tendon most at risk
Nerve damage

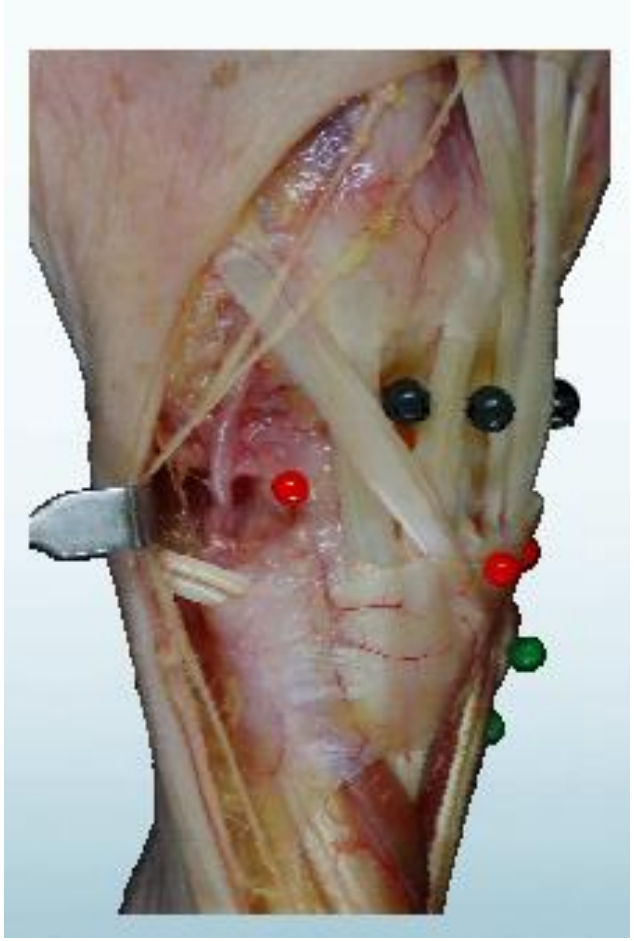
Infections
Reflex sympathetic dystrophy
Irritation from implanted material
Skin lacerations on finger traps



Radial nerve



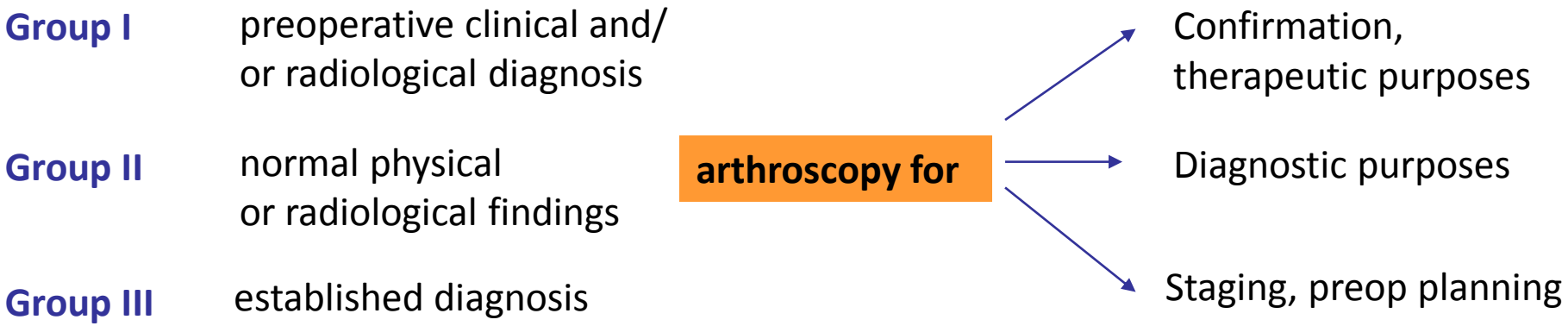
Ulnar nerve



Radial artery

How beneficial wrist arthroscopy is?

- Retrospective review of 125 patients with wrist pathology
- Correlation of clinical and radiological diagnosis with arthroscopic findings
- Investigation of how **beneficial** was the arthroscopic procedure for either diagnostic or therapeutic purposes



Material-Methods

- 125 consecutive wrist arthroscopies)
- Seven year period (2004-2011)
- 49 male, 76 female
- Mean age at operation 38 years (range 17-64 years)
- 57 patients (45.6%) had a documented previous injury
- 320 conventional diagnostic tests and 456 imagine studies!

Group I	preoperative clinical and/ or radiological diagnosis	94 patients (75.2%)
Group II	Pain, but normal physical or radiological findings	12 patients
Group III	established diagnosis	19 patients

How beneficial the arthroscopy was…

- **Group I**: when the pre-operative diagnosis was changed, excluded or limited in such a way that the management was changed
- **Group II**: when a diagnosis was established (valuable when an intra-articular pathology corresponded to the patient symptoms)
- **Group III**: when the pre-operative planning was changed

Results

- **Group I:** Arthroscopy was beneficial in 51/94 patients **(54%)** from in whom the pre-operative diagnosis was changed or augmented sufficiently to alter subsequent management.

- **Group II:** A beneficial arthroscopy establishing a definitive diagnosis was conducted for 9/12 patients **(75%)**

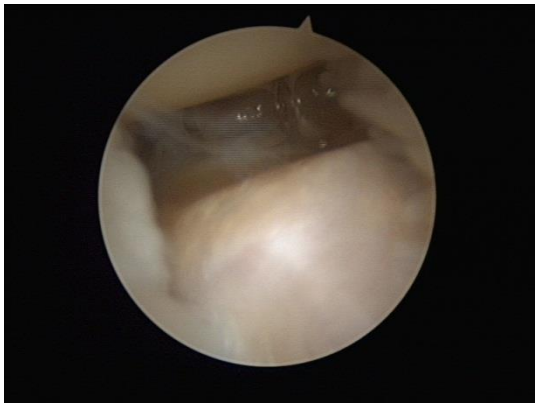
- **Group III:** Arthroscopy was of benefit to 14/19 patients **(74%)** for whom the subsequent definite management plan was modified.

- For all groups, arthroscopy was deemed of benefit when a therapeutic intervention was successfully conducted, independently of the ultimate outcome. There were 66/125 **(53%)** such patients.

Speculations…

- **9/12 (25%)** of the patients in Group II (no diagnosis) had a normal arthroscopic appearance (9.4 investigations per patient!!!)
  - work compensation, malingering, simulation?
  - undiagnosed chronic wrist pain?

- **31/51 (61%)** arthroscopies in Group I revealed significant unsuspected intra-articular pathology
  - unrelated to the clinical findings or misdiagnosed?



Conclusions

- Wrist arthroscopy is a useful diagnostic and therapeutic tool in the management of wrist disorders
- A thorough clinical examination is still the best way to reach the diagnosis
- Correlation of the unexpected arthroscopic findings with the symptoms of the patient to avoid over-treatment
- Useful in preoperative planning when a diagnosis is already exist
- Further advances are likely to occur from adapting open reconstructive procedures into an arthroscopic model