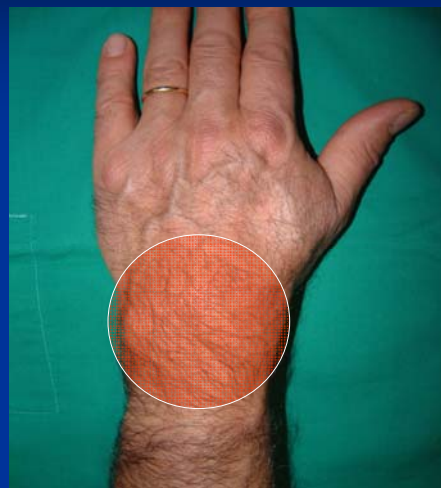


THE WRIST JOINT: ATHLETIC INJURIES

Gianni Rigoni
FMH Handsurgery
SSMS

Wrist unity

“The wrist links the hand
to the forearm”



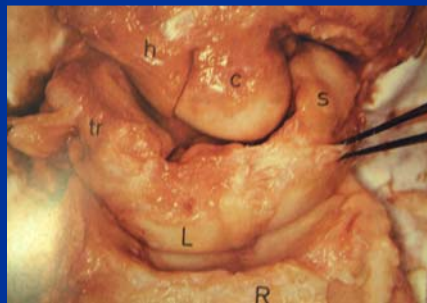
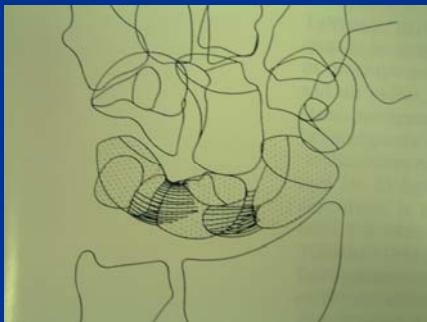
Anatomy

Bone



Anatomy

Intrinsic ligament



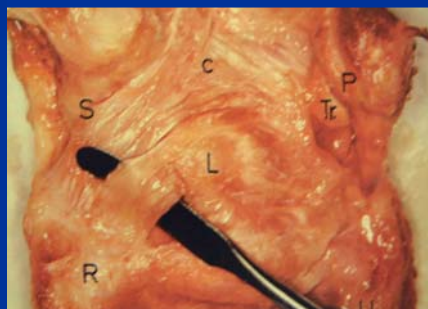
Anatomy

Triangular fibrocartilage(TFC)

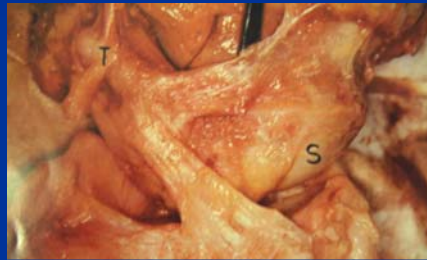
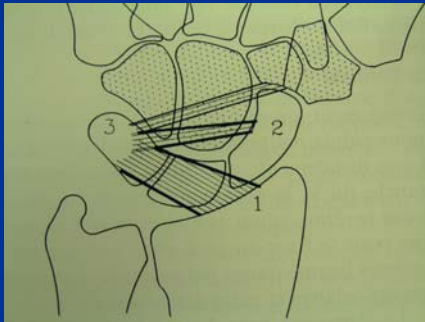


Anatomy

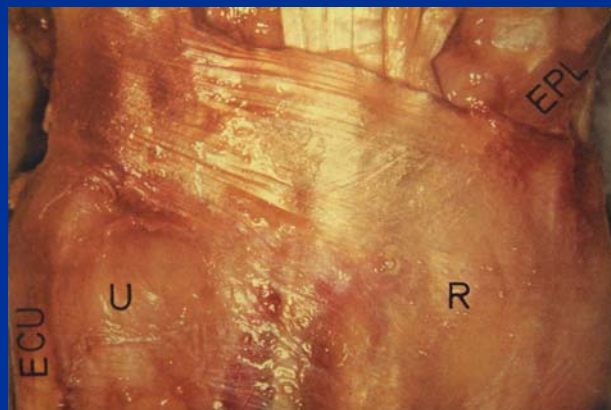
Volar capsular ligament



Anatomy
Dorsal capsular ligament



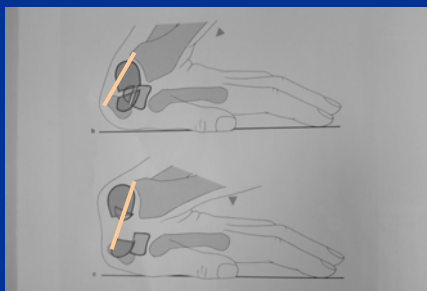
Anatomy
dorsal capsular ligament
(extensor retinaculum)



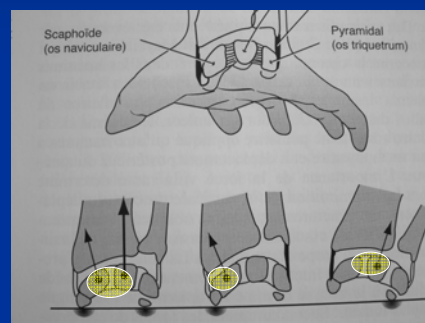
Wrist injuries Sprain and Fracturs

Indirect injury
in
flexion-extension
ulno-radial duxion
pro - supination
or combined
with strong velocity and power

Wrist injuries Dinamic: sprain-fractur



Hyperextension injury



Wrist injuries

Physical examination

Swelling



Compare with the whole side

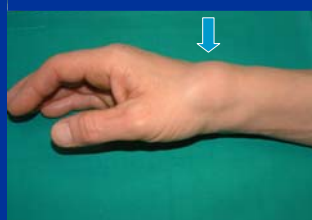


Wrist injuries

Diagnostic problem

Easy

in serious and obvious
pathologys



Difficult

in hidden pathologys

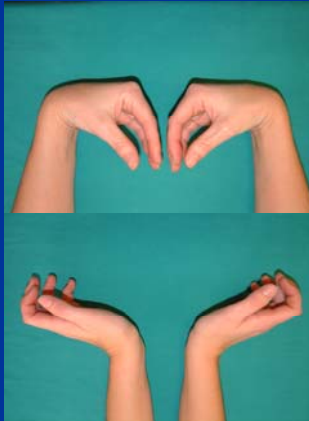


Wrist injuries

Physical examination

activ movement

Flexion and extension



ulno-radiale duxion



Wrist injuries

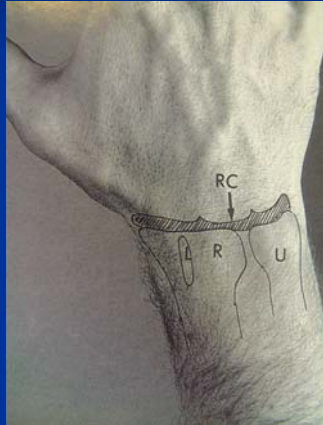
Physical examination

activ movement

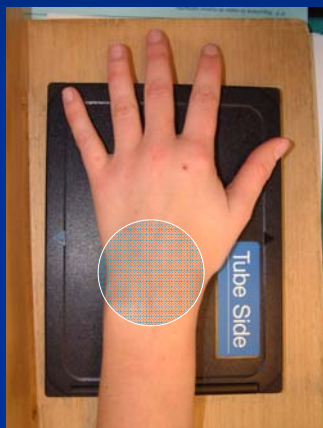
prono-supinazion



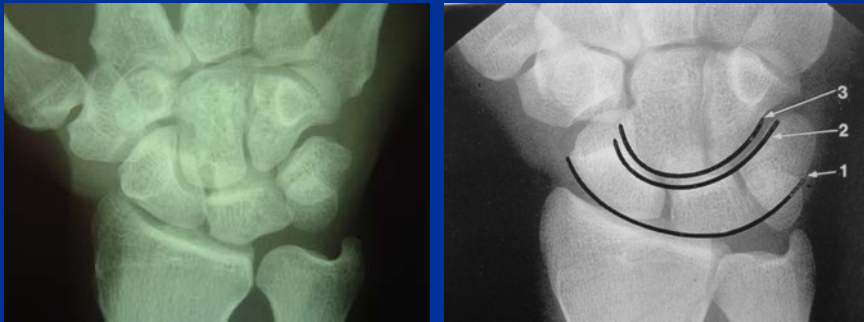
Wrist injuries find the painfull point



Roentgenographic approach

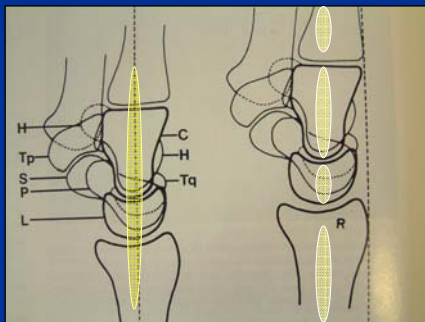


Roentgenographic approach Standard posteroanterior view (PA)



Lince di Gilula

Roentgenographic approach Standard lateral view



Further instrumental examination

- Arthrography (mono, bi or tricompartmental)
- Conventional tomography (CT) and CT-arthrography
- Magnetic resonance imaging (MRI)
- Ultrasound
- Arthroscopy

Instrumental examination specific vor bone tissue

Radiography

CT

MRI

Instrumental examination specific vor **ligament**

Indirect

- Arthrography
- Arthro CT
- Arthro MRI

Direct

- MRI
- Arthroscopy

Most frequently Injuries of the Wrist

■ **Bone Injuries**

- **Carpal Scaphoid Fracture**
- Distal Radius Fracture
- Hook of Hamate Fracture
- Lunate Fracture

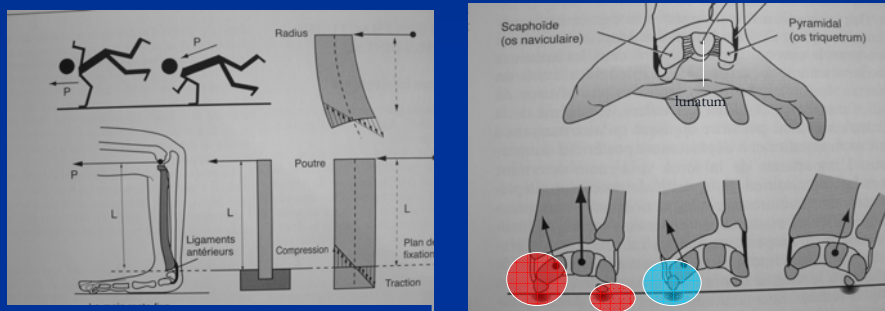
■ **Ligament Injuries**

- **Scapho Lunate Rupture**
- Luno Triquetral Rupture
- Midcarpal Instability
- Dislocation of the carpus
- Perilunate dislocation
- **Distal Radioulnar Joint and Triangular Fibro-cartilage Complex**

Carpal Scaphoid Frature (CSF)

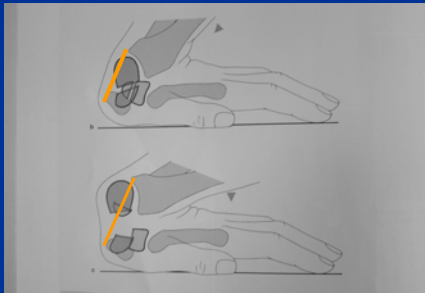
- The most common, 70% of all carpal fractures
- The most problematic
 - in the Diagnosis
 - in the Tractament

Carpal Scaphoid Bone Fractur Biomechanic



Carpal Scaphoid Bone Fracture

Biomechanic



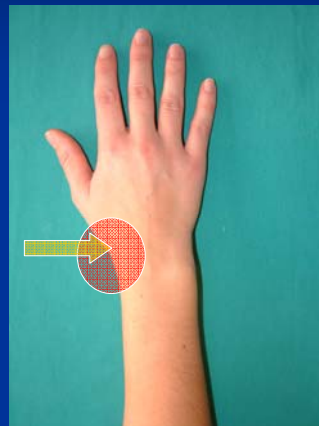
Trauma in more than 90 degrees of Hyperextension and 10 d. of radial Deviation



Carpal Scaphoid Bone Fracture

Diagnosis: Physical Examination

- Tenderness in the “anatomic snuffbox”
- Decreased range of motion
- Pain with dorsiflexion
- (Swelling)



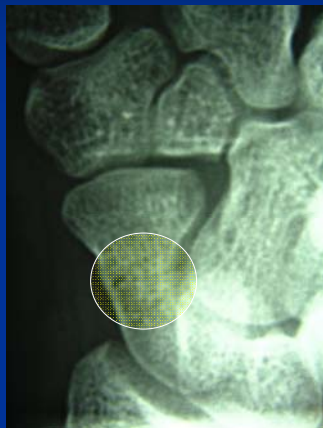
Carpal Scaphoid Bone Fracture

Diagnosis: conventional radiology



Carpal Scaphoid Bone Fracture

Diagnosis: conventional radiology



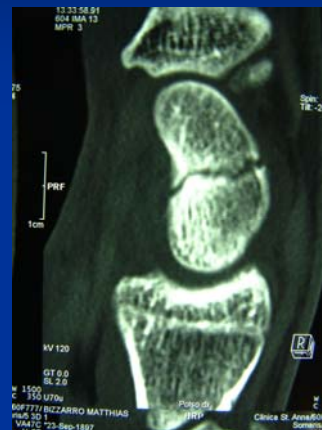
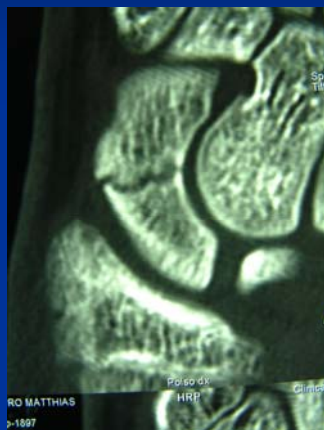
Carpal Scaphoid Bone Fracture Diagnosis: Conventional radiology

MONTHS LATER

NON UNION

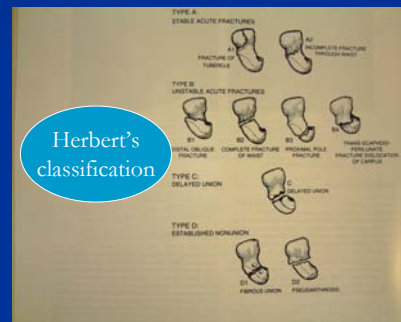
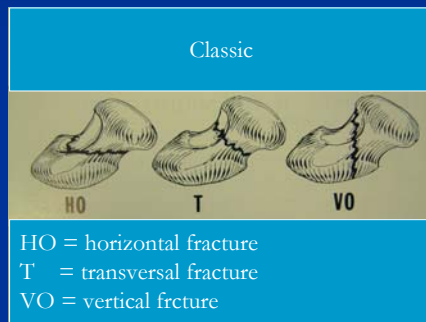


Carpal Scaphoid Bone Fracture Diganosis: CT



Scaphoid Bone Fractur: NON UNION (PSEUDOARTHROSIS)

Carpal Scaphoid Bone Fracture Classification



Carpal Scaphoid Bone Fracture Diagnosis

Any contact-sport athlete who as **radial wrist** pain should be considered to have a **scaphoid fracture** until proven otherwise

In cases of clinical suspicion
MRI studies is necesery

Carpal Scaphoid Bone Fracture Treatment

- If the **fracture** are **stable**
 - Cast until healed : 3 month
 - Cast plus use of a playin cast/splint
 - Operation with internal fixation
- If the **fracture** are **instable**
 - Operation with internal fixetion

Carpal Scaphoid Bone Fracture Treatment vor profesional athlete

Open reduction and and internal fixation

Advantage

Return to sport after 6 weeks (with cast 10-12 w)

Less rate of nonunion

Carpal Scaphoid Bone Fracture ideal treatment



After 8 weeks



Ligament injury

The most common and most
problematic

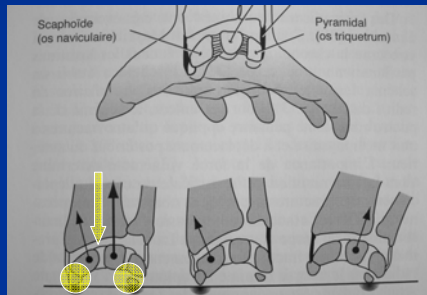
■ Scapholunate injuries

Lunotriquetral injuries
Scafotriquetral injury
Midcarpal instability
Dislocation of the carpus

■ Distal radioulnar joint (DRG) and triangular fibrocartilage complex injuries (TFC)

Scapholunate rupture

Dinamic



Hyperextension trauma
and ulnoradial load



Scapholunateligament rupture

Diagnosis: Physical examination

- Tenderness of scafolunate area
- Decreased range of motion
- (Swelling)
- Positive Watson Test



Scapholunate rupture

Diagnosis: physical examination



Verticalizzazione dell'osso navicolare

Watson Test

Scapholunate rupture: Diagnosis

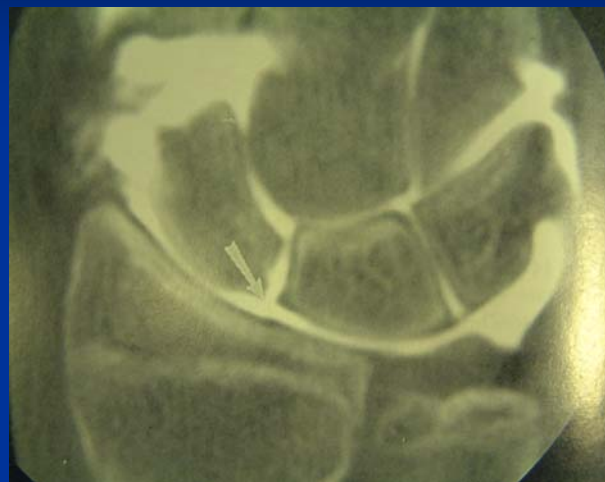
conventional radiology



Scapholunate rupture: **Diagnosis**
Arthrography (indirect evaluation)

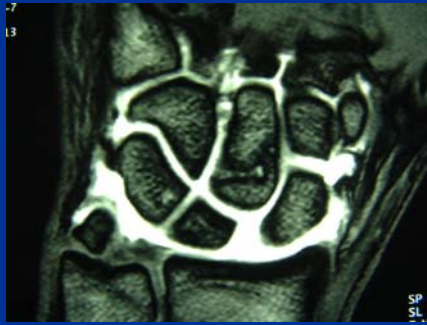


Scapholunate rupture: **Diagnosis**
CT-arthrography (indirect evaluation)

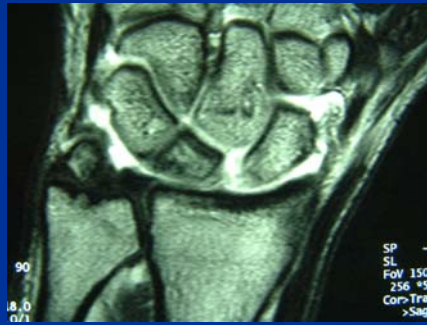


Scapholunate rupture: Diagnosis

RM-artrographie (indirect and direct)



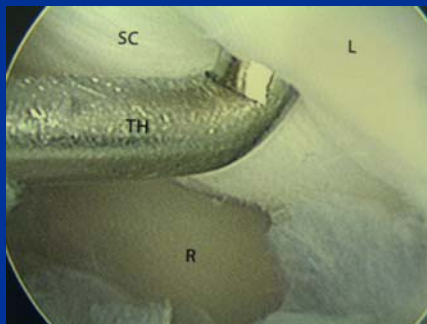
Ecogradiante (evidenzia il contrasto)



T1 (dettagli anatomici)

Scapholunate rupture: Diagnosis

Arthroscopy (direct evaluation)



acute Scapholunate rupture: Treatment

Complete

open repair with
augmentation using a
portion of scaphotriquetral
ligament



Incomplete

arthroscopic shrinkage

Scapholunate rupture acute with bone detach

Treatment: operation



chronic Scapholunate rupture treatment

Reconstruction of S-L ligament

- bone-ligament-bone (oteoligamentoplastic)
- transossäre fixation with ligament augmentation

Bat: 1) long athletic activity interruption
2) bad prognosis
3) risk to interrupt the athletic activity

Cronic scapholunate rupture: Bone-ligament-bone repair



Cronic scapholunate Ligament fixation (Taleisnik)

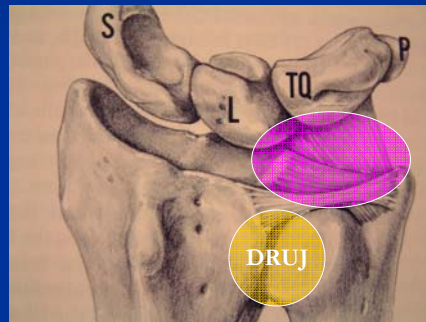


Scapholunate repair: Result

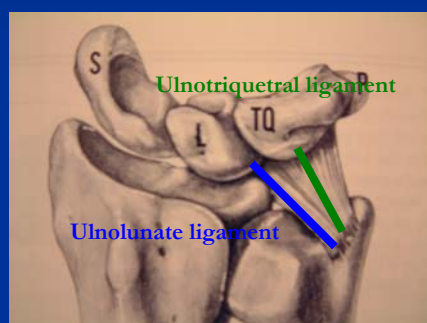


Triangular fibrocartilage (TFC)

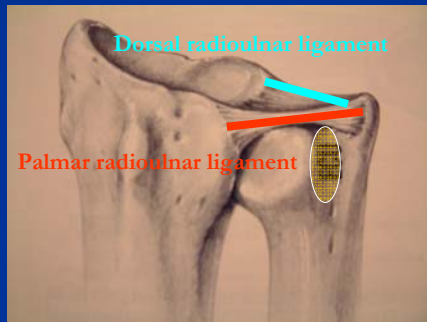
TFC
Stabilizer of distal
radioulnar joint (DRUJ)



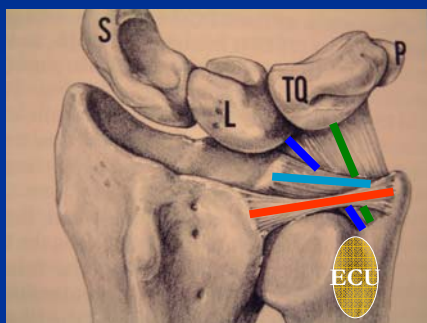
TFC anatomy ulnotriquetral and ulnolunate ligament



TFC anatomy: dorsal and palmar ligament



TFC anatomy: ECU compartement



TFC injury

- **Acute traumatic** events involve axial load-bearing with rotational stress
- **Overuse**
- **Repetitive trauma**

TFC injury Diagnosis

- Anamnesis
- Differential diagnosis
- Physical examination
- Imaging studies
- **Arthroscopy**

TFC injuries

Diagnosis: physical examination

- Tenderness between the pisiform and ulnar styloid on the ulnar border of the wrist
- Distal radio ulnar joint instability (piano key sign)



TFC injuries

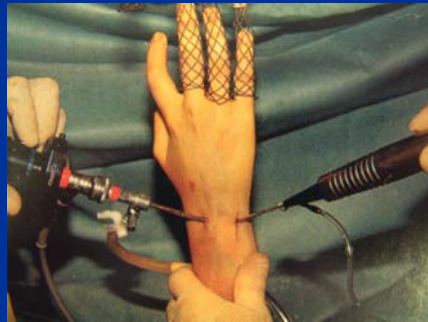
Diagnosis: imaging studies

- Tricompartiment Wrist arthrogram
- MRI arthrogram (high resolution)
- CT scan in neutral and pronation and supination
- Wrist arthroscopy

TFC Injuries

Diagnosis: **arthroscopy**

- Advantage
 - Diagnostic
 - Therapeutic



TFC injuries

Diagnosis and Treatment

The physician treating high level athletes may consider a **more aggressive approach** to the patient with suspected TFC/DRUJ injury

- 1) If DRUJ **intability** is demonstrated, early intervention with arthroscopy (TFC repair)
- 2) If DRUJ is **stable** and symptoms are present for 2 weeks, arthroscopy is indicated

TFC injuries *acute* *Artrscopic diagnosis*

CLASSIFICATION OF TFCC TEARS (Palmer)

- 1A (traumatic tears of the central articular disc)
- 1B (peripheral TFC at the ulnar insertion)
- 1C (distal to ulnolunate-ulnotriquetral lig.)
- 1D (lesion at the radial insertion)

TFC injuries acute *Palmer 1A*



TFC injuries acute

Palmer 1B



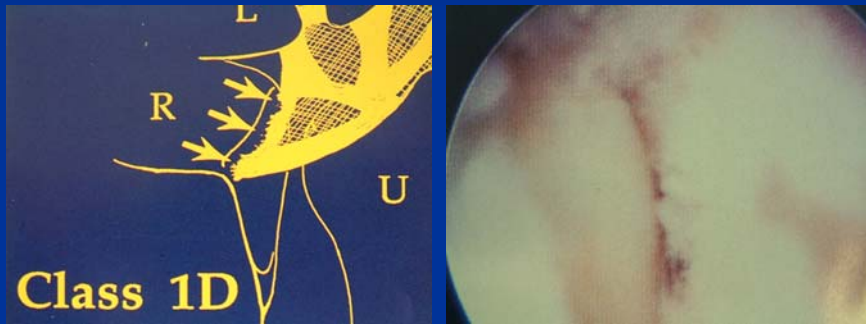
TFC injuries acute

Palmer 1C



TFC injuries acute

Palmer 1D



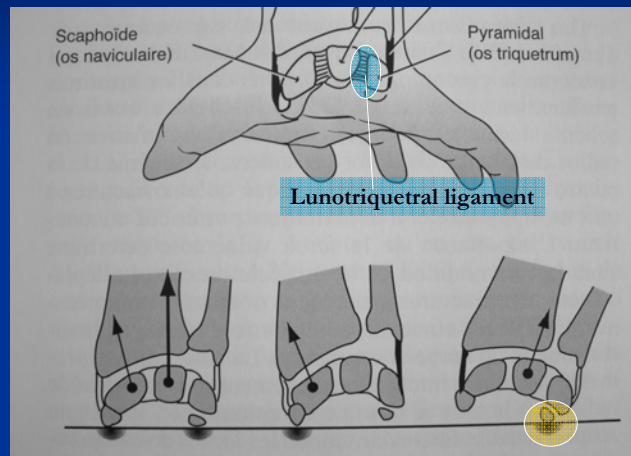
TFC acute injuries

Treatment

- Palmer 1A: arthroscopic debridement
- Palmer 1B: arthroscopic repair
- Palmer 1C: repair of ulnocarpal ligaments open or arthroscopically
- Palmer 1D: arthroscopic repair (?)

Lunotriquetral injuries

Dinamic



Extension trauma and radial deviation

Physical examination luno-triquetral instability(LT)



Lunotriquetral ballottement
(Reagan's)

Lunotriquetral injuries

Diagnosis

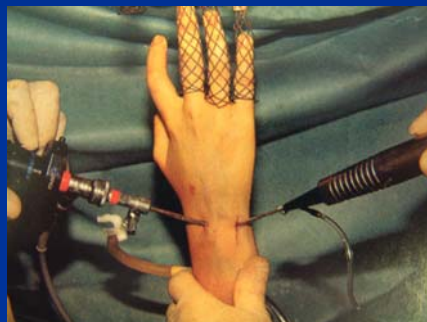
- Ulnarsided wrist pain
- Weakness
- Giving way
- Click sound
- Tenderness over the lunotriquetral ligament
- Lunotriquetral shear test positiv



Lunotriquetral injuries

Diagnosis

- Arthrography (?)
- Magnetic resonanz
- Most definitivediagnostic tool are the **arthroscopy**



Lunotriquetral injuries Therapy

■ Acute

immobilisation

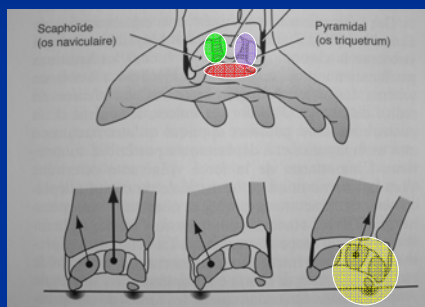
(Healing in 80% of cases)

■ Chronic: surgical option

- arthroscopic lunotriquetral ligament debridement
- lunotriquetral ligament augmentation plastic
- lunotriquetral arthrodesis

Perilunate dislocation

- Significant trauma
- Significant swelling and decreased range of motion
- Excessive radiocarpal hyperextension and ulnar deviation plus intercarpal supination



Disruption of ligament:

- Scapholunate
- Lunotriquetral
- Capitoulunate volar

Perilunate dislocation Diagnosis



Perilunate dislocation Diagnosis



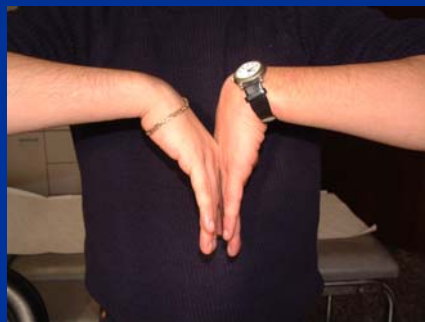
Perilunate dislocation

Treatment: surgery



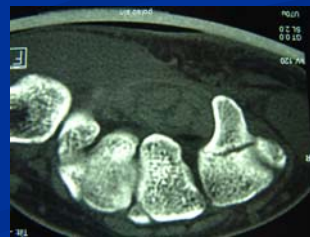
Perilunate dislocation

Result



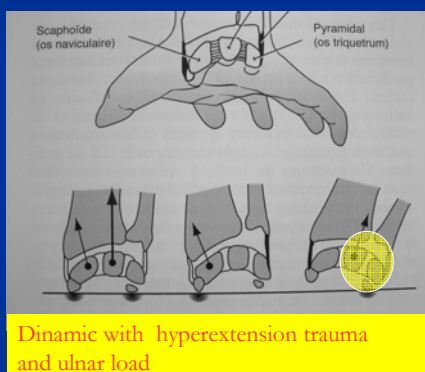
Hook of the Hamate Fracture

- Incidence 2%-4% of all carpal fractures
- Direct trauma (by abutment of the hook on an object)
- Tenderness over the hook
- Diagnosis:
 - conventional radiology
 - CT scan



Lunate Fracture

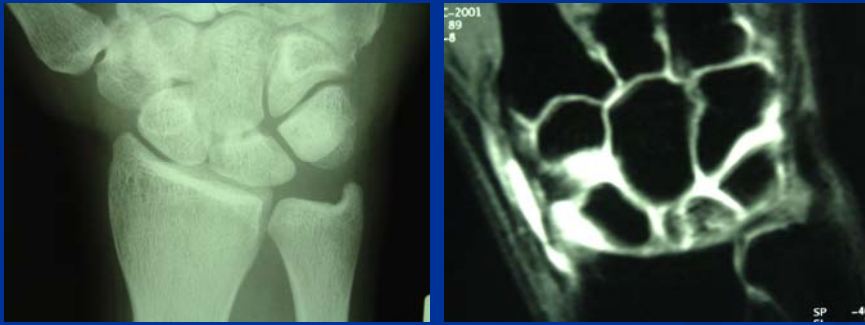
- is rare
- adequate trauma
- tenderness of the lunate
- In combination with avascular necrosis (Kienböck)
- Diagnosis:
 - conventional radiology
 - CT



Dynamic with hyperextension trauma and ulnar load

Lunate fractures

Diagnosis



Lunate fracture

Treatment



Lunatum Fracture Result



Grazie mille per l'ascolto

MD G. Rigoni
Via St. Anna
cp 16
CH-6924 Sorengo

