TREATMENT OF SCAPHOLUNATE TEARS: Place of Wrist Arthroscopy

Ch. Mathoulin

Acknowledgements to all EWAS members,
Particularly:

Marc GARCIA-ELIAS
Jane MESSINA
Luc VAN OVERSTRAETEN
Emmanuel CAMUS

EWAS
European Wrist Arthroscopy Society

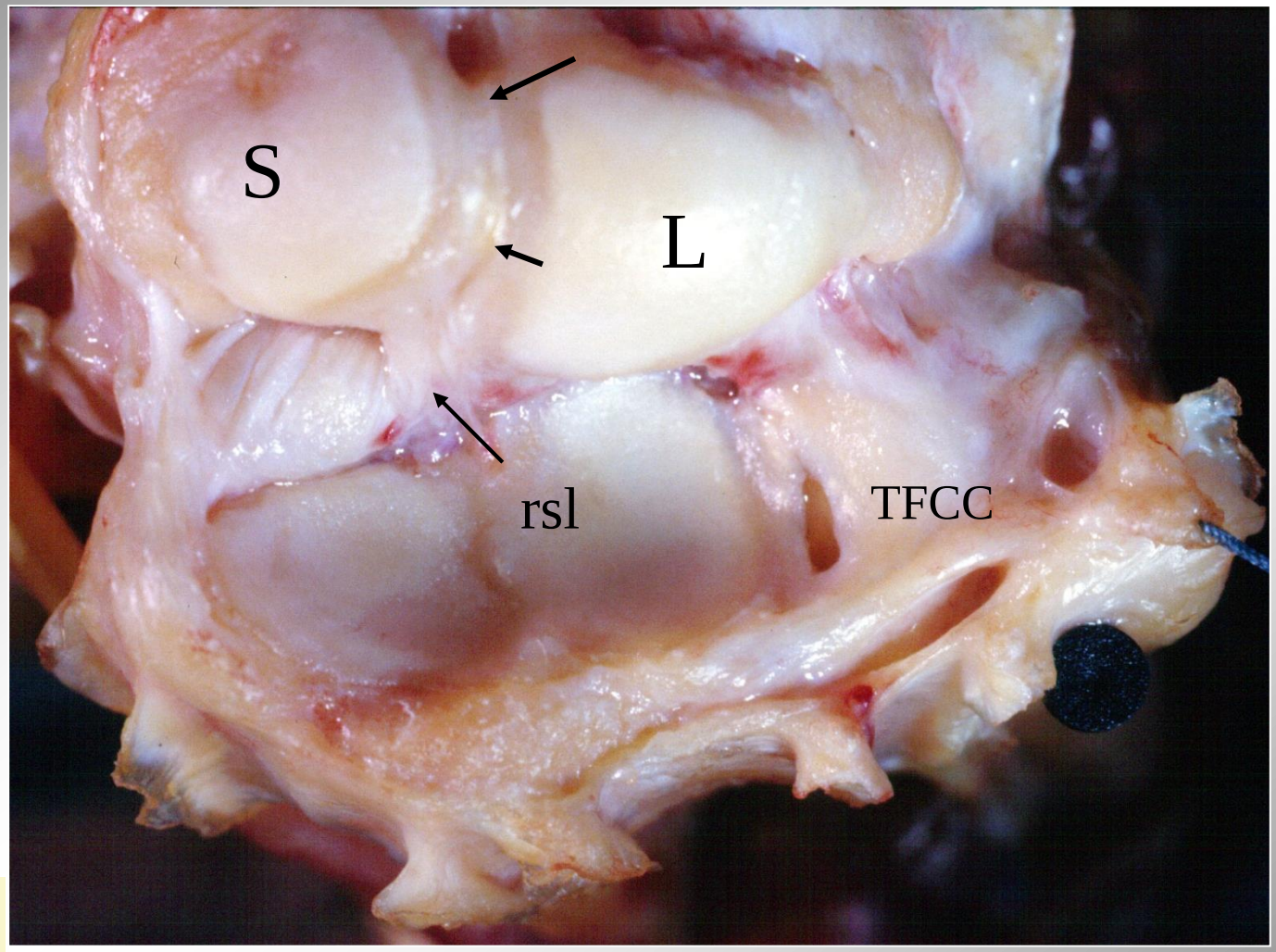
Institut de la Main

PERIOD 1
« The pioneers »

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Classical ANATOMY



(Pagliei (l))

Scapho lunate ligament :
anterior, dorsal and intermediate

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

J.H. Dobyns

R.L. Linscheid

Traumatic Instability of the Wrist

DIAGNOSIS, CLASSIFICATION, AND PATHOMECHANICS*

BY RONALD L. LINSCHEID, M.D.†, JAMES H. DOBYNS, M.D.†, JOHN W. BEABOUT, M.D.†, AND RICHARD S. BRYAN, M.D.†, ROCHESTER, MINNESOTA

From the Mayo Clinic and Mayo Foundation, Rochester

Post-traumatic instability of the carpus and the zigzag or sink deformity of the intercarpal joint in rheumatoid arthritis have interested two of us (R. L. L. and J. H. D.) for several years [10, 18]. Recently, when we encountered several cases of post-traumatic instability of the intercarpal joints, we were stimulated to review our experience with this condition, especially with rotatory subluxation of the intercarpal joint and the associated changes in position of the scaphoid with respect to the radius and the other carpal bones.

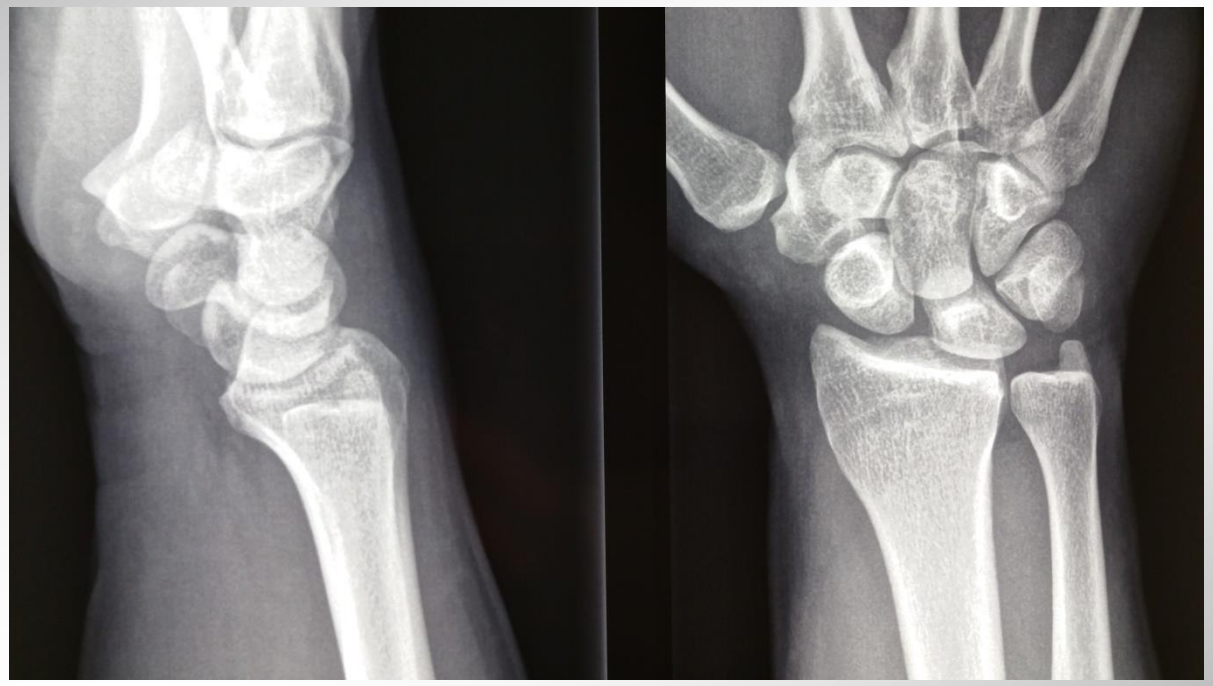
J. Bone Joint Surg 54-A: 1612-1632, 1972

EWAS
European Wrist Arthroscopy Society

Institut de la Main

CLASSIFICATION

DYNAMIC
STATIC

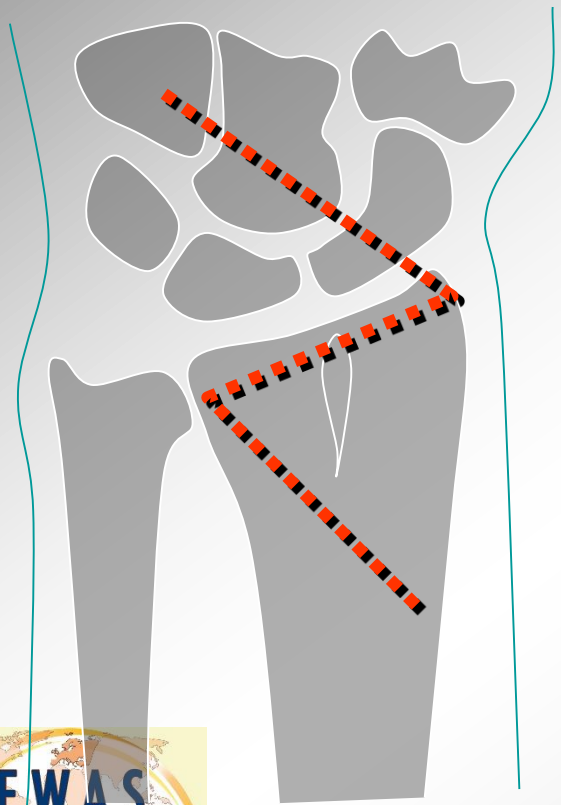


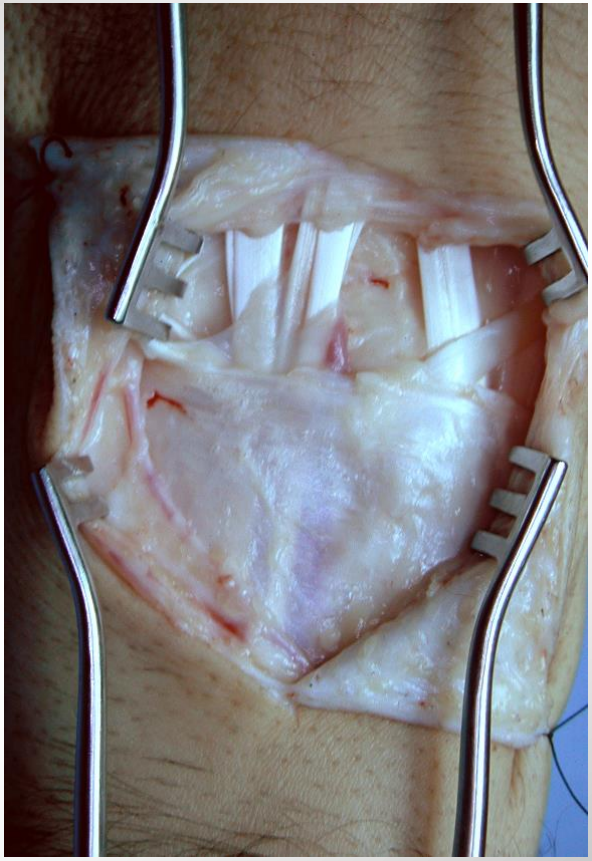
GAP
DISI
SCAPHOLUNATE ANGLE

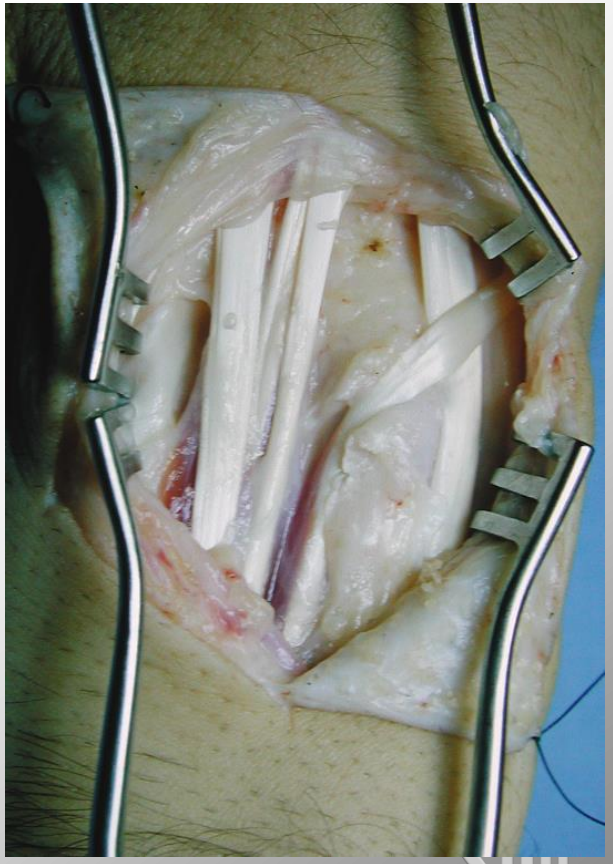
EWAS
European Wrist Arthroscopy Society

Institut
de la Main

DIRECT SUTURE



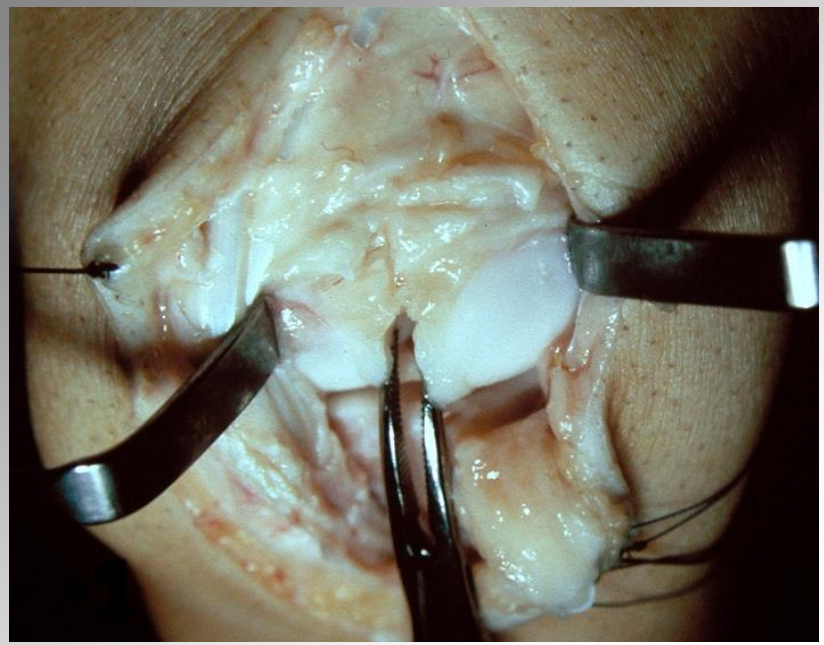
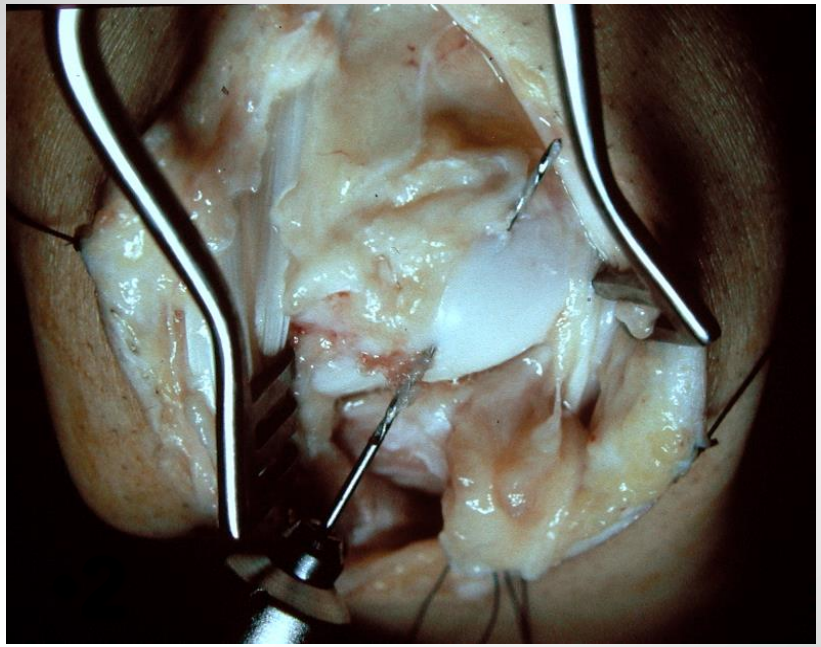
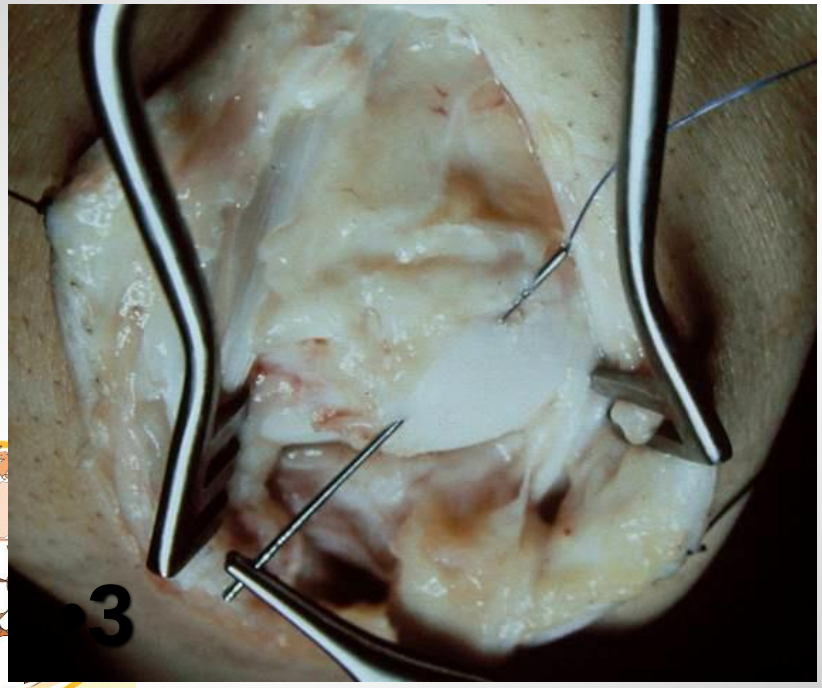




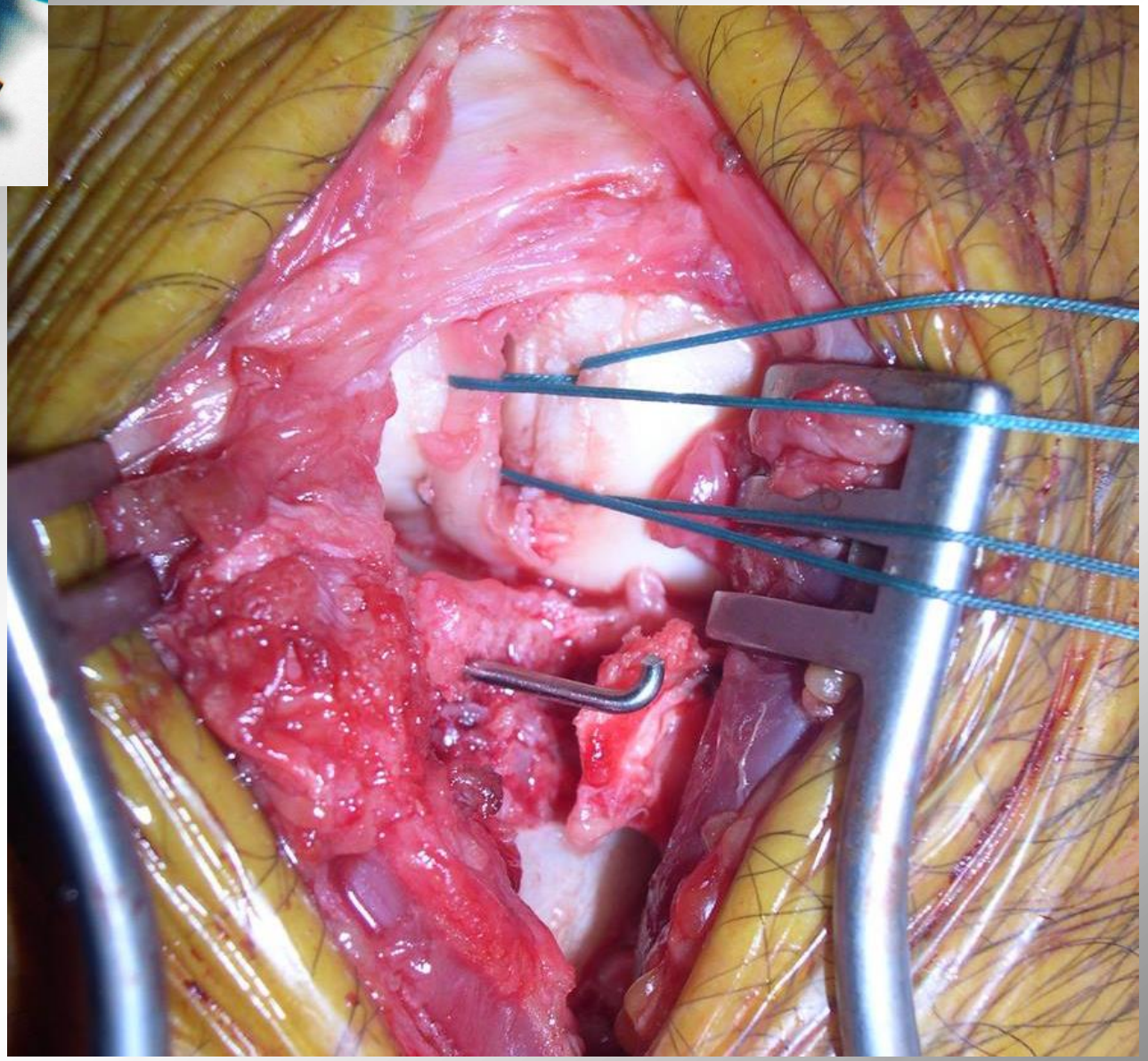
Open reduction + ligament repair + percutaneous K-w fixation

EWAS
European Wrist Arthroscopy Society

Institut de la Main

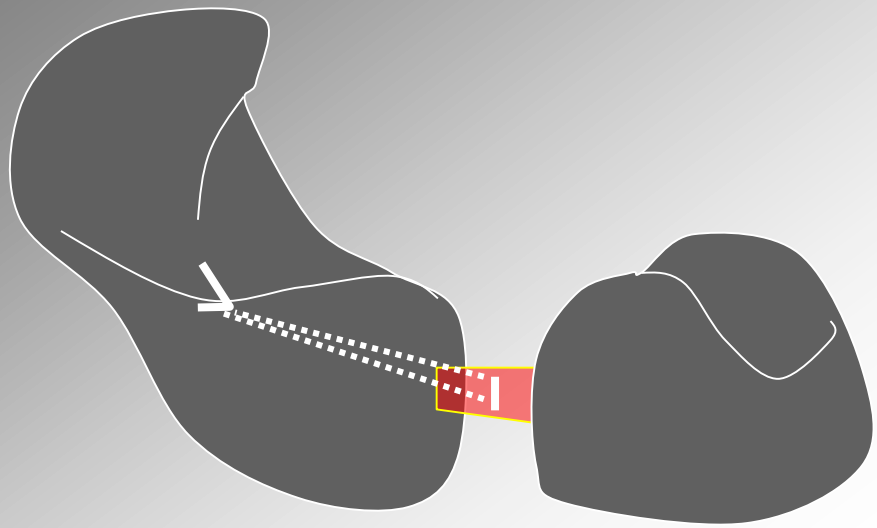





European Wrist Arthroscopy Society



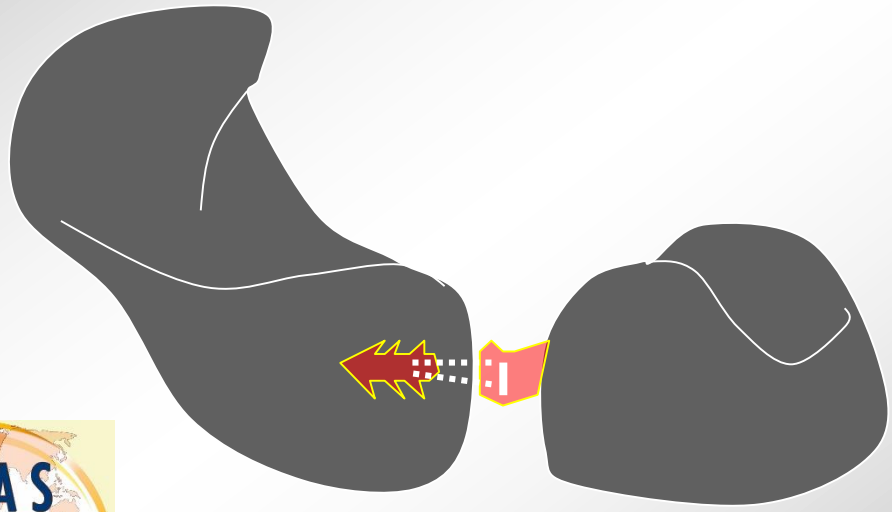
EWAS
European Wrist Arthroscopy Society

Institut
de la Main



Transosseous sutures

Large open approach + poor purchase of anchors in vascular compromised areas



Suture anchor

Detachment and Intra-articular migration of anchor sutures

EWAS
European Wrist Arthroscopy Society

Institut de la Main

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Bad location of anchors!!

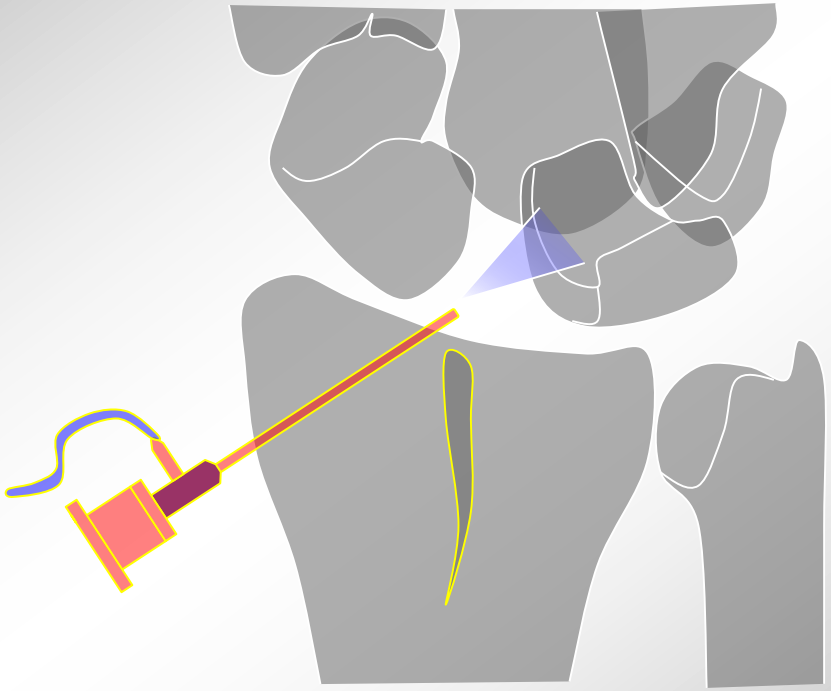
K-WIRE FIXATION

Closed reduction + percutaneous K-w fixation

Closed reduction | 6 days post-fixation | 4 months F-U

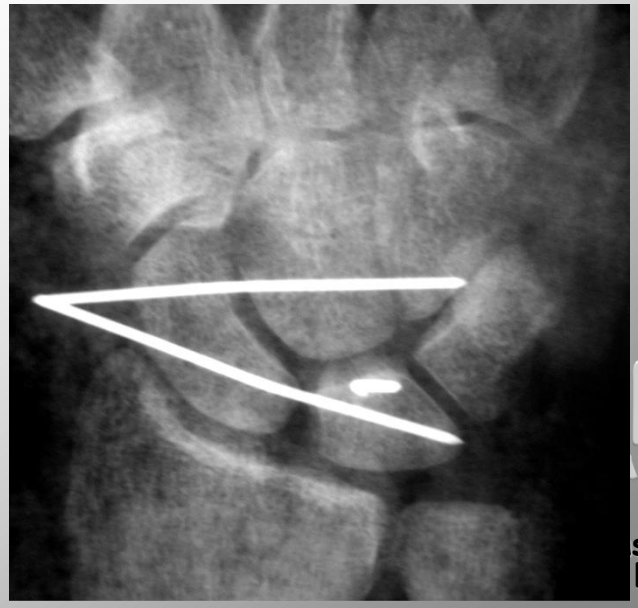
EWAS
European Wrist Arthroscopy Society

Institut de la Main



Arthroscopically guided percutaneous K-wire fixation

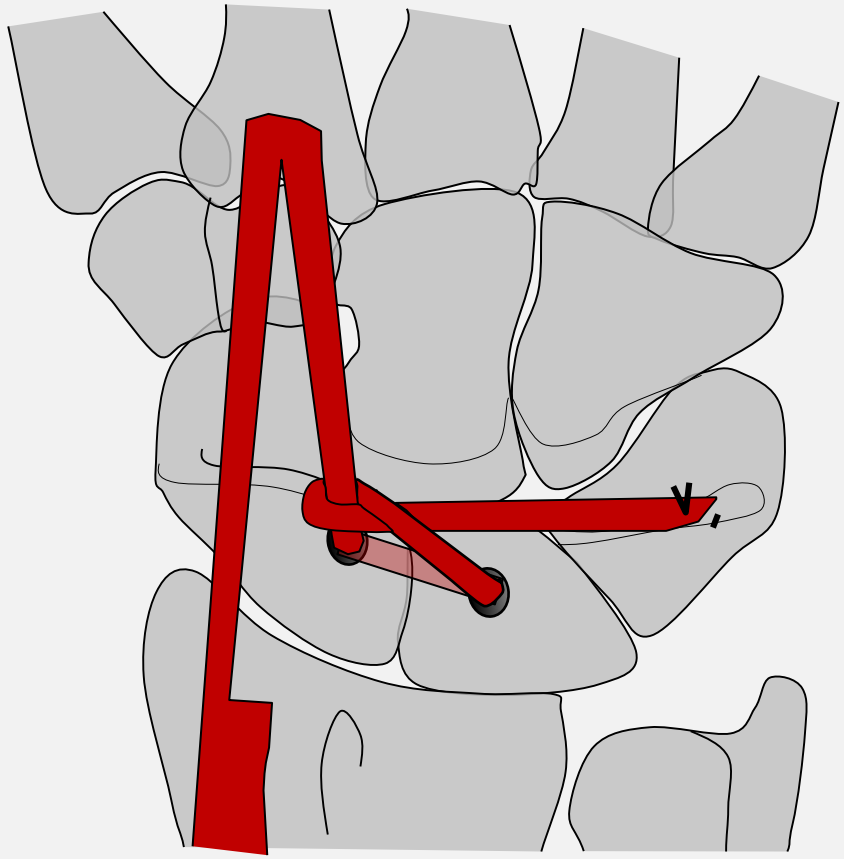
Whipple (1995)



EWAS
European Wrist Arthroscopy Society

stitut
la Main

LIGAMENTOPLASTY



•ECRL ligamentoplasty

•“Traumatic Instability of the wrist.”

•AAOS Instr. Course Lectures 24:182-199, 1975

EWAS
European Wrist Arthroscopy Society

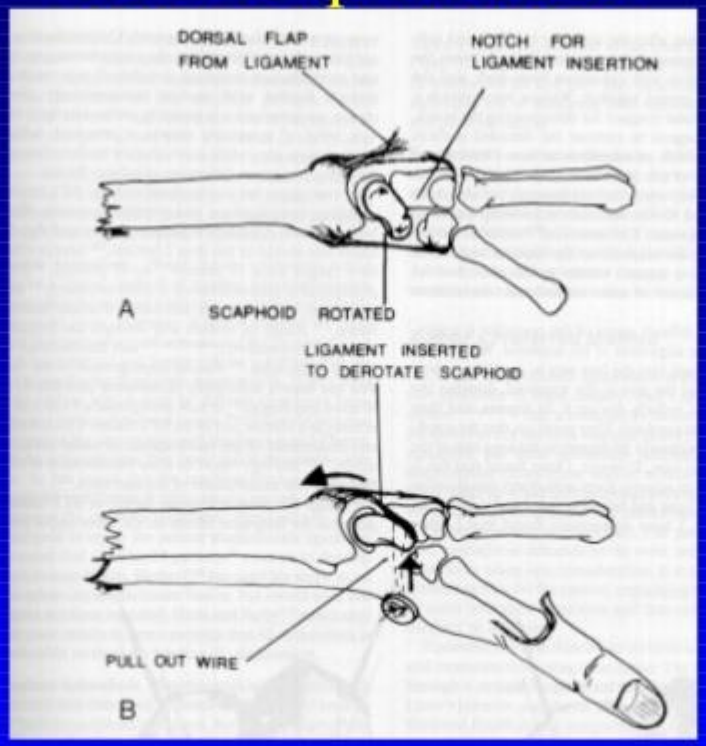
Institut de la Main

Taleisnik J. “These procedures are difficult, unreliable…and the degree of patient satisfaction is frequently disappointing because of late complications after prolonged follow-up” The Wrist, 1985

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

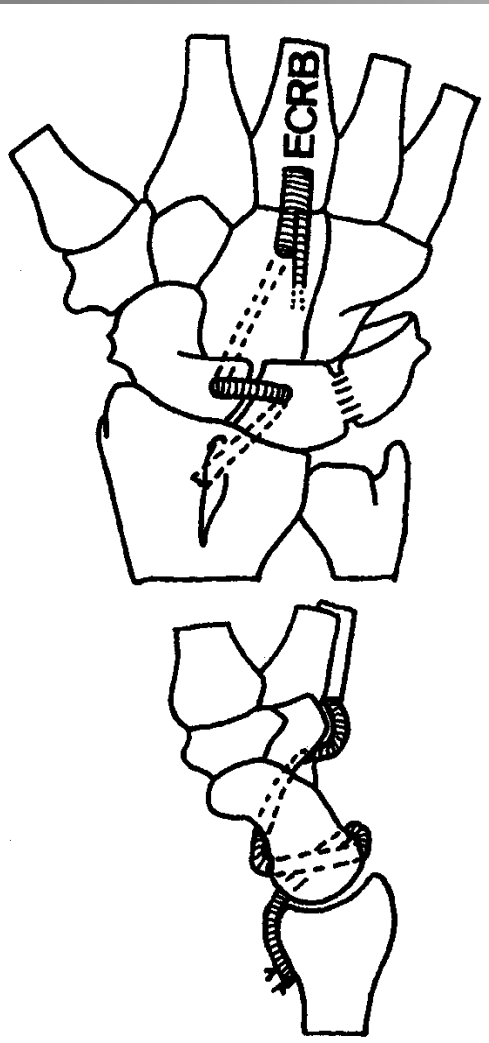
Blatt Capsulodesis

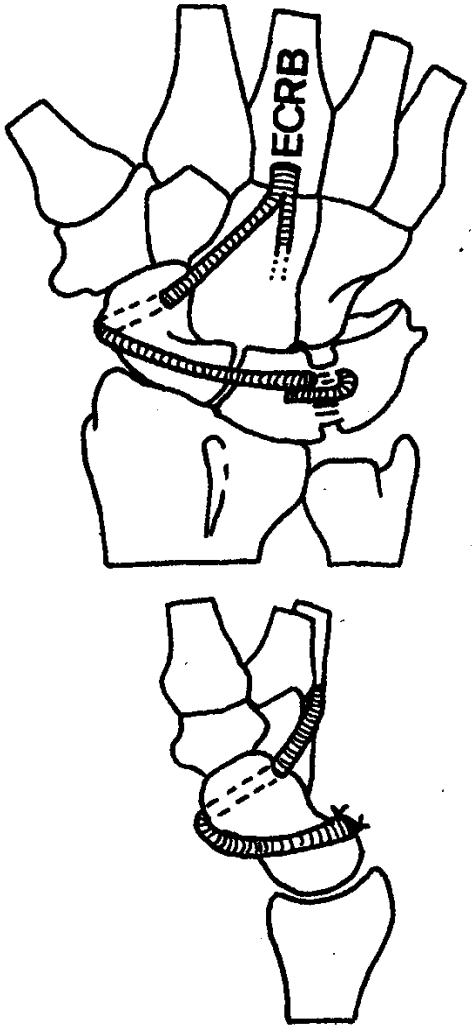


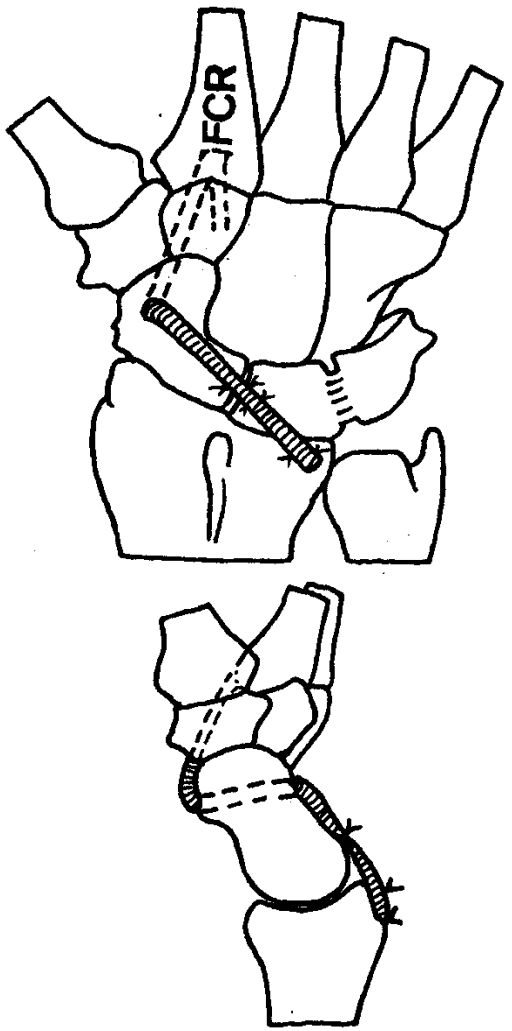
BLATT 1987

European Wrist Arthroscopy Society

Institut de la Main



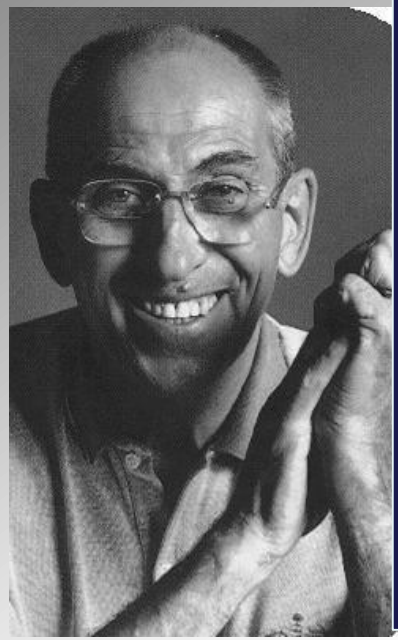


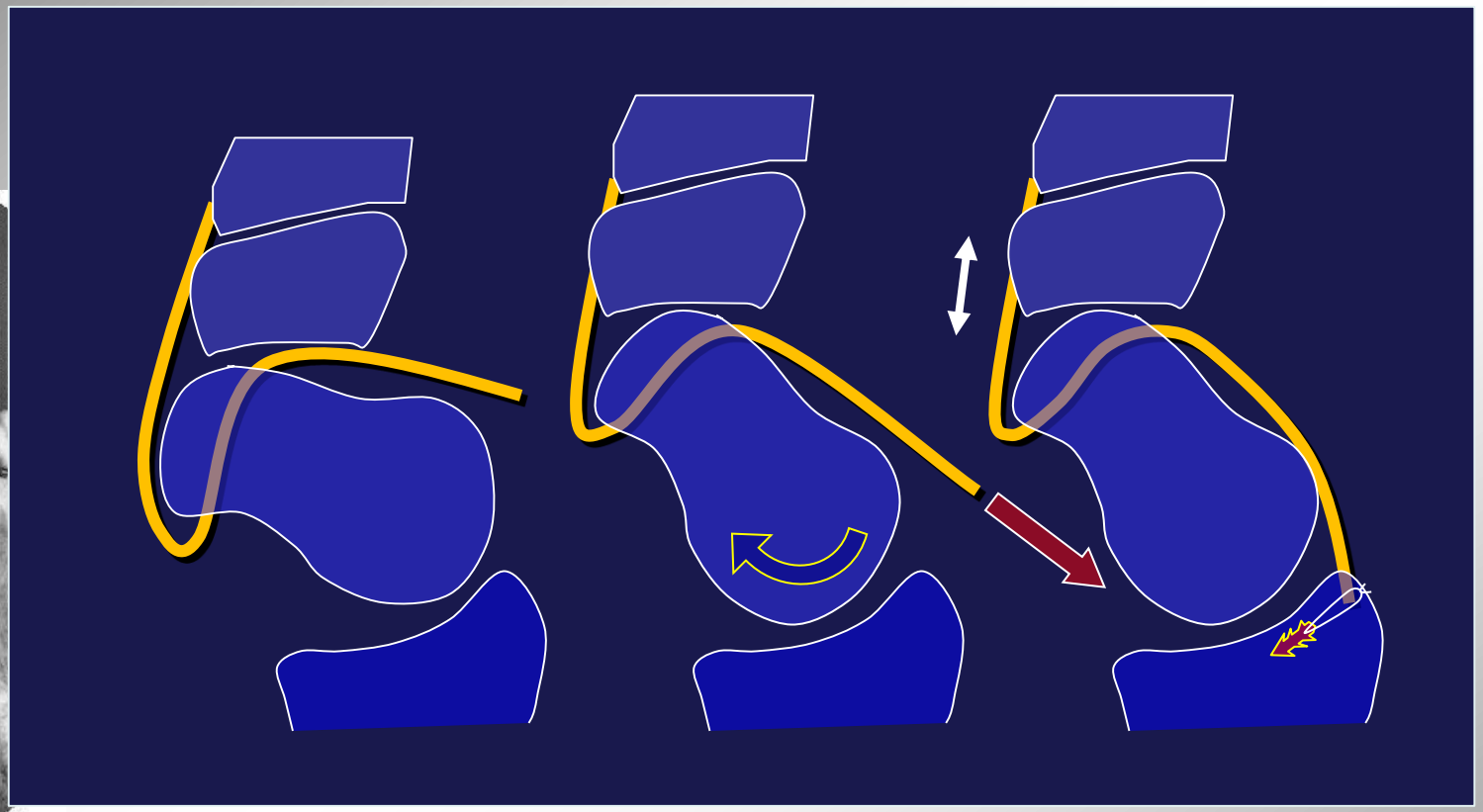


ALMQUIST 1991 **LINSCHEID 1992** **BRUNELLI 1995**

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

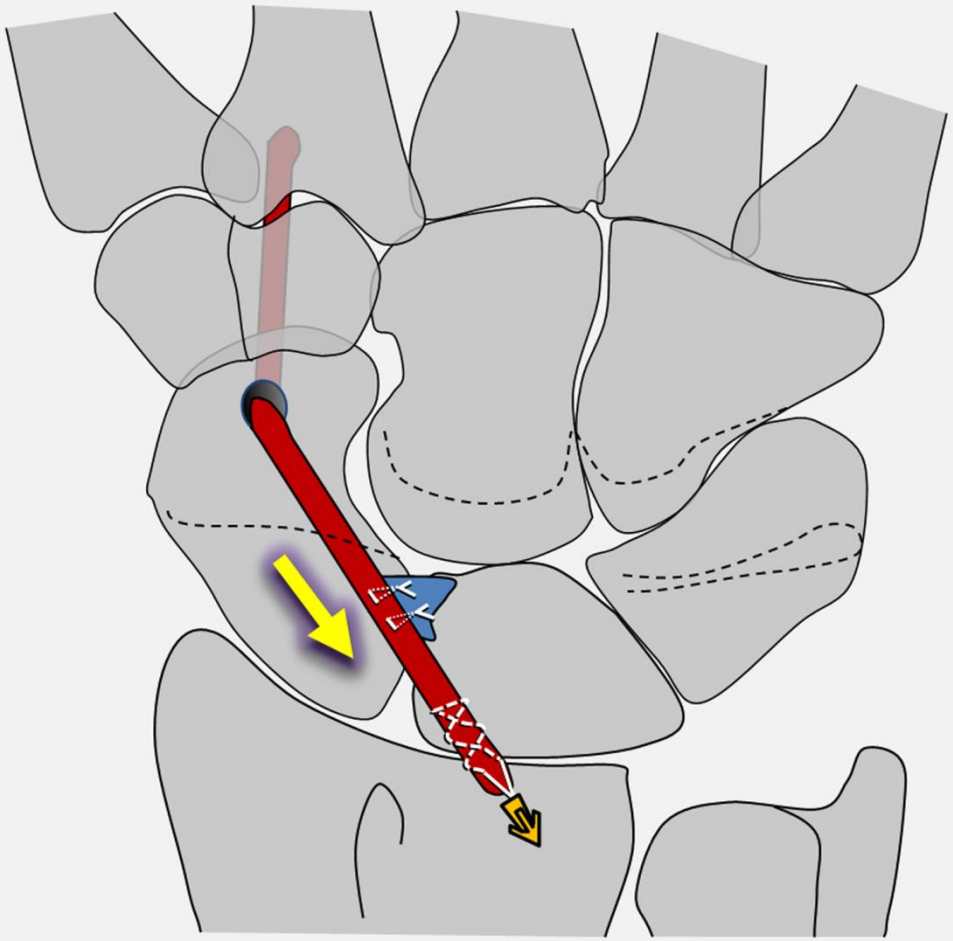




Brunelli GA, Brunelli GR. A new technique to correct carpal instability with scaphoid rotary subluxation: a preliminary report.
J Hand Surg Am. 1995; 20 (Pt 2): 82-85

EWAS
European Wrist Arthroscopy Society

Institut de la Main



Scaphotrapezoid tenodesis
(Brunelli & Brunelli, 1995)[10]

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

•31 patients.
F-U: 54 months

•Scapholunate angle:

56º before surgery
62º at follow-up

•SL gap:

2.7 mm before surgery
3.9 mm at follow-up

• 19% required further surgery due to persistent pain

Moran SL et al. J Hand Surg Am 2005; 30: 16-23

EWAS
European Wrist Arthroscopy Society

Institut de la Main

PERIOD 2
« The specialists »

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Staging of scapho-lunate tears

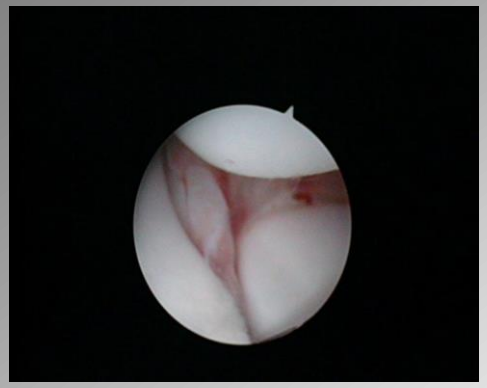
DAUTEL +++

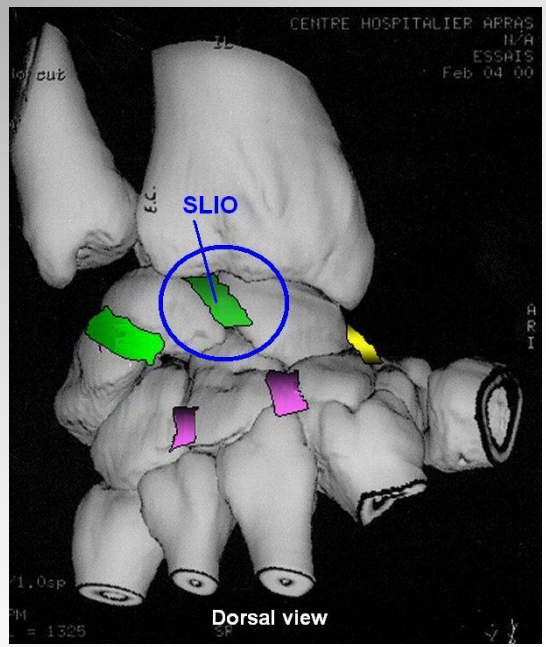
Geissler et al 's[13] arthroscopic classification of SL ligament tears

Grade	Description
I	Attenuation /hemorrhage of interosseous ligament as seen from the radiocarpal joint. No incongruency in midcarpal space
II	Attenuation /hemorrhage of interosseous ligament as seen from the radiocarpal joint.. A slight gap (less than the width of a probe) between scaphoid and lunate may be present
III	Incongruency and/or step-off at the SL joint space seen in both the radiocarpal and midcarpal space. The probe may be passed through the gap between scaphoid and lunate
IV	Incongruency and/or step-off at the SL joint space seen in both the radiocarpal and midcarpal spaces. Gross instability with manipulation . A 2.7 mm arthroscope may be passed though the scapholunate gap

EWAS
European Wrist Arthroscopy Society

Institut de la Main





	EWAS CLASSIFICATION of SL dissociation
Stage I	No passage of the probe in SL space, but synovitis.
Stage IIA	Volar passage in the SL space without widening
Stage IIB	Dorsal passage in the SL space without widening
Stage IIC	Complete passage in the SL space without widening
Stage IIIA	Volar partial widening at dynamic instability test from MC joint (volar instability)
Stage IIIB	Dorsal partial widening at dynamic instability test from MC joint (dorsal instability)
Stage IIIC	Complete widening of the space at dynamic test
Stage IV	Gap with passage of the arthroscope from MC to RC joint

EWAS
European Wrist Arthroscopy Society

Messina JC, Dreant N, Luchetti R, Lindau T, Mathoulin C.
Scapholunate tears : a new arthroscopic classification.
Chirurgie de la main 2009 Vol 28 (6): 339-44

Institut de la Main

Staging of scapho-lunate tears

- *J Hand Surg Am 2006*
  - *Garcia Elias and al*

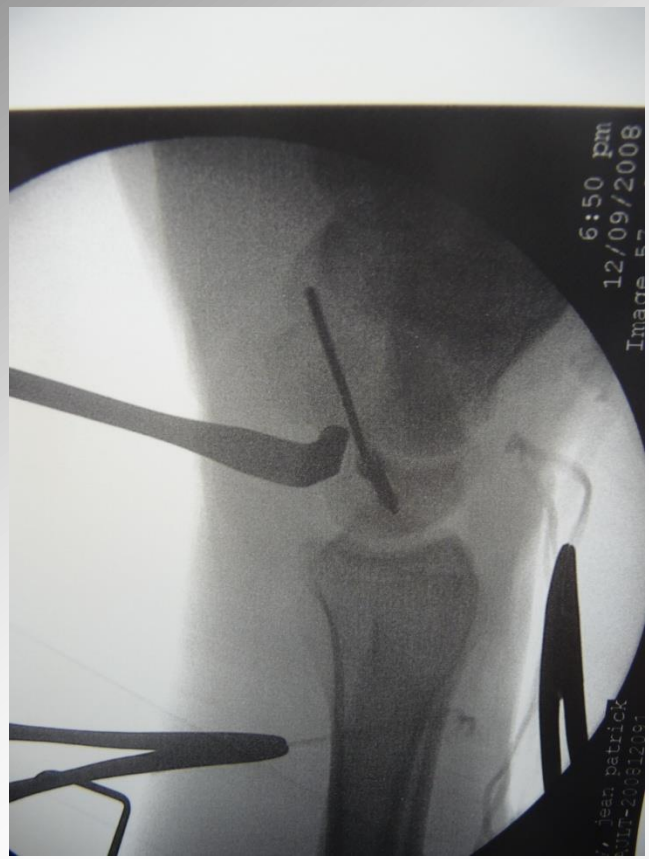
	I	II	III	IV	V	VI
Partial injury	yes	no	no	no	no	no
Repairable	yes	yes	no	no	no	no
Normal alignment	yes	yes	yes	no	no	no
Reductible	yes	yes	yes	yes	no	no
Normal cartilage	yes	yes	yes	yes	yes	no

- **Stage I: Capsulodesis (Szabo's technique)**
- **Stage II: Open anterior SL ligament repair**
- **Stage III: Bone-ligament-bone reconstruction**
- **Stage IV: Three ligament tenodesis**
- **Stage V: RSL fusion + distal scaphoidectomy**
- **Stage VI: PIN + AIN denervation**

EWAS
European Wrist Arthroscopy Society

Institut de la Main

RASL procedure (Rosenwasser, NY)

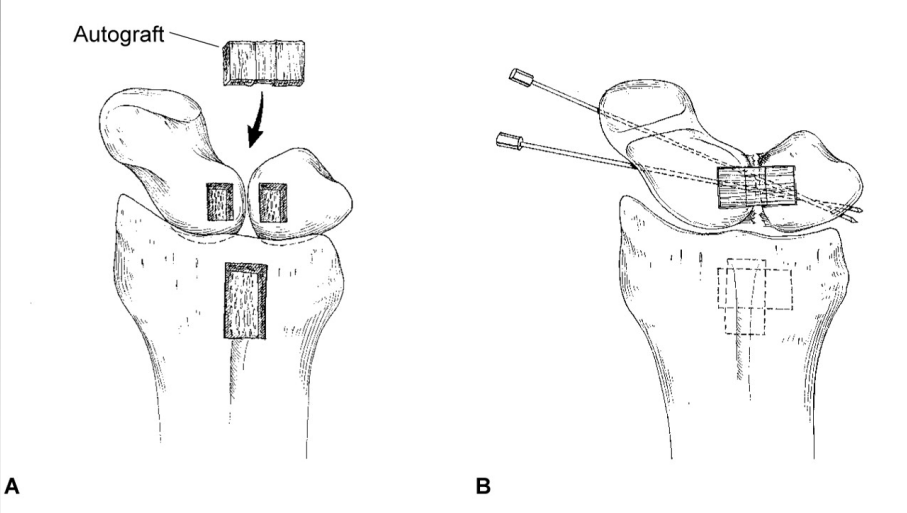


Rosenwasser MP, et al:
The RASL procedure: Reduction and Association of the Scaphoid and Lunate using the Herbert screw.
Tech Hand Up Extrem Surg. 1997

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Bone-Ligament-Bone (CUENOD)



Cuénod P. Osteoligamentoplasty and limited dorsal capsulodesis for chronic scapholunate dissociation.
Ann Chir Main 1999

Outcomes of bone-ligament-bone: Van Kampen, Bayne, Moran, Berger
Radiological progression of arthritis was not prevented, same results as other ligamentoplasties, they have abandoned this technique
JWS 2015; 4; 230-238

EWAS
European Wrist Arthroscopy Society

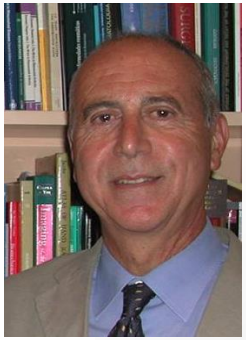
Institut de la Main

According to Marc Garcia-Elias, a tendon reconstruction of the scapholunate (SL) ligamentous complex is indicated…

- ✓ ….when there is a complete and non-reparable rupture of the SL ligamentous complex…
- ✓ ….when the secondary stabilizers (STT, SC, RSC and STq) are insufficient or torn,…
- ✓ …..when there is no ulnar translocation and/or a grossly malaligned lunate
- ✓ …..and when the carpal misalignment is easily reducible

EWAS
European Wrist Arthroscopy Society

Institut de la Main



Three-Ligament Tenodesis for the Treatment of Scapholunate Dissociation: Indications and Surgical Technique

Marc Garcia-Elias, MD, PhD, Alberto L. Lluch, MD, PhD,
John K. Stanley, FRCS, MChOrth, FRCS, FRCSE

From the Department of Hand and Upper Extremity Surgery, Kaplan Institut, Barcelona, Spain; and the Department of Hand and Upper Limb Surgery, Wrightington Hospital for Joint Disease, Wigan, England.

Different surgical techniques have been proposed to treat traumatic scapholunate instability. Deciding which treatment is best for each individual case is not easy. In this article we report an algorithm of treatment based on a number of prognostic factors that may help in this matter. We also report on the promising results obtained using a new technique, the 3-ligament tenodesis, for the treatment of nonrepairable complete scapholunate ligament rupture, causing a reducible carpal malalignment without secondary osteoarthritis. This technique incorporates features from 3 previously described techniques. (J Hand Surg 2006; 31A:125–134. Copyright © 2006 by the American Society for Surgery of the Hand.)

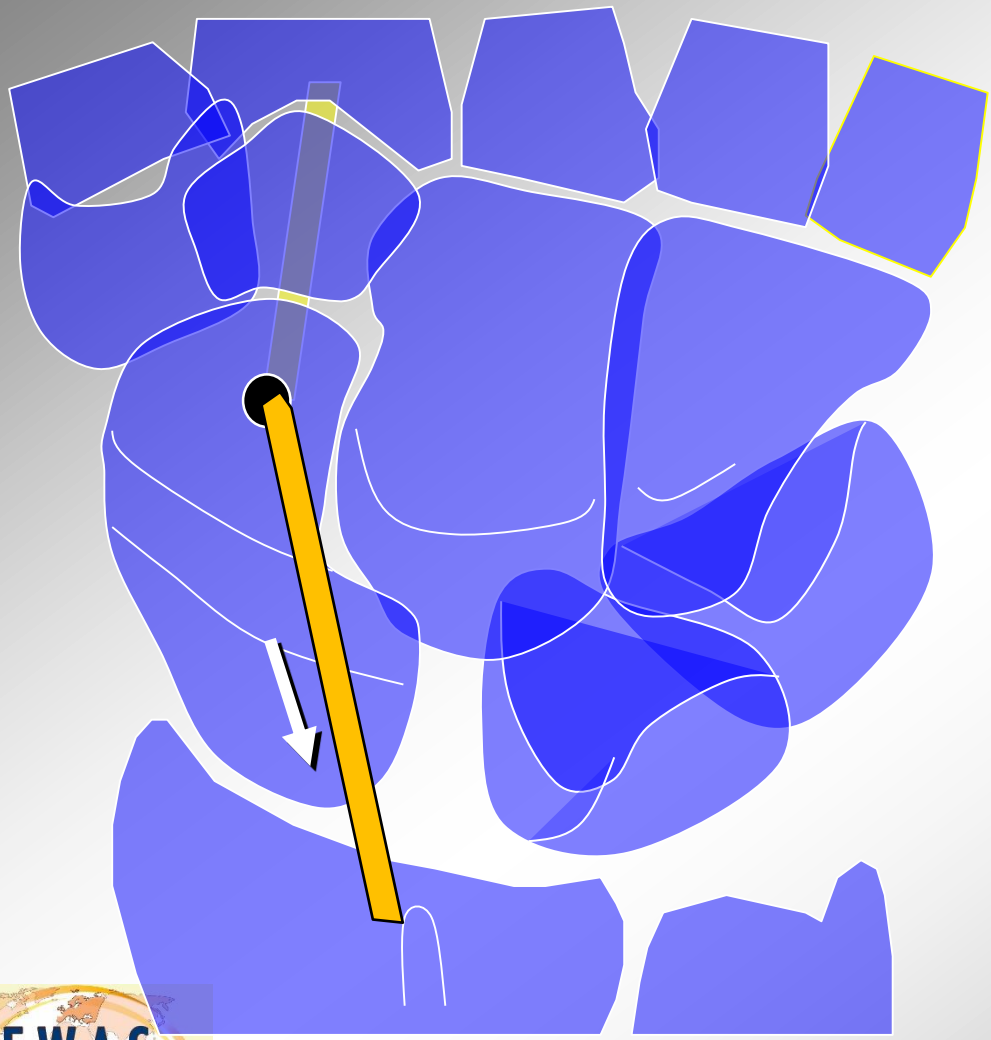
Key words: Wrist instability, scapholunate ligament, tenodesis.

The Journal of Hand Surgery 2006; 31A:125-134

EWAS
European Wrist Arthroscopy Society

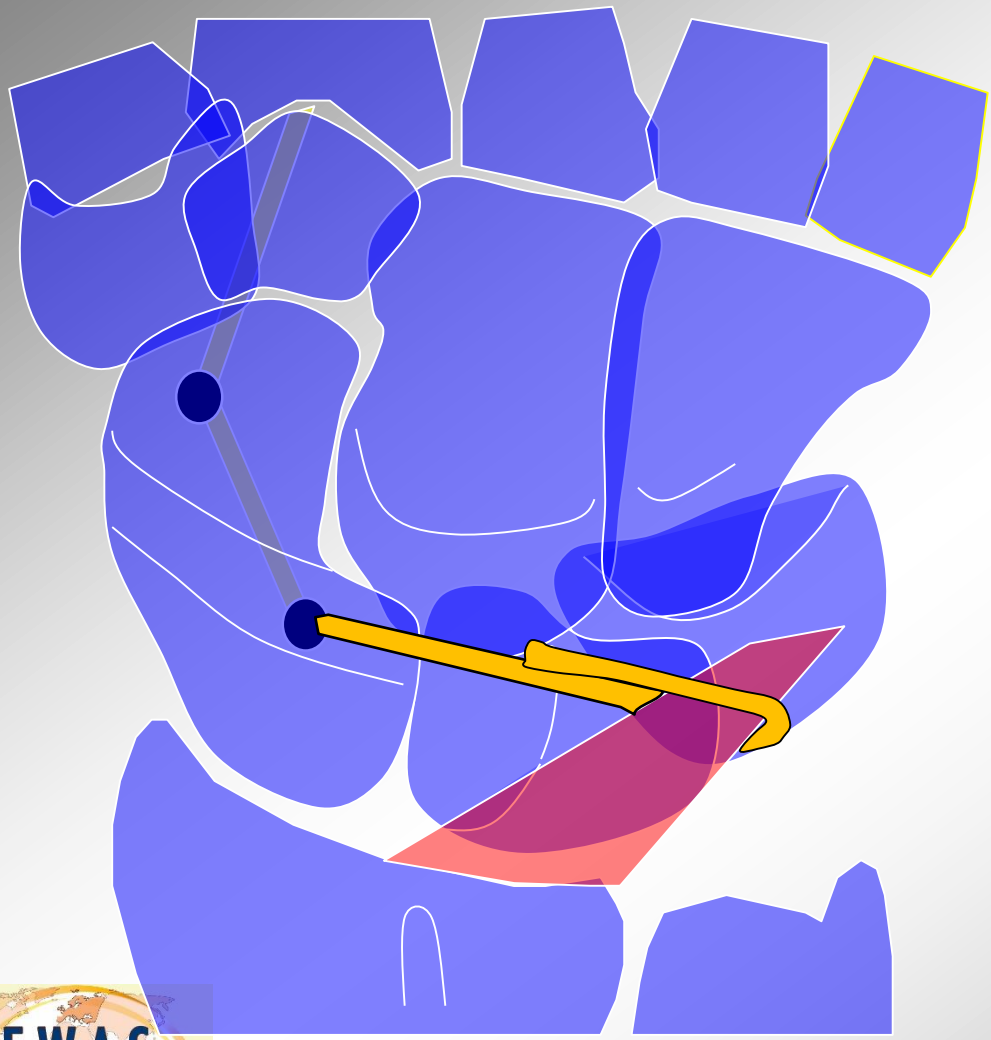
Institut de la Main

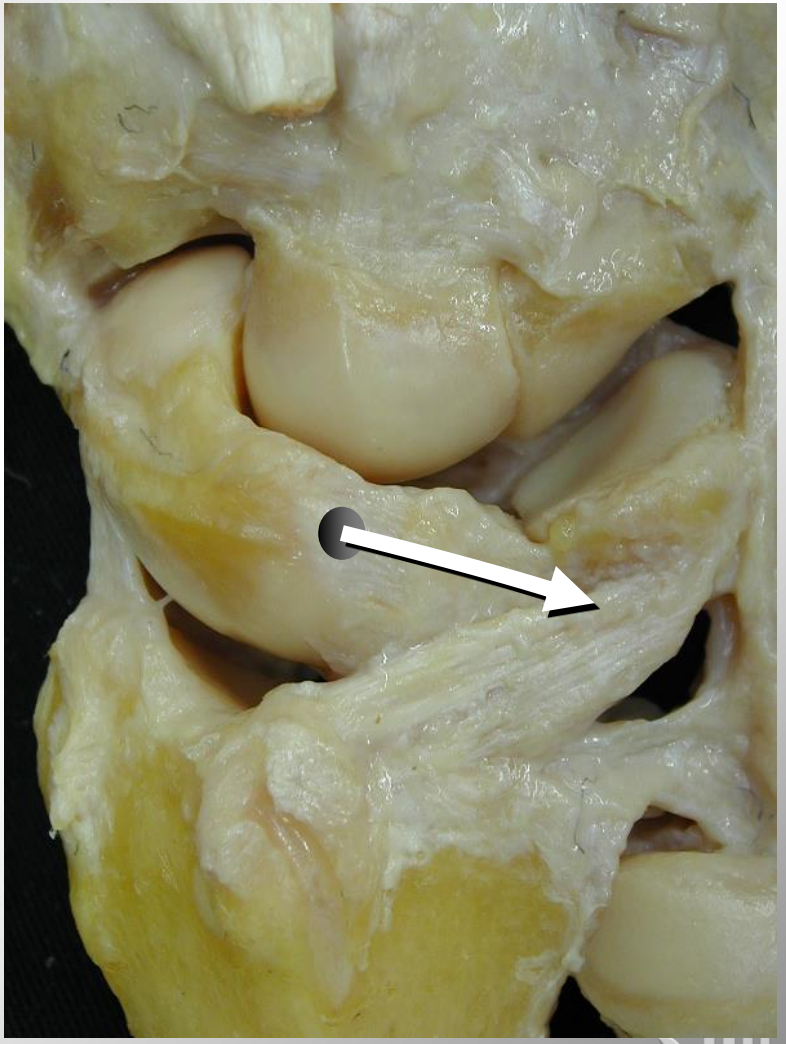
3LT Tenodesis (Garcia-Elias)



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

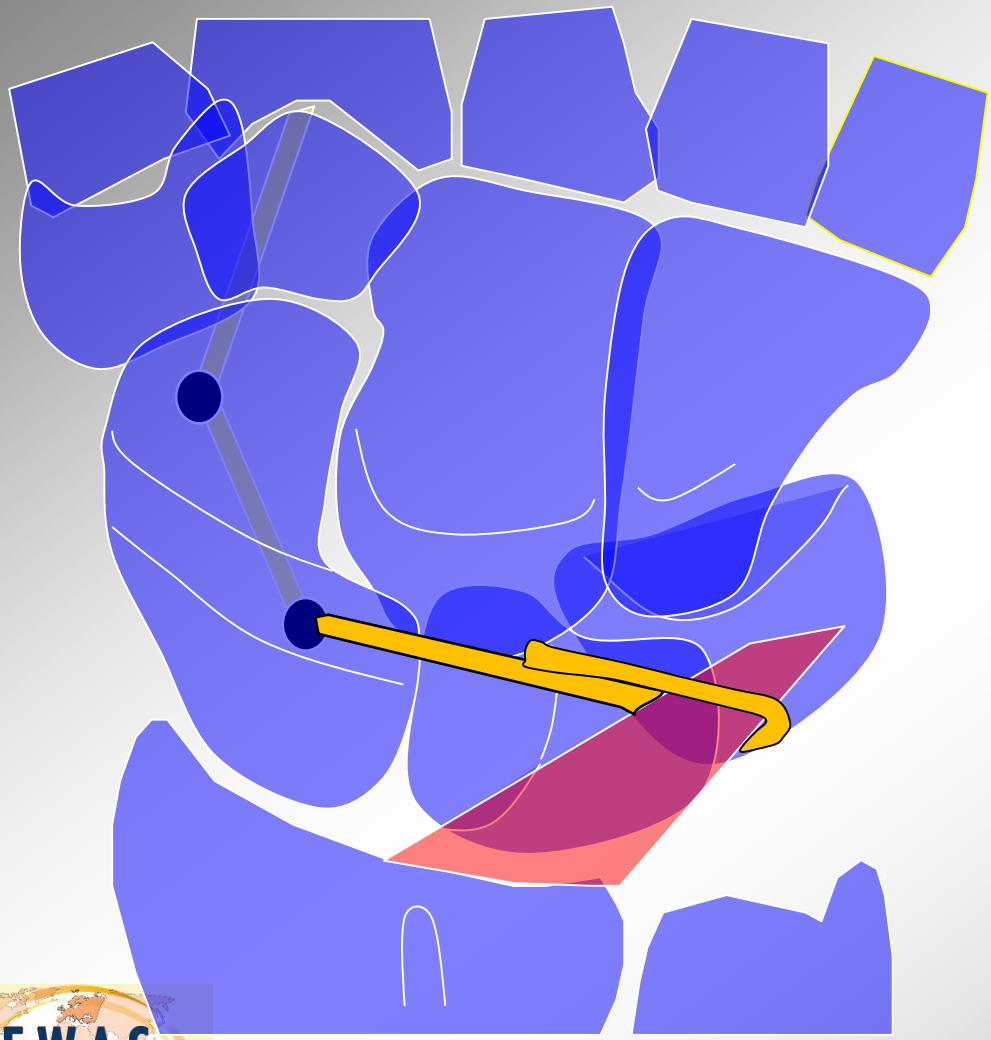




Modified Brunelli's ?

EWAS
European Wrist Arthroscopy Society

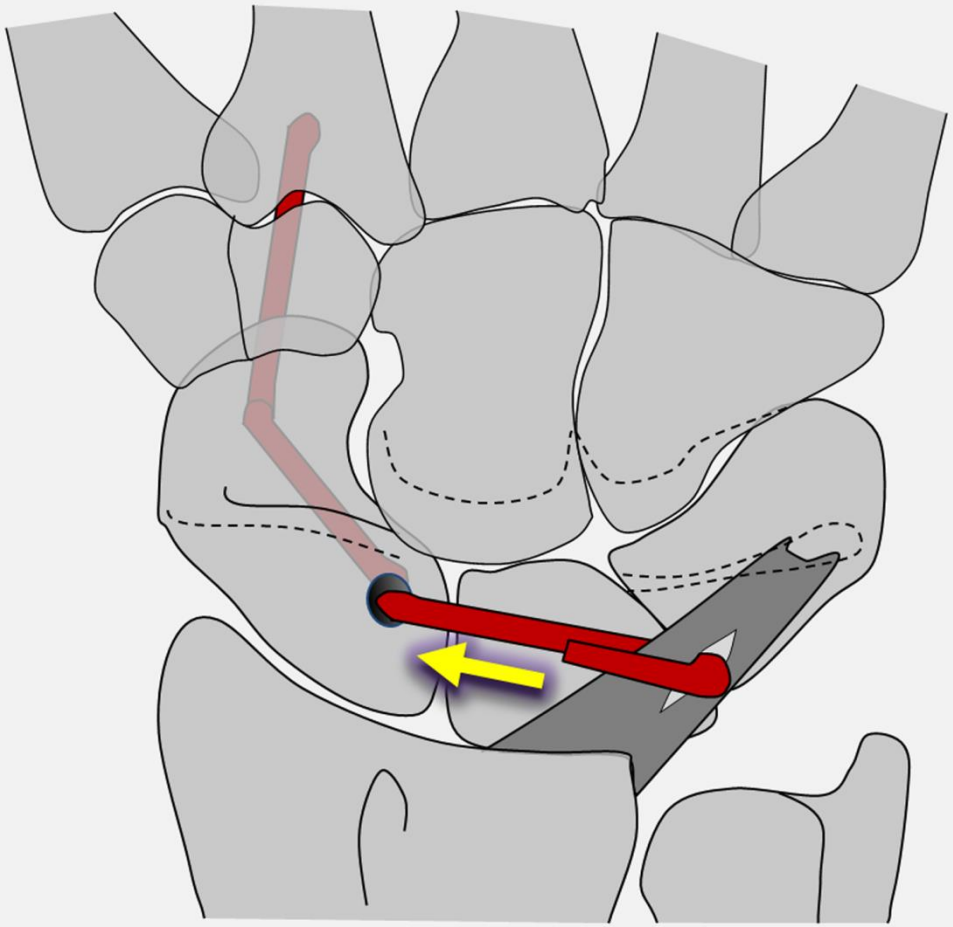
Institut
de la Main



Wrong Brunelli's !!

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

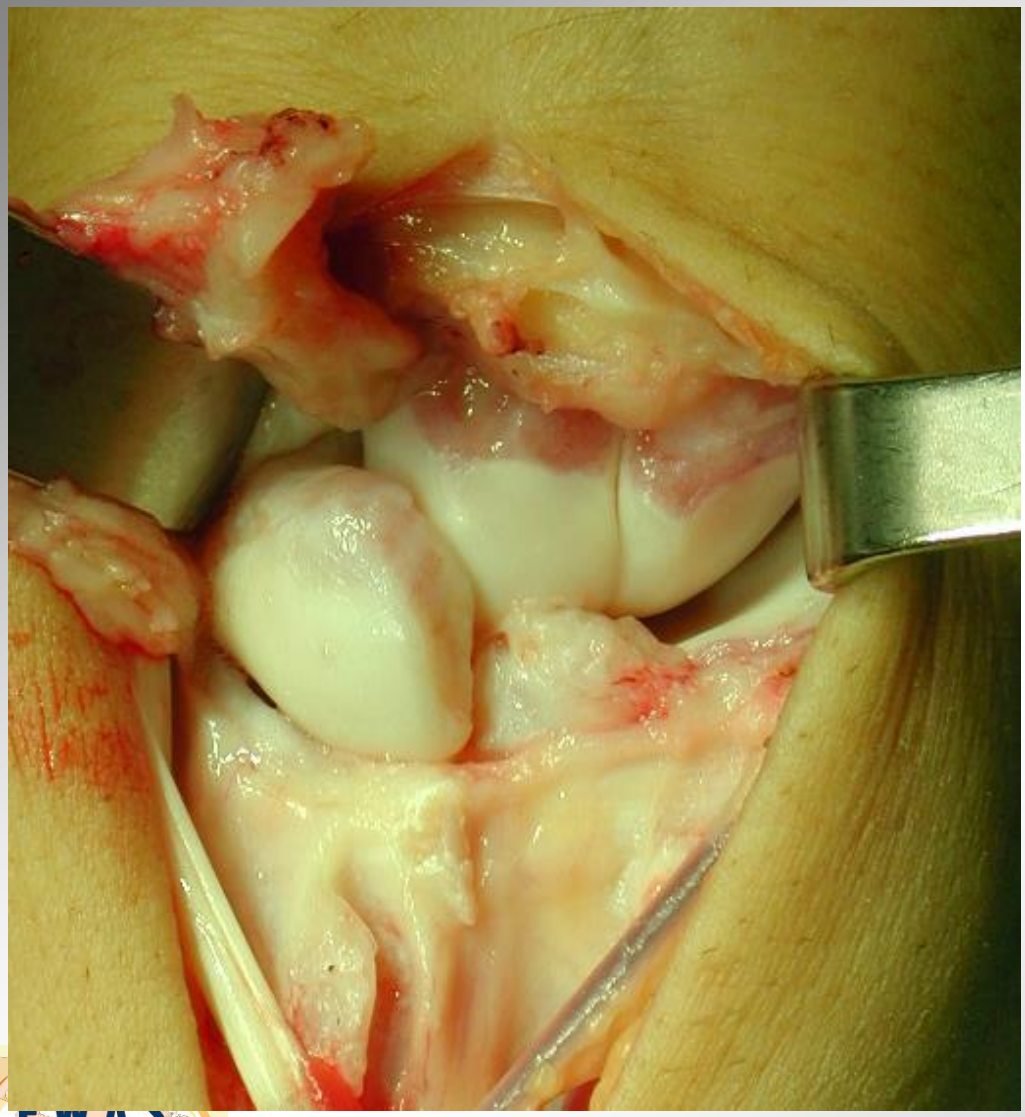


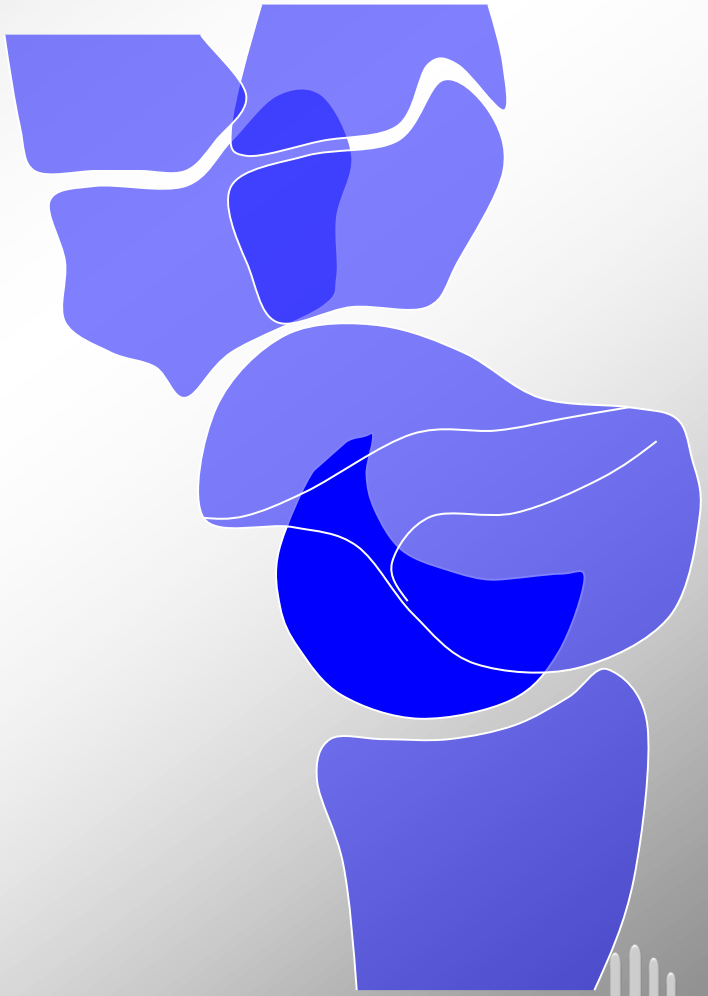
Three-ligament tenodesis
(Garcia-Elias et al., 2006) [27]

J Hand Surg Am. 2006; 31:125-34.

EWAS
European Wrist Arthroscopy Society

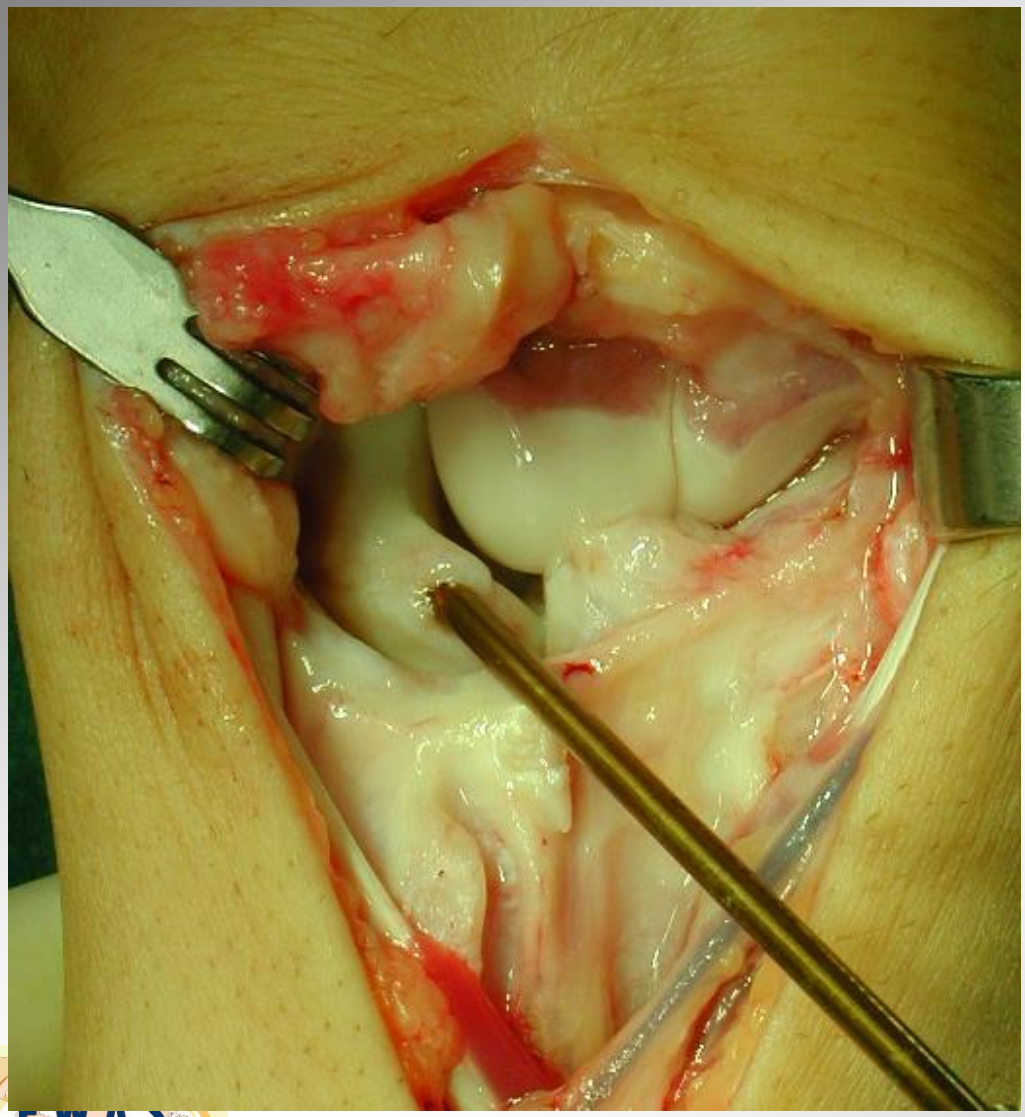
Institut
de la Main

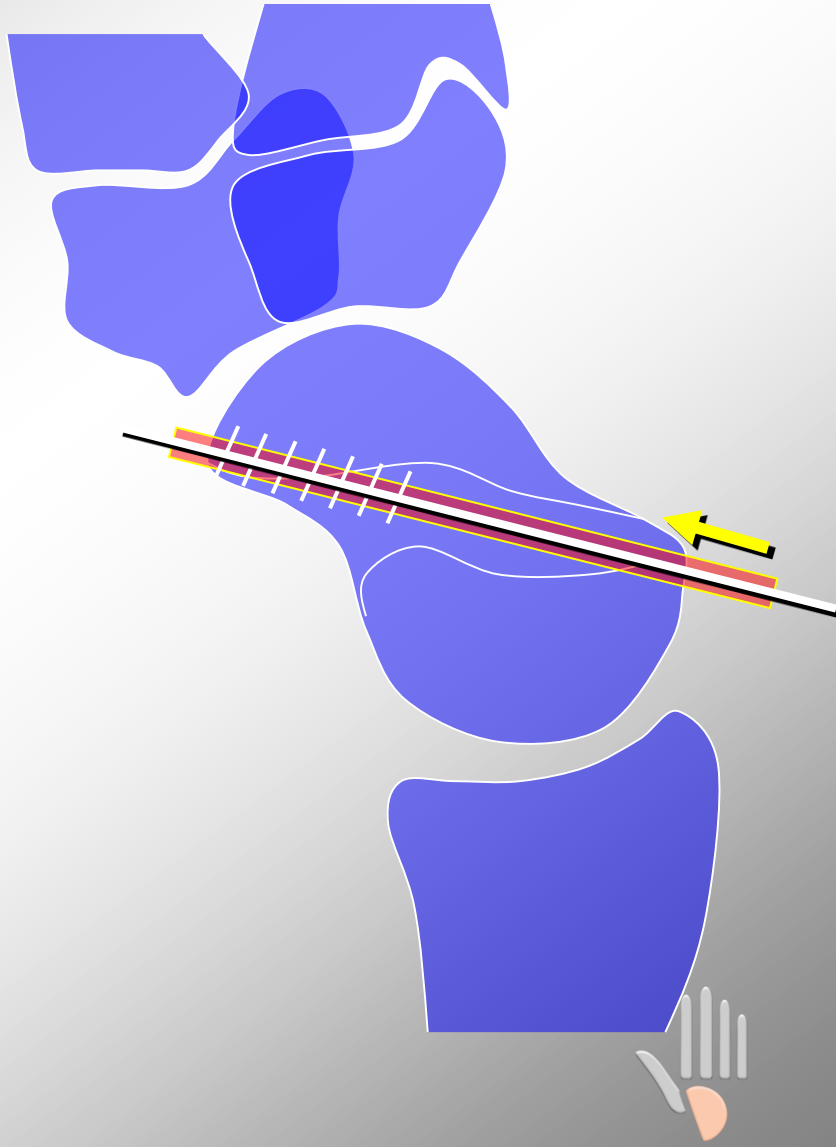




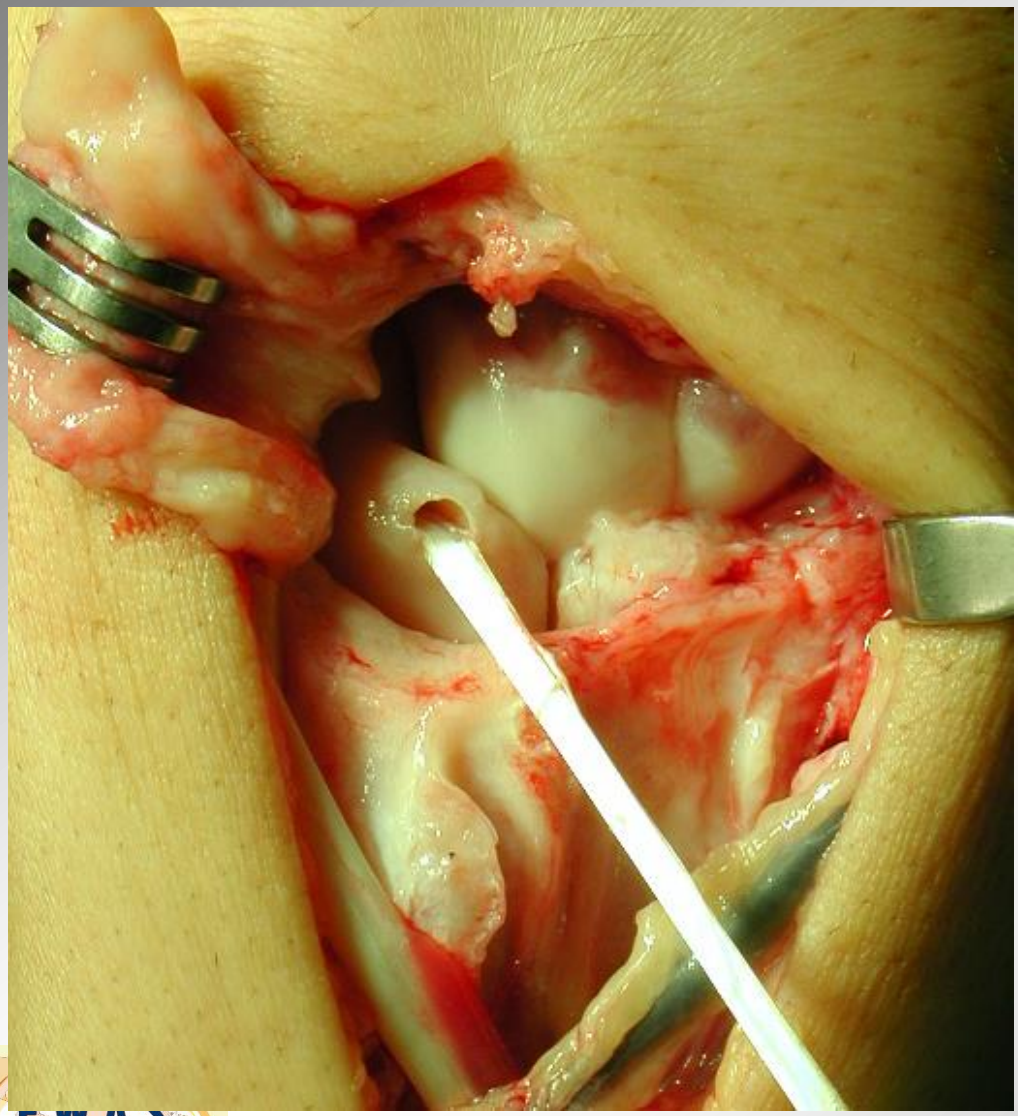
EWAS
European Wrist Arthroscopy Society

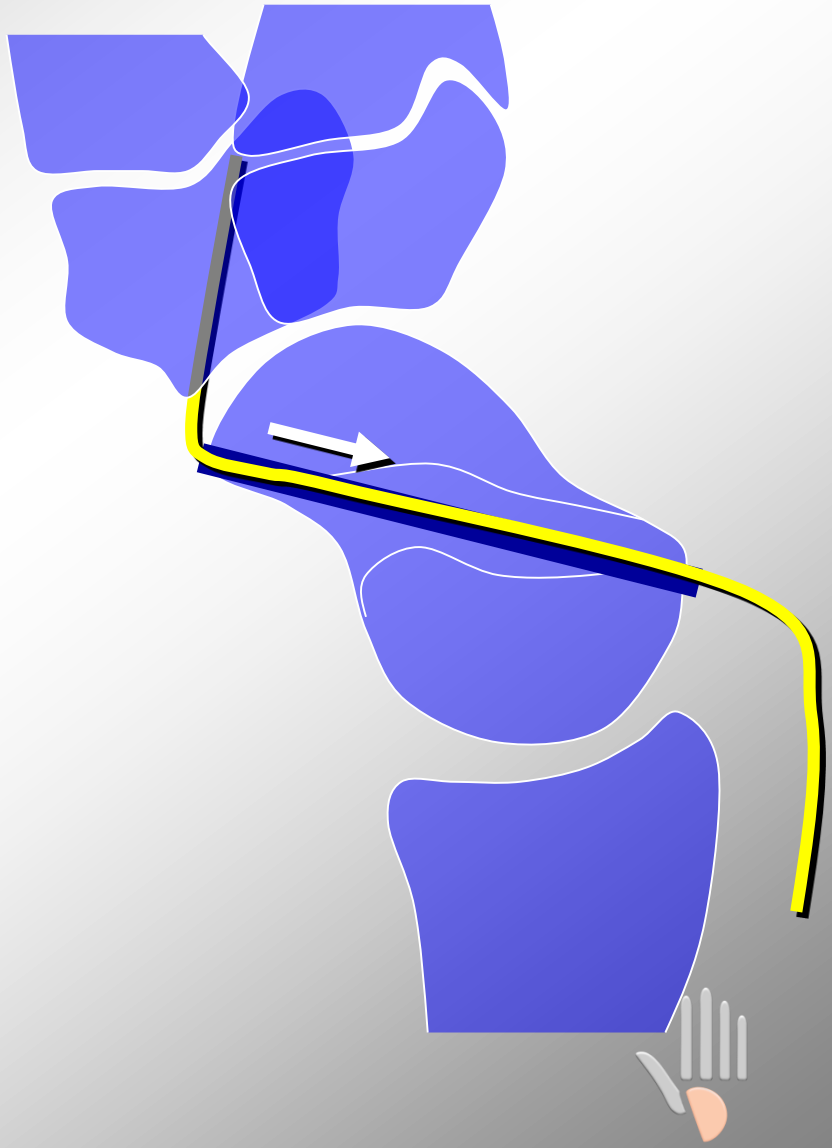
Institut
de la Main





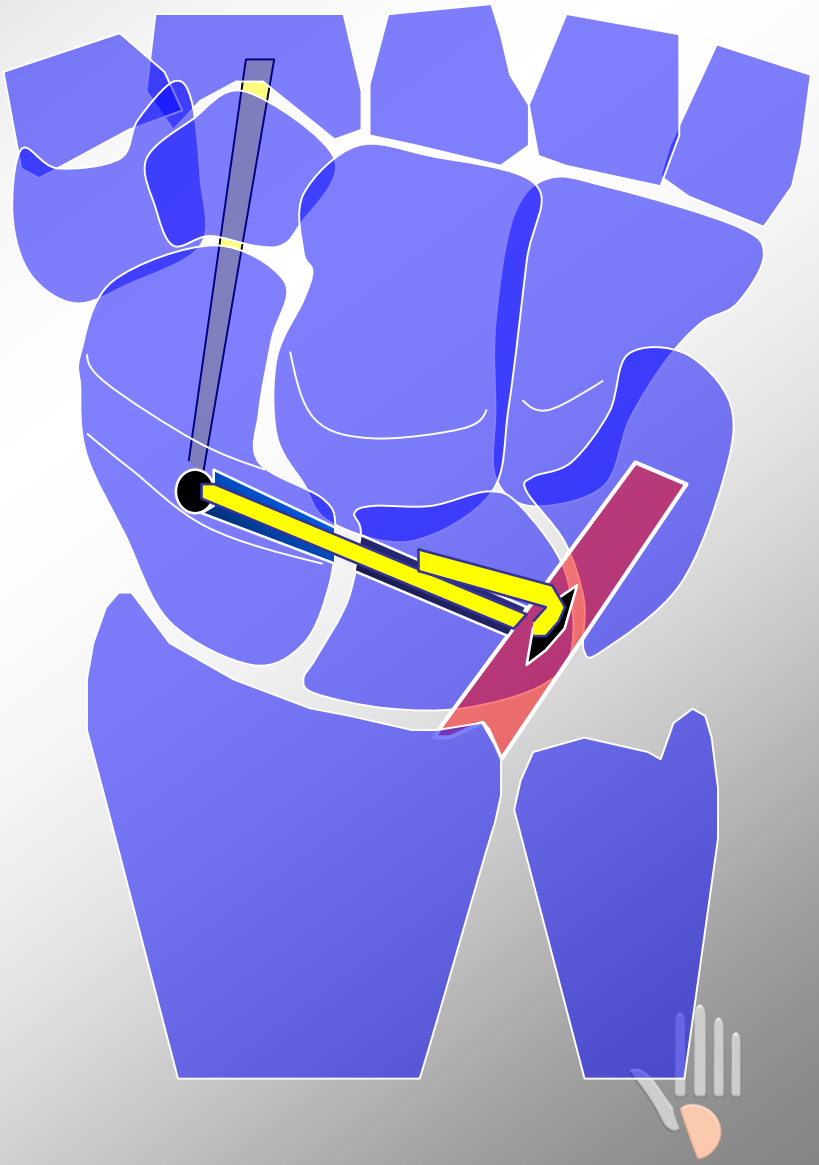
Institut
de la Main





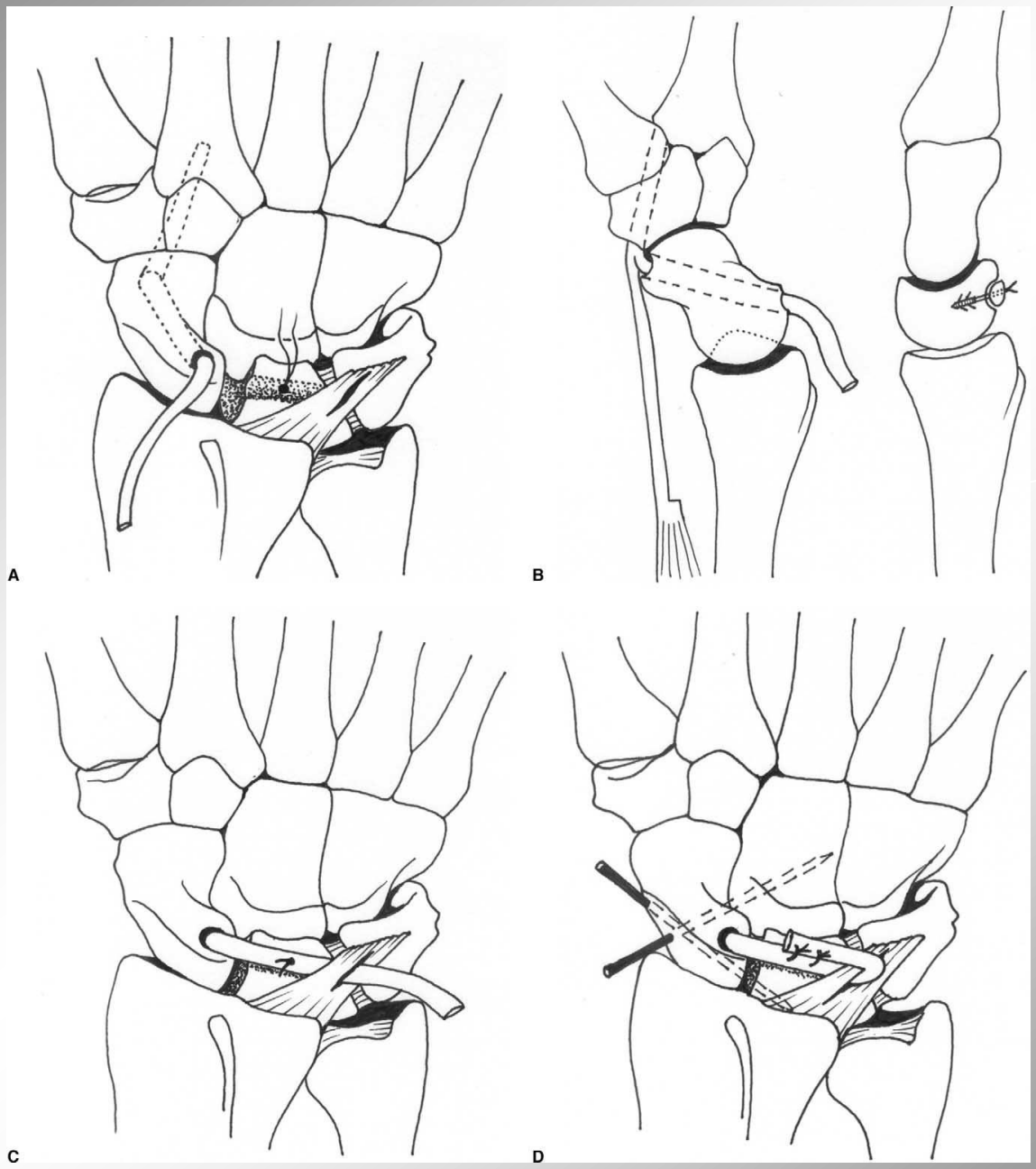
EWAS
European Wrist Arthroscopy Society

Institut
de la Main



EWAS
European Wrist Arthroscopy Society

Institut
de la Main



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

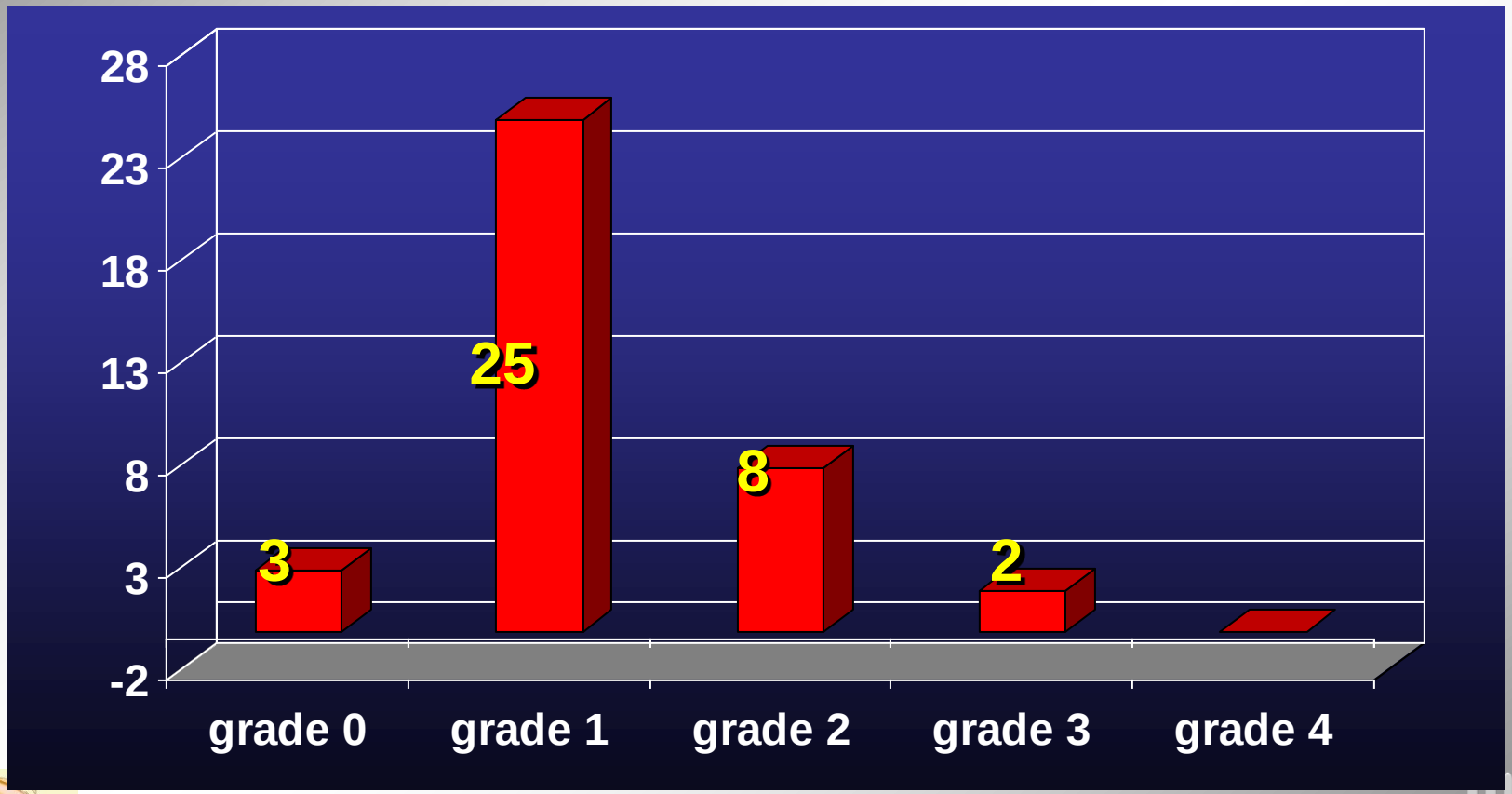
PAIN

Grade 1: occasional discomfort with heavy use

Grade 2: pain with heavy use and/or extremes of motion

Grade 3: pain with activities of daily living

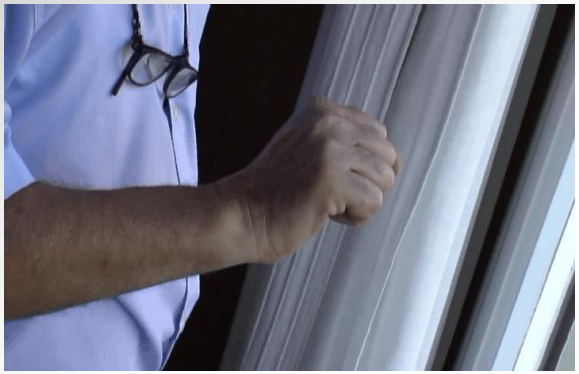
Grade 4: pain at rest



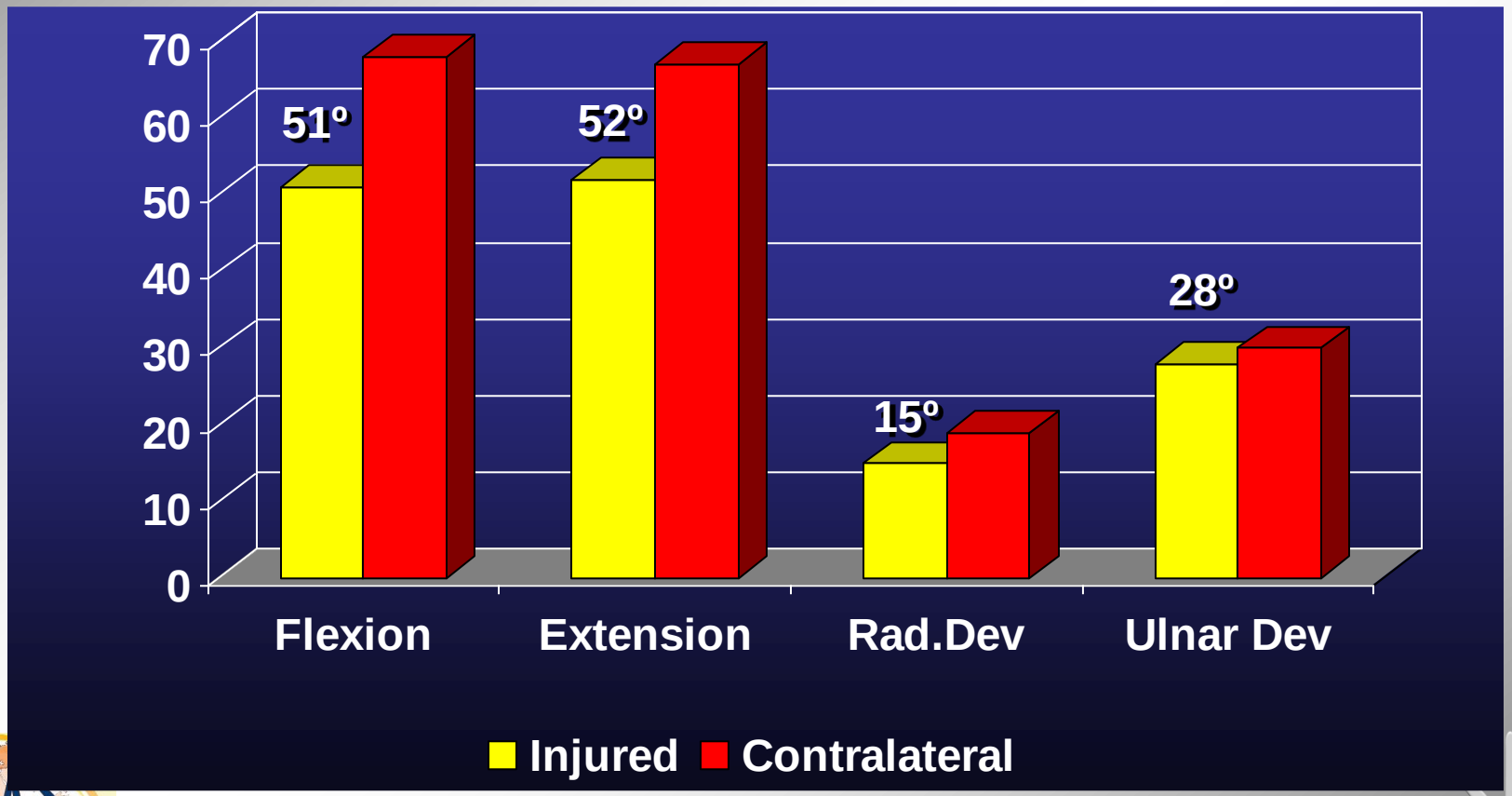
EWAS
European Wrist Arthroscopy Society

Institut de la Main

MOTION



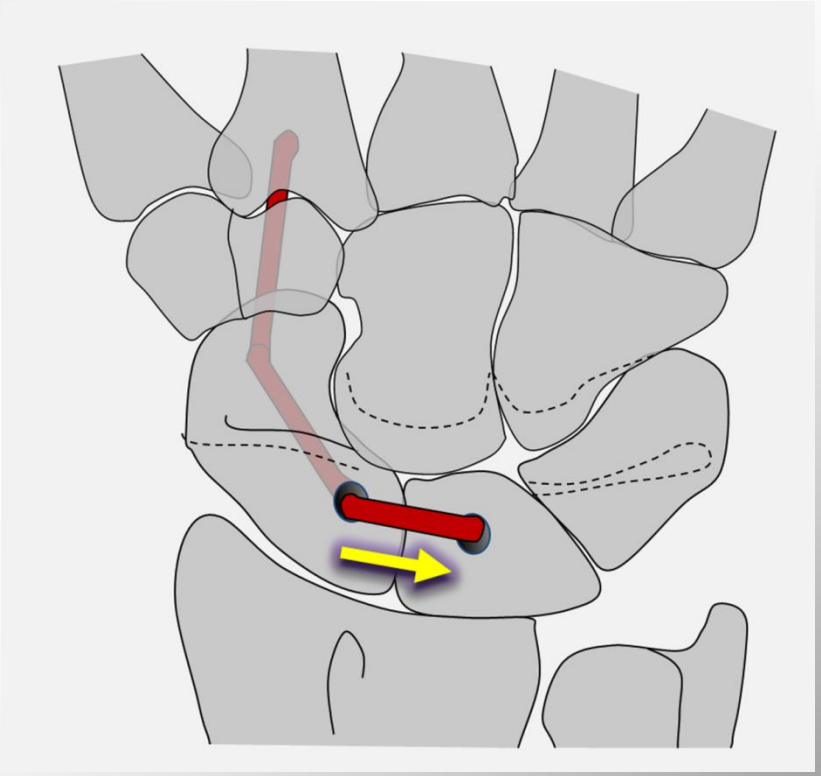
degrees



EWAS
European Wrist Arthroscopy Society

Institut de la Main

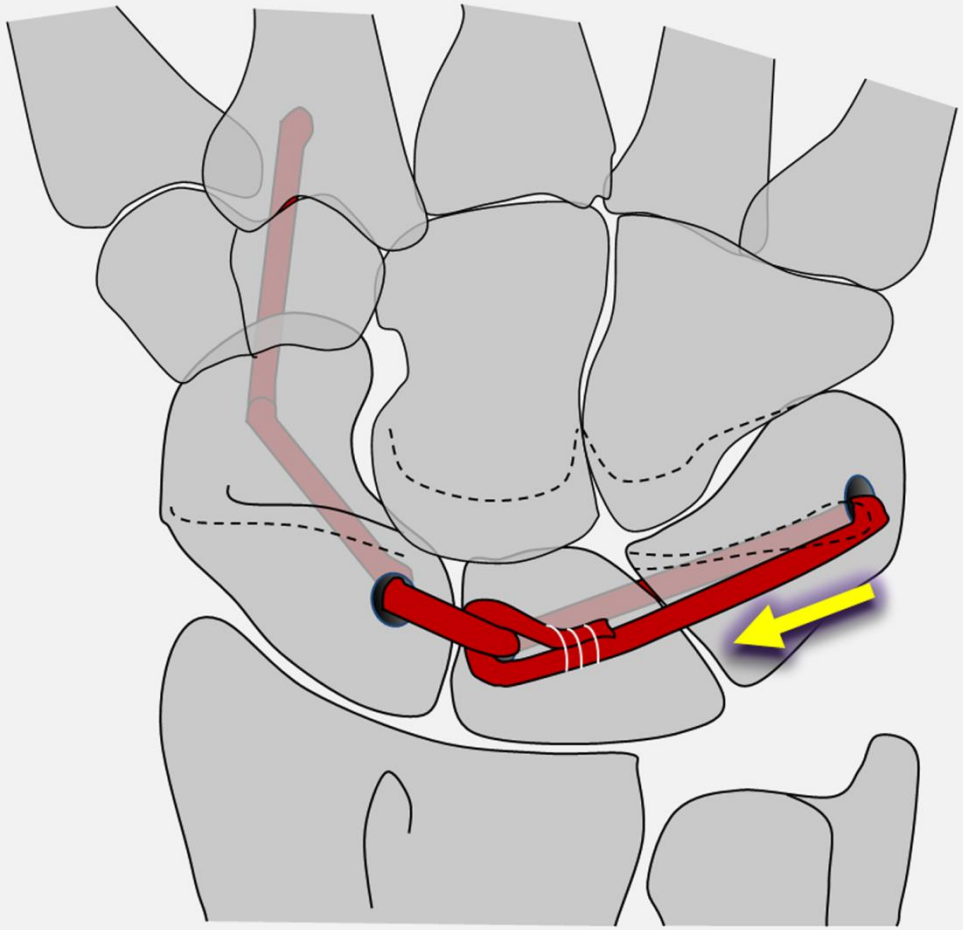
Other Alternatives



J Hand Surg Eur 2011;36:682-9

EWAS
European Wrist Arthroscopy Society

Institut de la Main



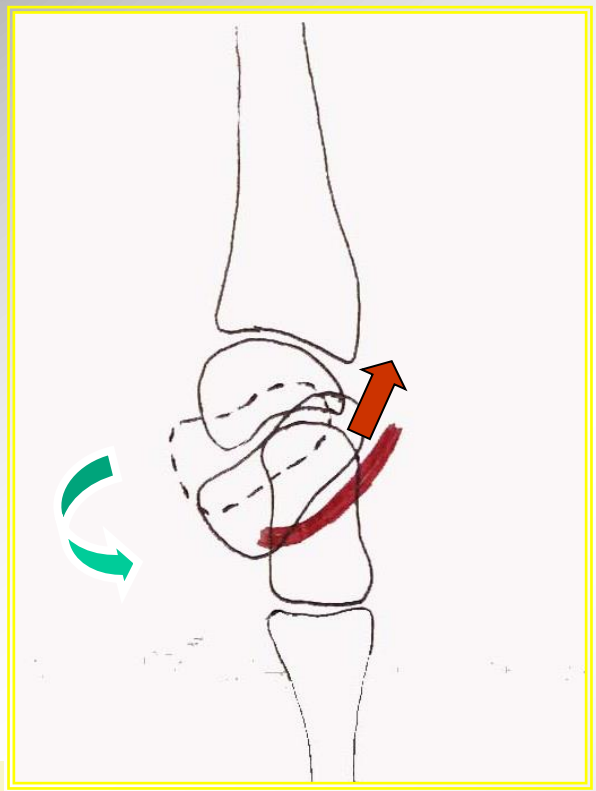
Scapho-luno-triquetral tenodesis
(Ross et al., 2014)[90]

EWAS
European Wrist Arthroscopy Society

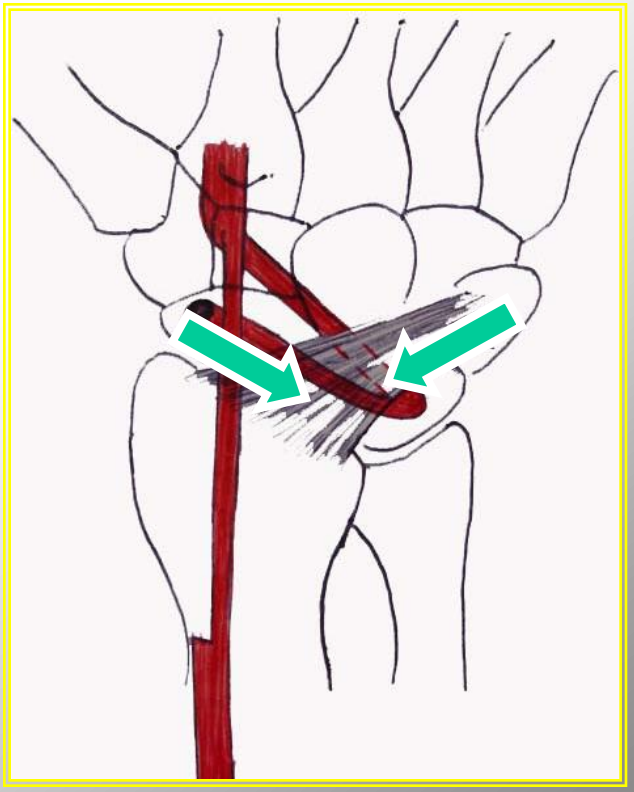
Institut
de la Main

Dorsal ECRB ligamentoplasty

Scaphoid verticalization



Reduction of SL gap

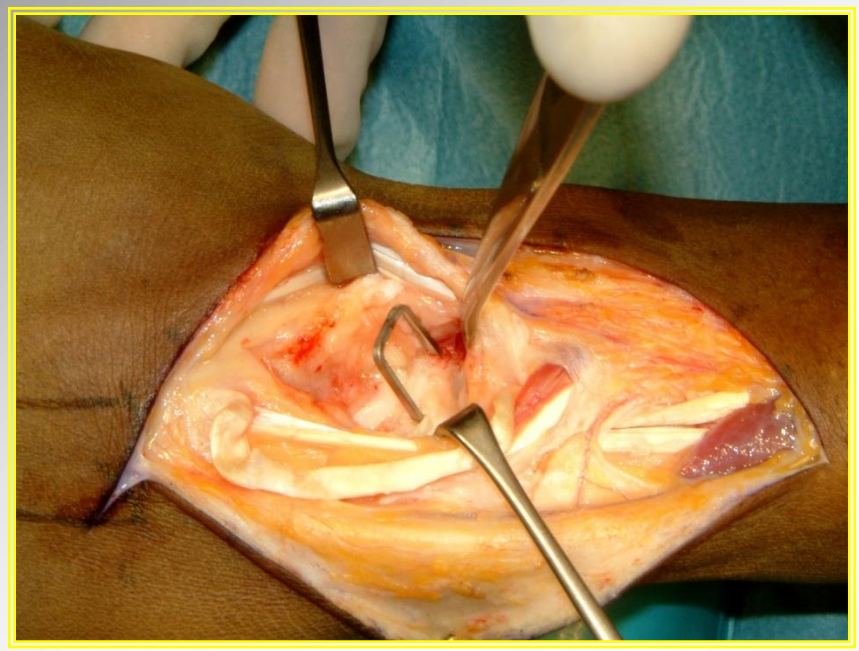


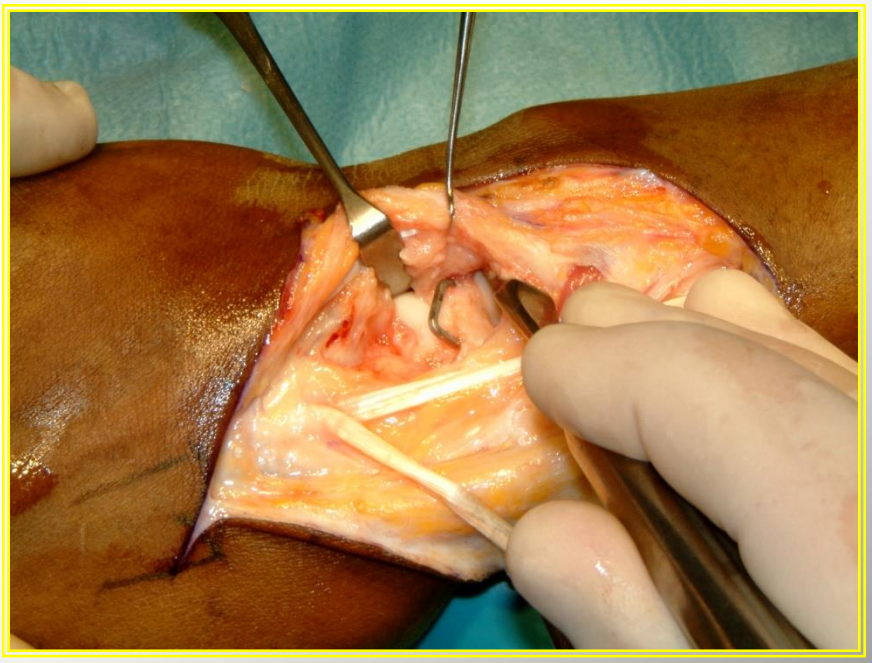
EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Technique

Stabilization of SL space



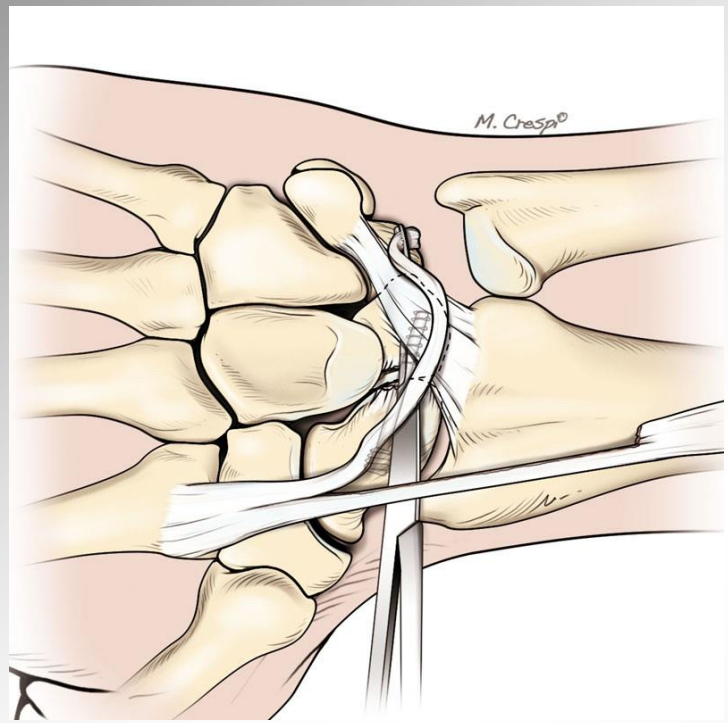


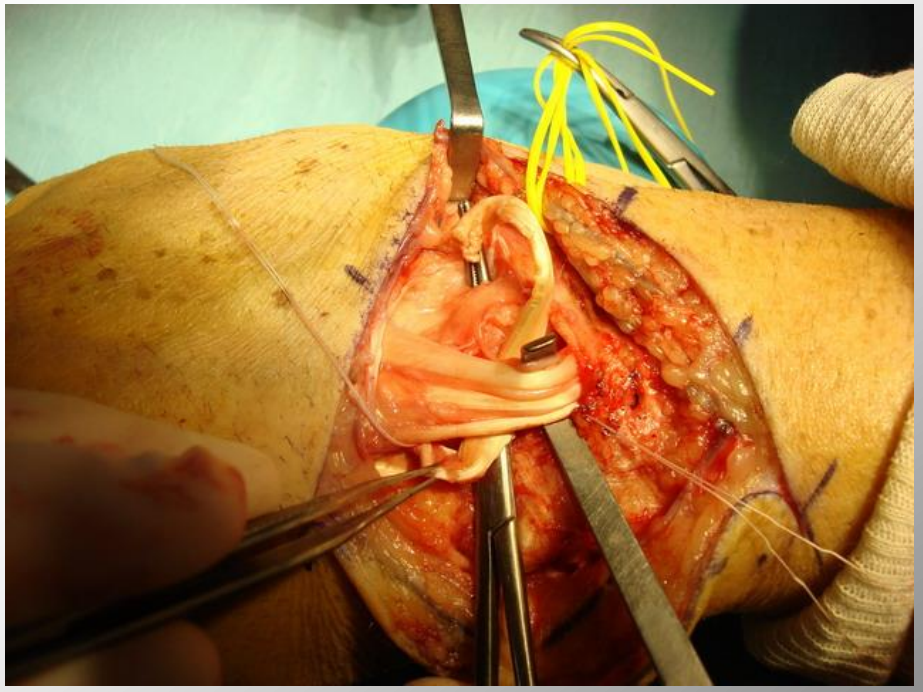
European Wrist Arthroscopy Society

Institut de la Main

Technique

Passing of hemi-strip around the DRC ligt



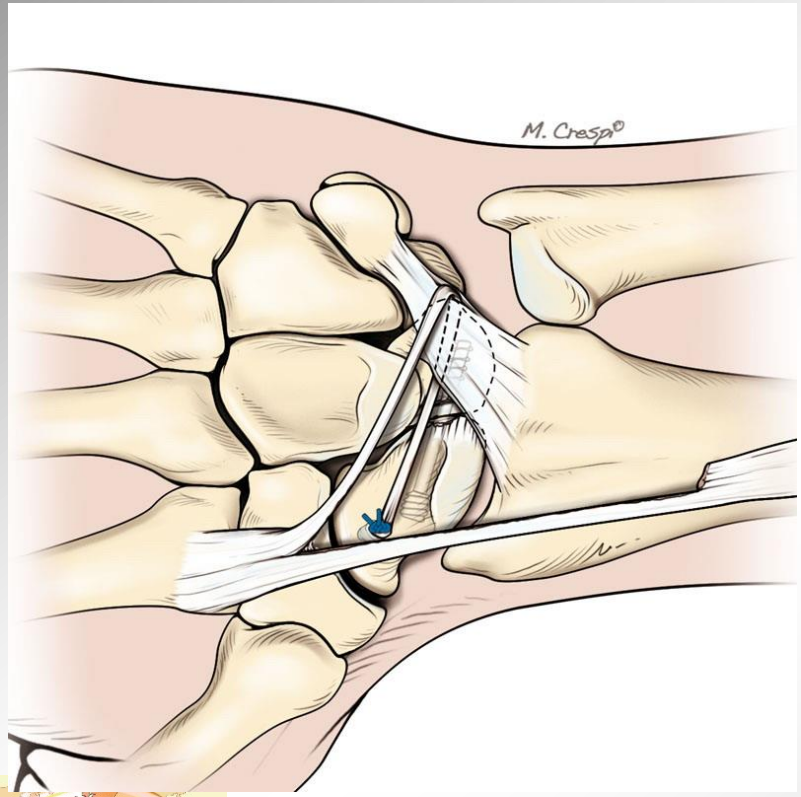


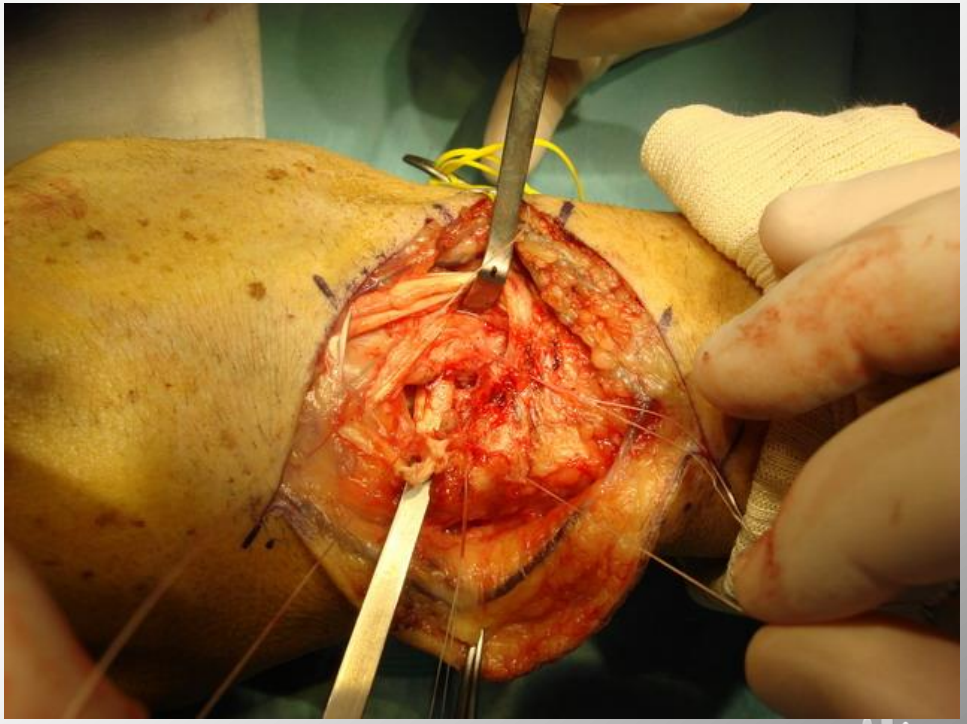
EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Technique

Passing of hemi-strip around the DRC +Fixation into the dorsal-distal scaphoid with an anchor



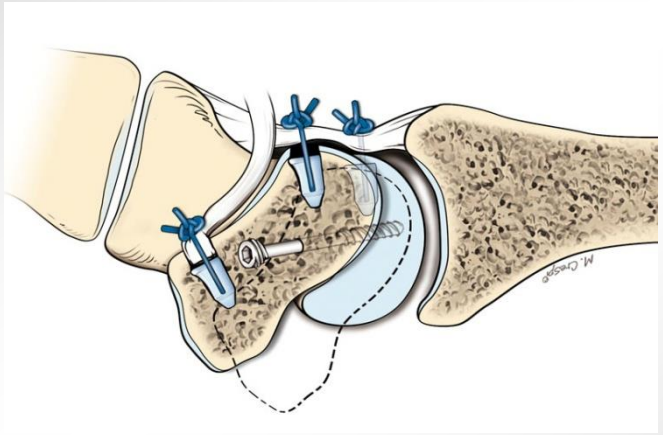


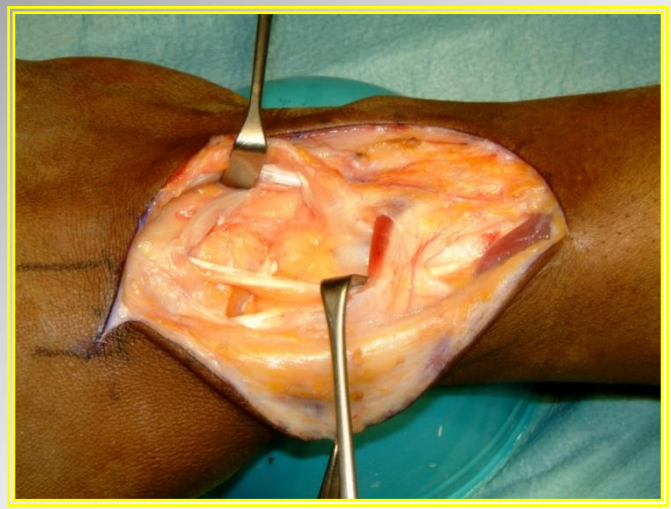
EWAS
European Wrist Arthroscopy Society

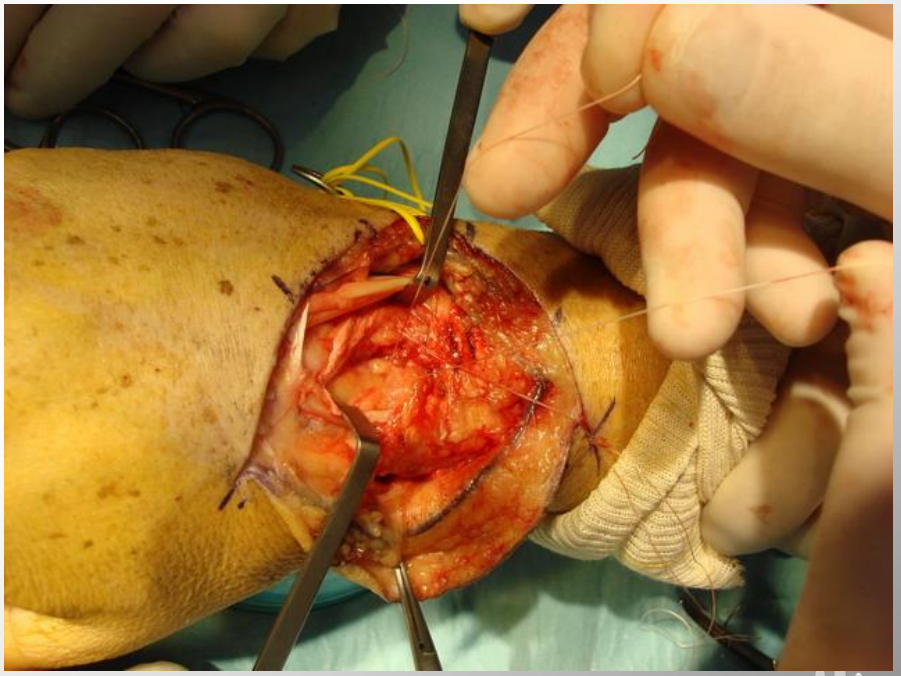
Institut
de la Main

Technique

Closing of capsule







- **Splint 6 weeks**
- **SL immobilization 6 months**

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Results

32 patients

Average follow-up : 50 months (Range 27 to 67)

- Pain :
  No pain in 12 cases
  Pain in 20 cases, severe in 9 cases (28%!!)

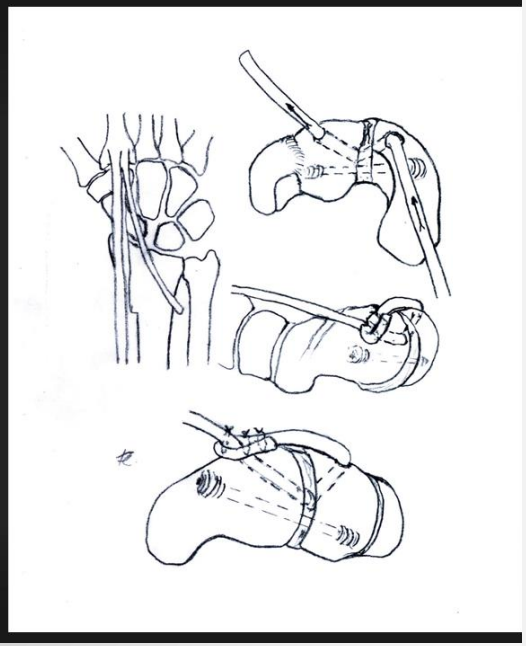
- ROM :
  70° extension, **32° flexion!!**
  normal pronation-supination

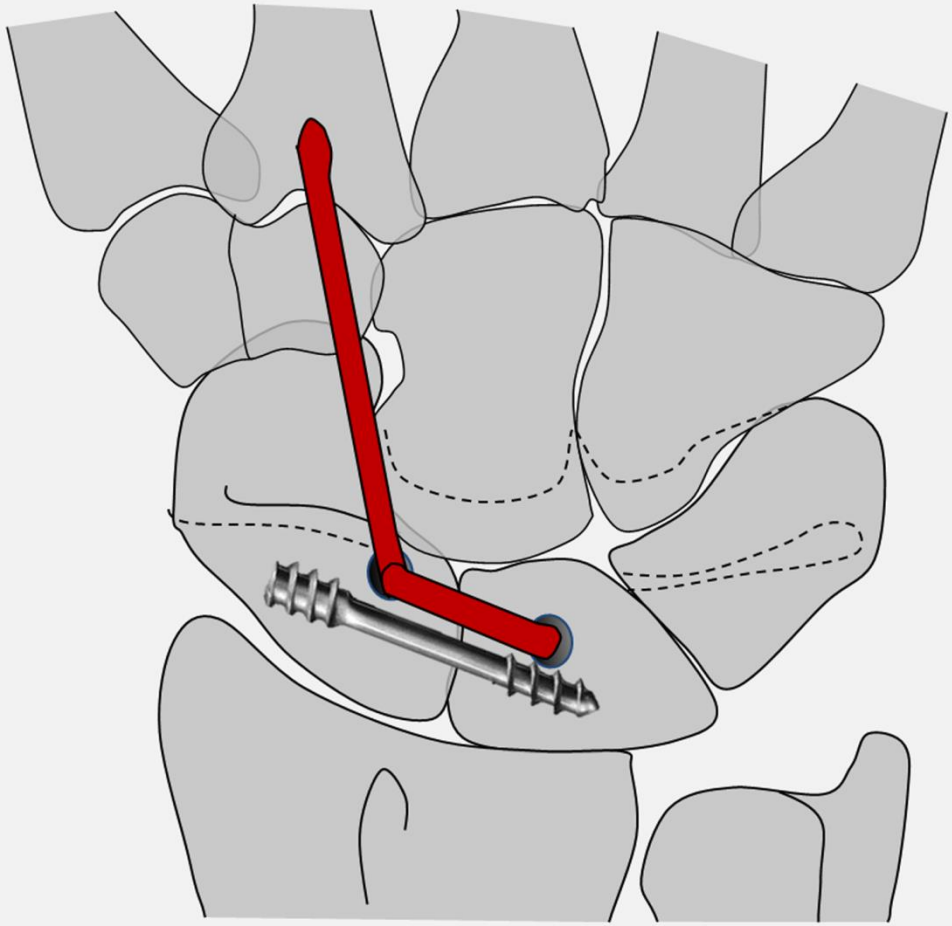
- Strength : 86% comparative to the opposite side

EWAS
European Wrist Arthroscopy Society

« ECRB tenodesis and dorsal capsulodesis for the treatment of chronic post-traumatic scapholunate instability»E. PAPADOGEORGEOU, Ch. MATHOULIN
Chirurgie de la main, 2003, 29; 2 : 172-79

Institut de la Main



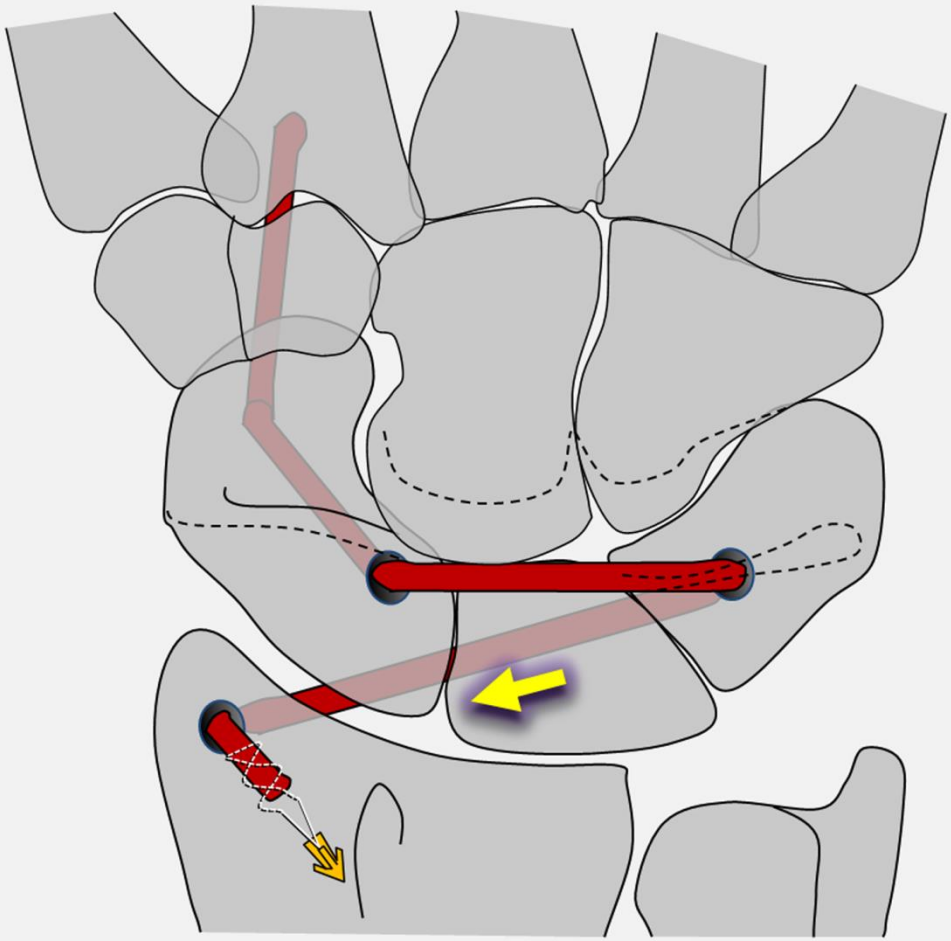


ECRL ligamentoplasty + RASL
(Fernandez DL, 2014)

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

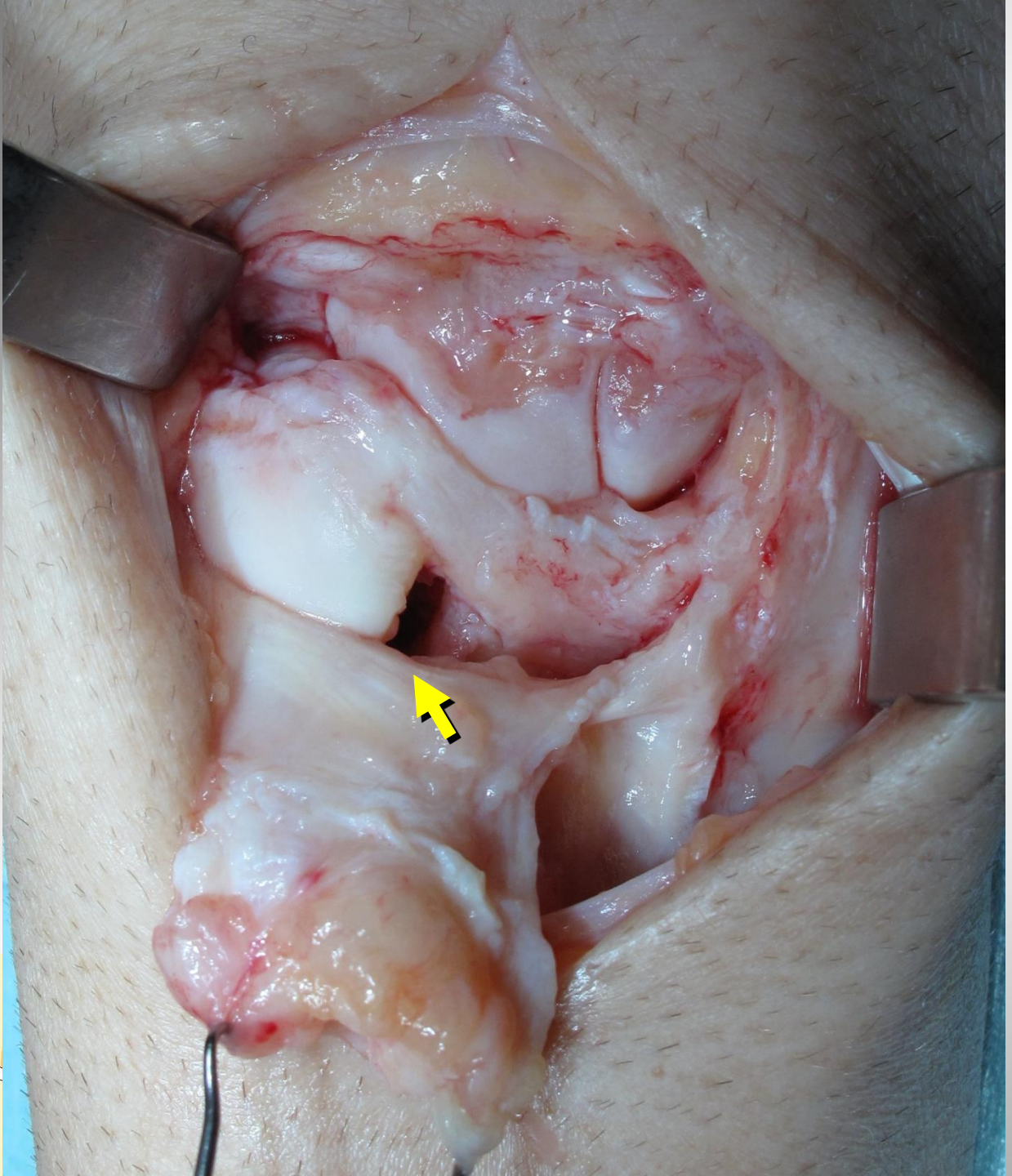
Dr. Andrew Chin

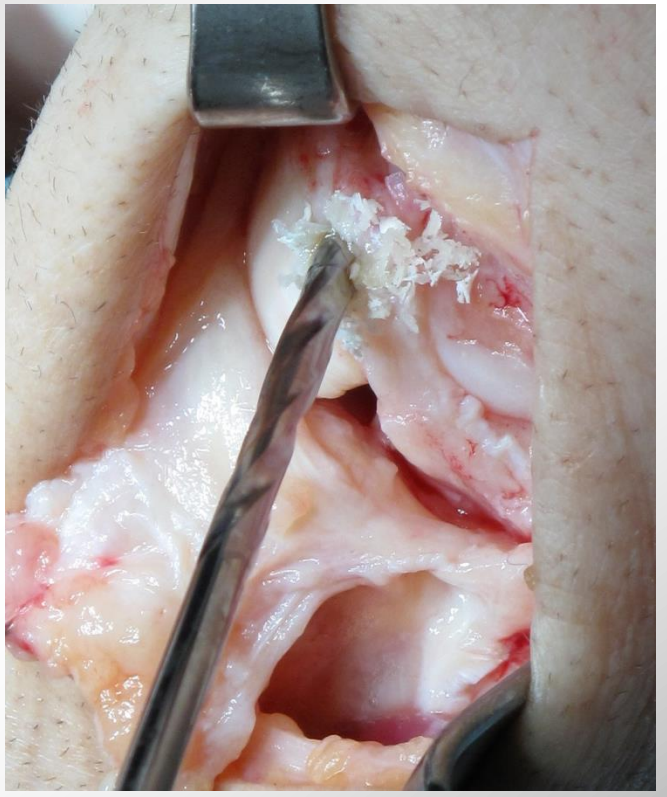


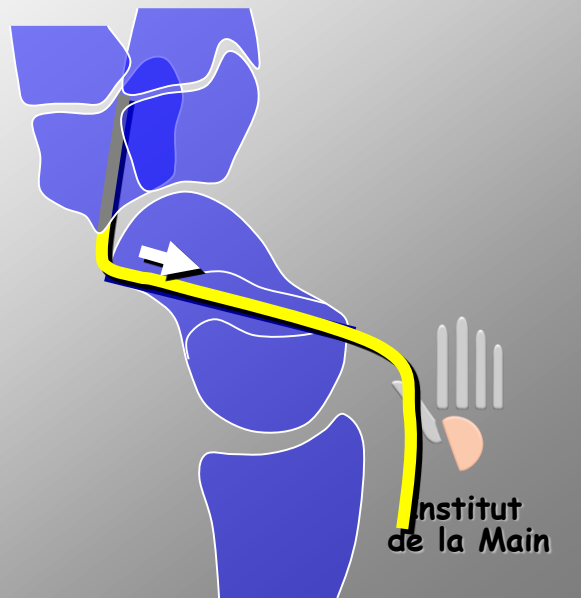
Antipronation spiral tenodesis
(Chee et al., 2012)[13]

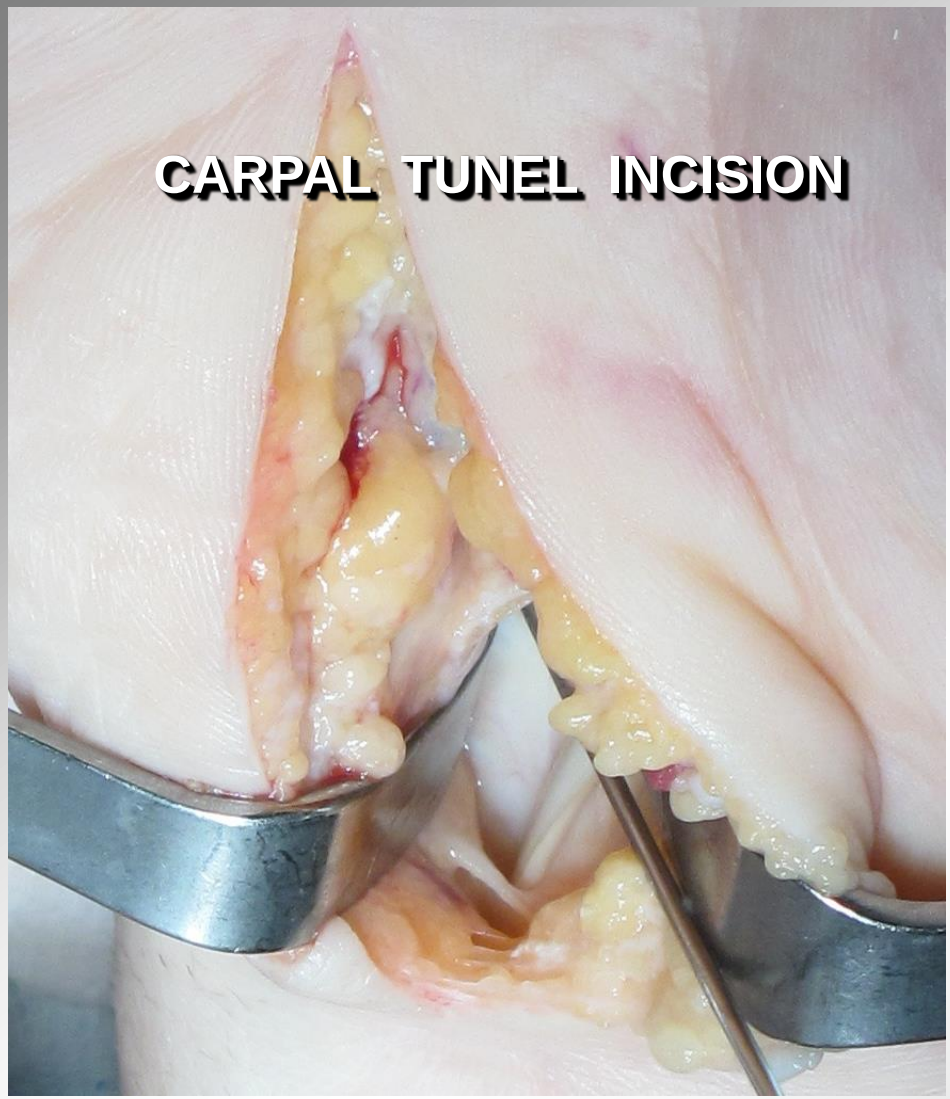
EWAS
European Wrist Arthroscopy Society

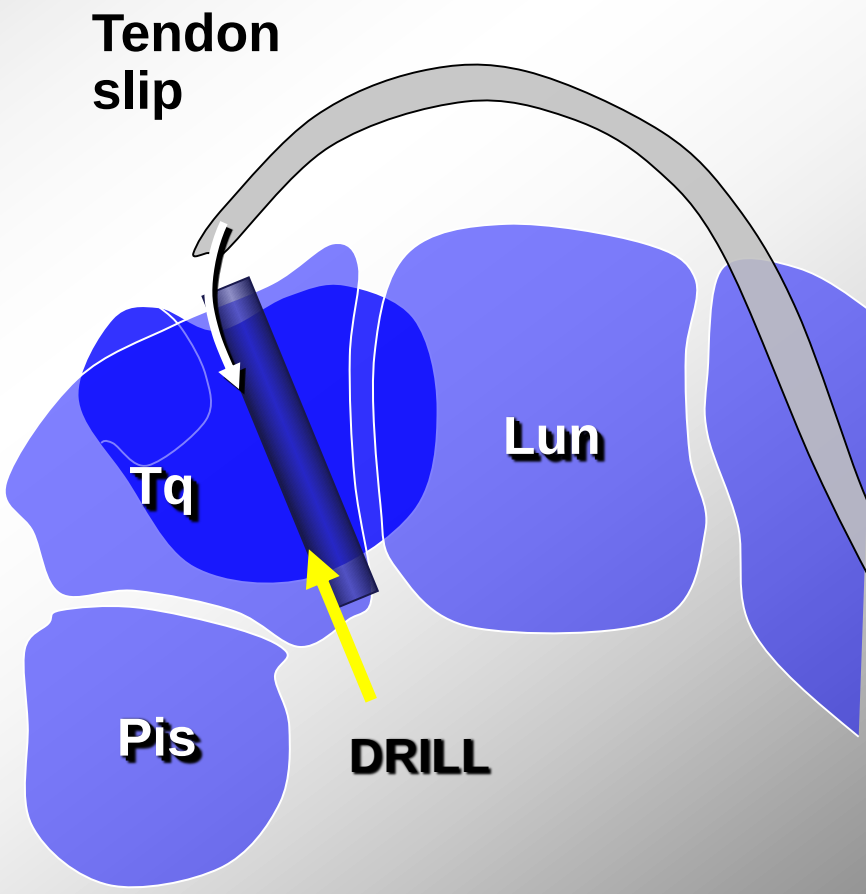
Institut
de la Main






Institut
de la Main



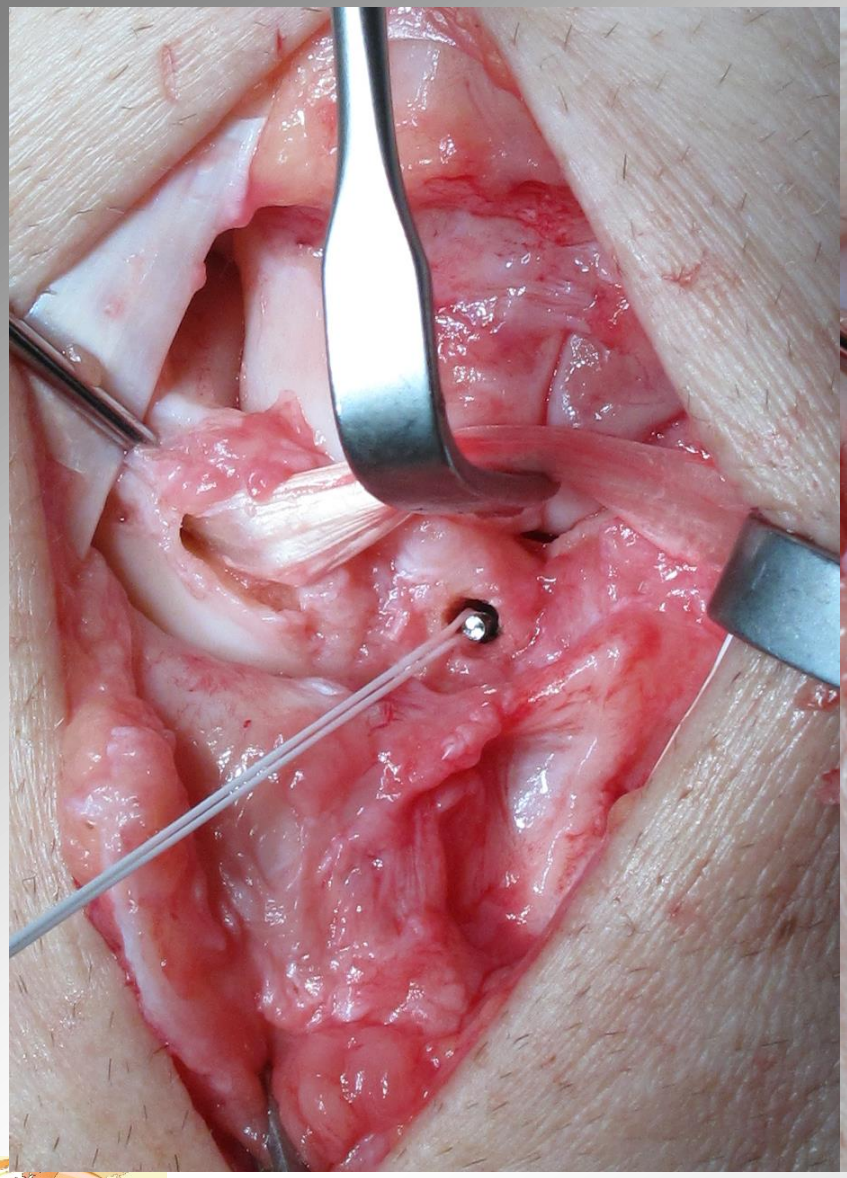


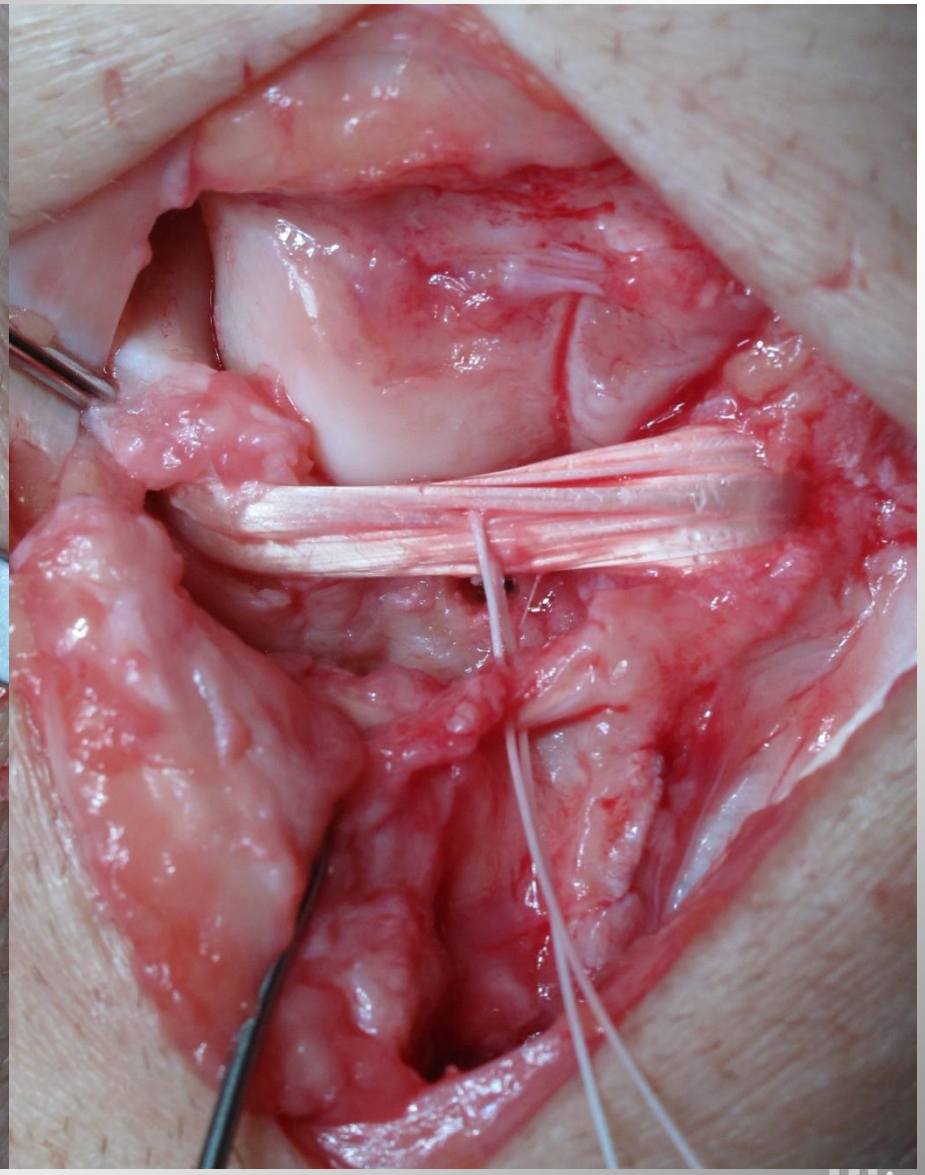
EWAS
European Wrist Arthroscopy Society

Institut de la Main

EWAS
European Wrist Arthroscopy Society

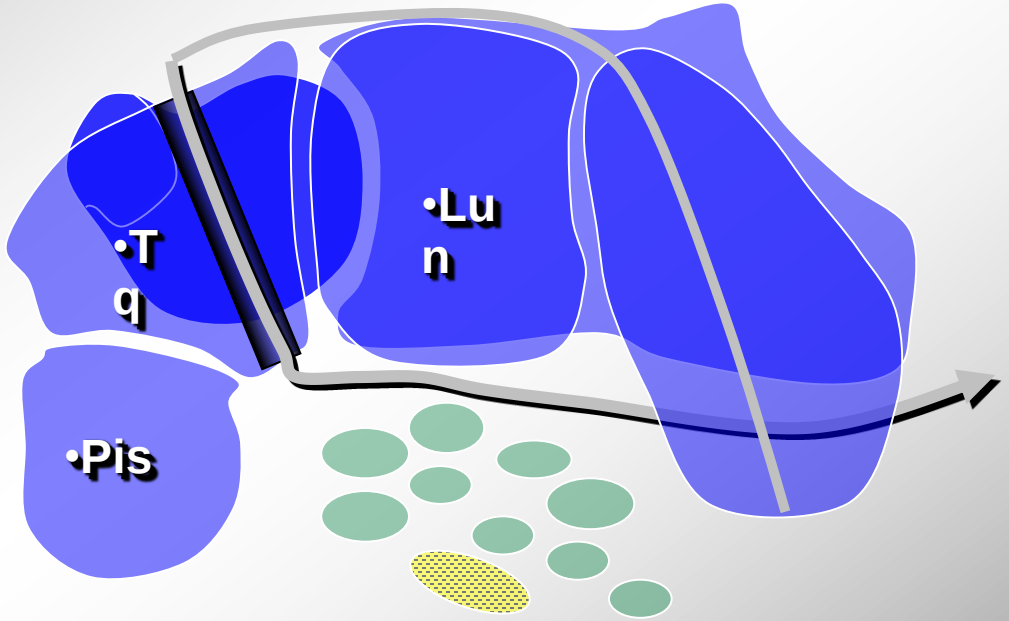
Institut
de la Main





EWAS
European Wrist Arthroscopy Society

Institut
de la Main

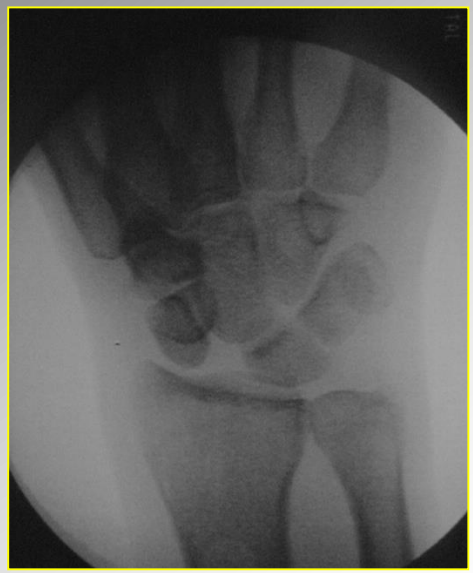


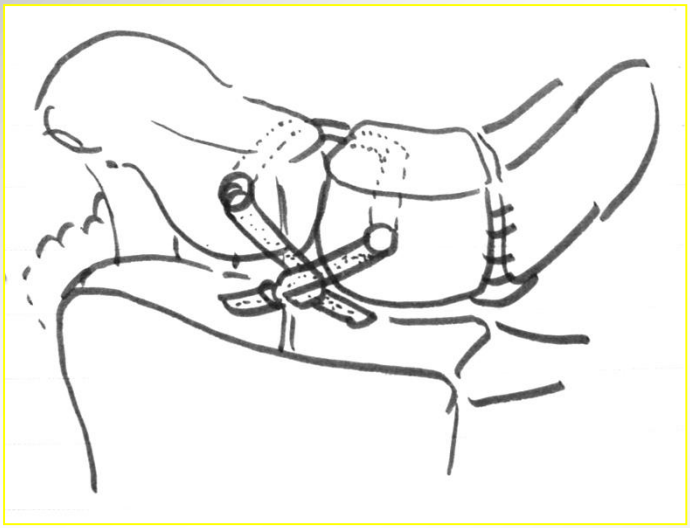
Tendon slip is passed deep to the flexor digitorum, adjacent to the radiocarpal capsule, aiming at the tip of the radial styloid

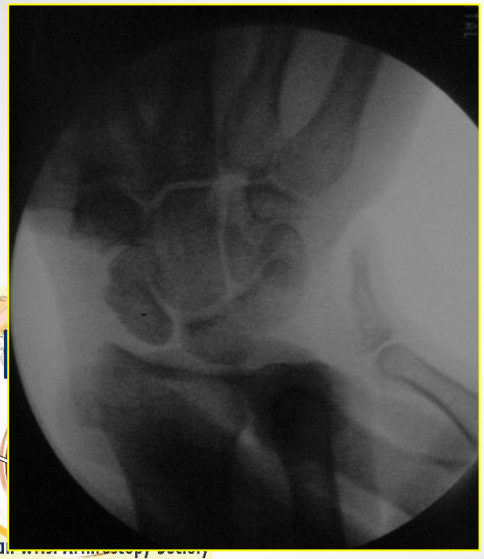
EWAS
European Wrist Arthroscopy Society

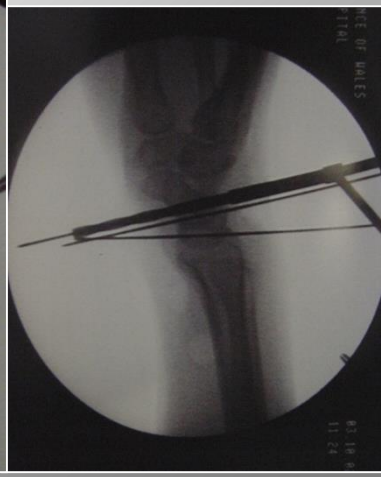
Institut
de la Main

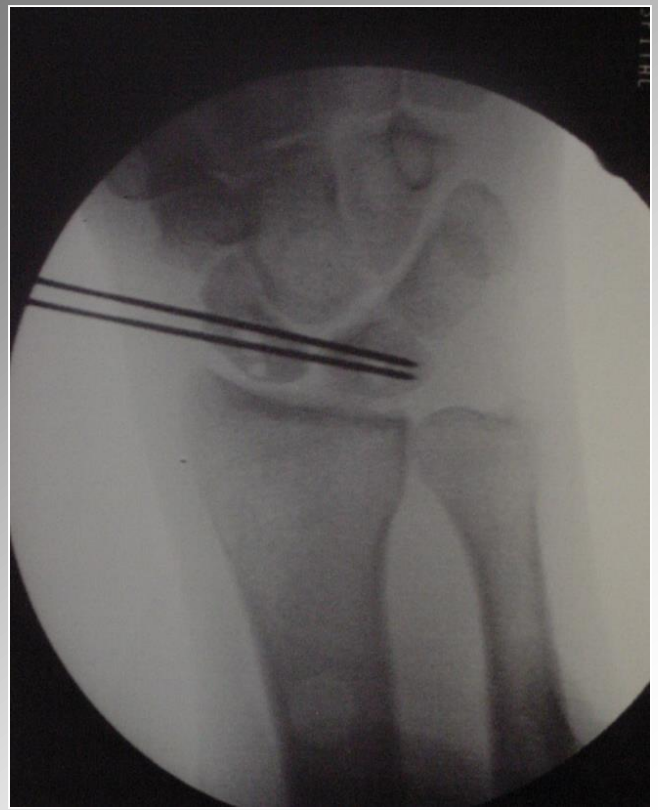
Arthroscopic Assisted SL Ligament Reconstruction with Tendon Graft For Chronic SL Dissociation
Pc Ho 2008

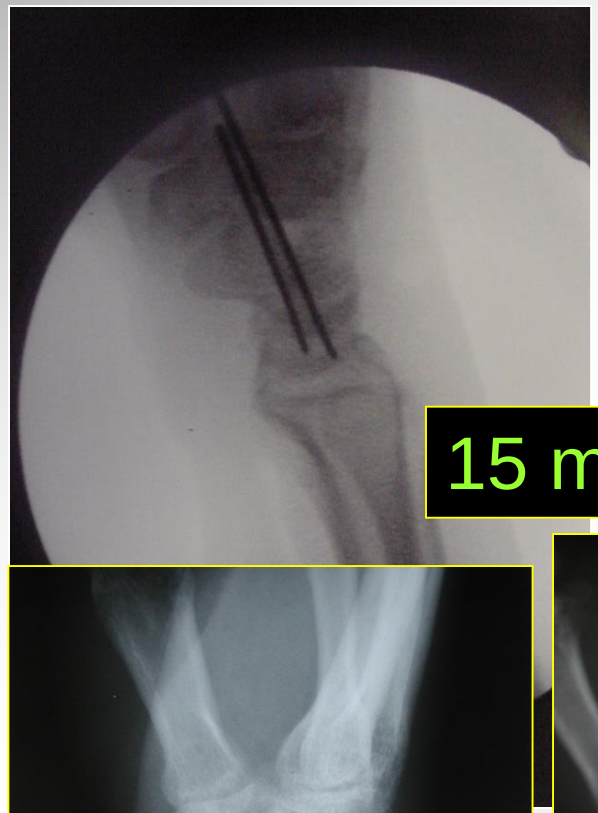




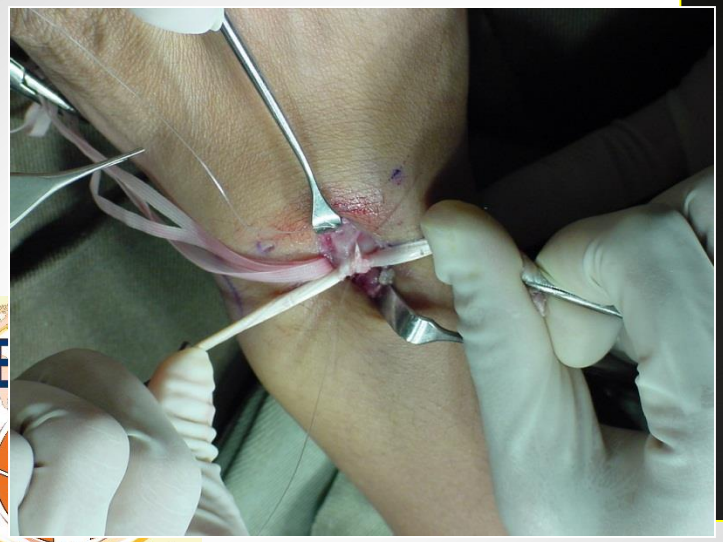








15 months PO



European Wrist Arthroscopy Society

Marc Garcia-Elias:
« If the « 3LT» technique was so great, there wouldn't be so many modifications published !! »

The role of three-ligament tenodesis in the treatment of chronic scapholunate instability

N. Pauchard, A. Dederichs, J. Segret, S. Barbary, F. Dap, and G. Dautel

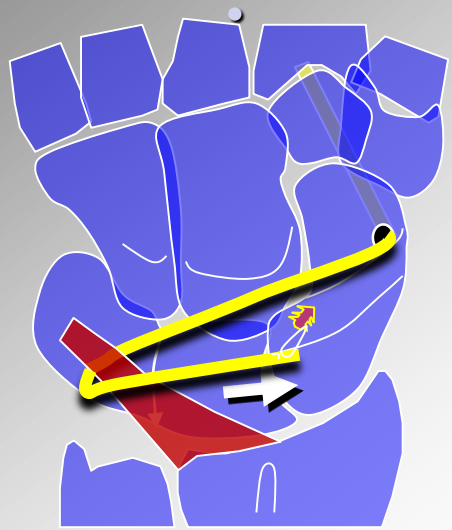
J Hand Surg Eur. 2013;38:758-66

" This study challenges the long-term benefit of three-ligament tenodesis in both dynamic and static chronic scapholunate instability"

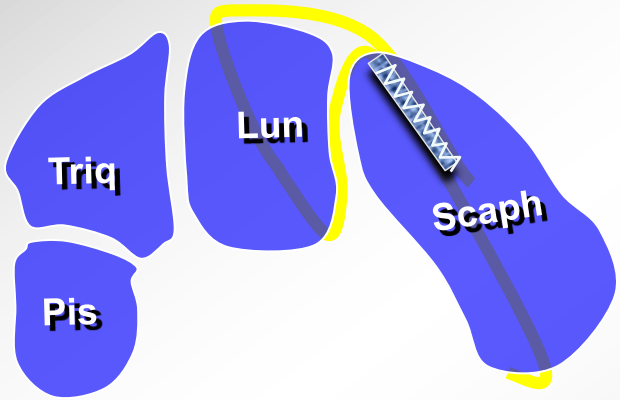
EWAS
European Wrist Arthroscopy Society

Institut de la Main

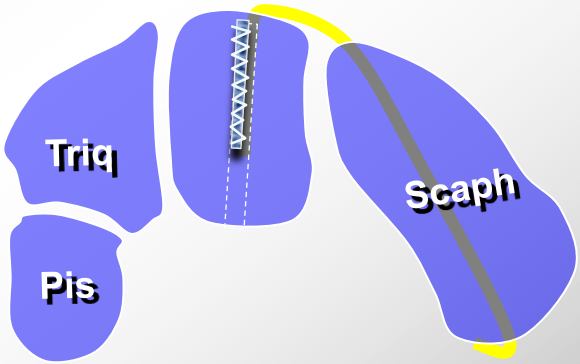
Marc Garcia-Elias:
« If the « 3LT» technique was so great, there wouldn't be so many modifications published !! »



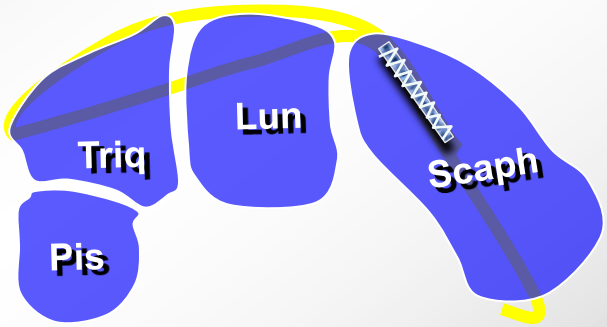
Howlett 2008



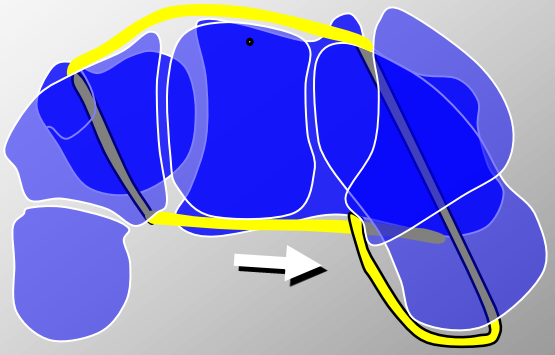
Schweizer 2010



Corella 2011



Ross 2013



Chee 2012

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Marc Garcia-Elias:
« If the « 3LT» technique was so great, there wouldn't be so many modifications published !! »

The 3LT technique should not be used…

1) when the subluxation cannot be easily reduced

2) when the lunate is unstable (ulnar translocation)

3) when cartilage is not normal

4) when the patient is a heavy manual worker

5) when the surgeon is not used to this technique

6) when ……

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Where are we going ?

- ✓ **Is it reasonable to believe that this tendon will ever become a normal ligament ?**
- ✓ **Will it ever contain mechanoreceptors ?**
- ✓ **Will it be able to resist the amount of tensions and torques involved in this joint ?**

EWAS
European Wrist Arthroscopy Society

Institut de la Main

“ If you don’t know where you are going, you’ll probably end up somewhere else ”

L.P. (Yogi) Berra

EWAS
European Wrist Arthroscopy Society

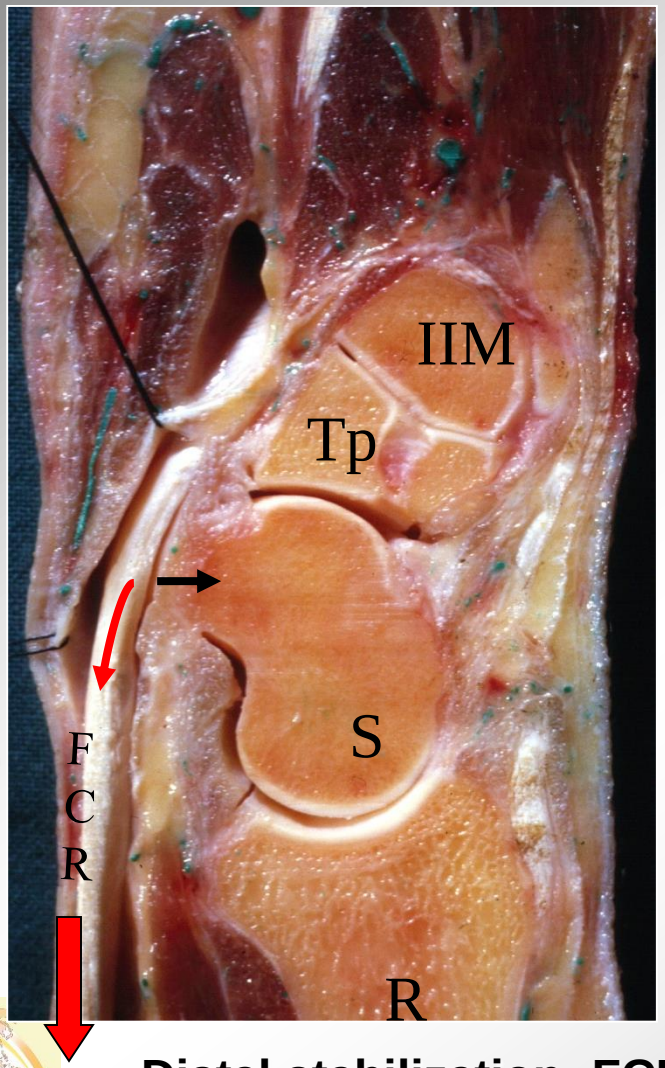
Institut de la Main

PERIOD 3
« The Anatomists »

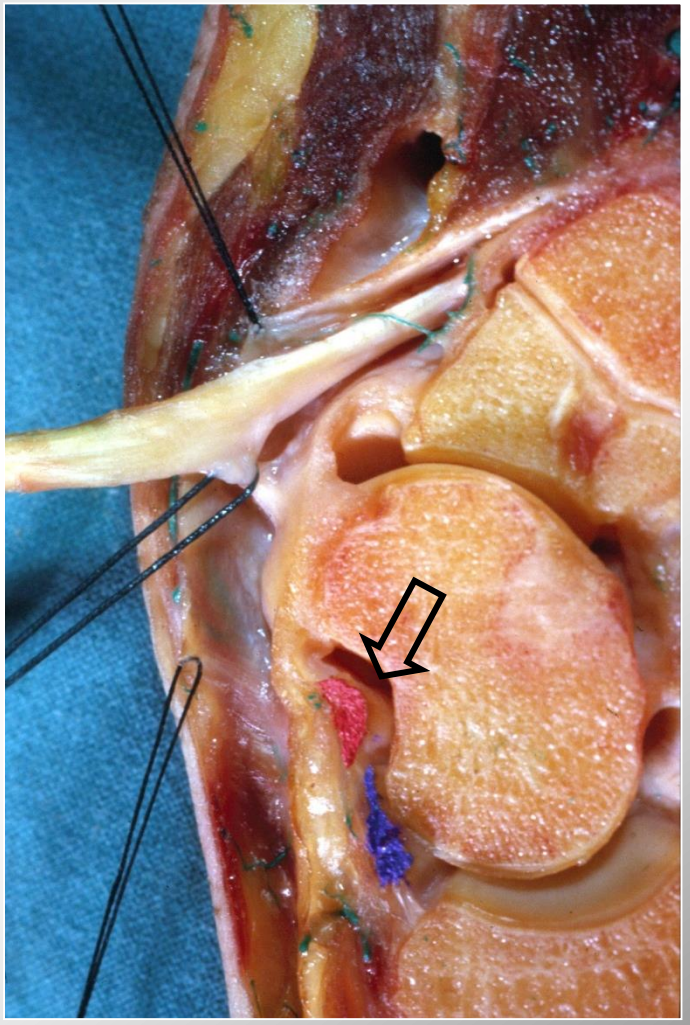
EWAS
European Wrist Arthroscopy Society

Institut
de la Main

ANATOMY



(Pagliei (I))



Distal stabilization: FCR + STT Ligt + RSC Ligt

Importance of FCR
(Salva-Coll, Garcia-Elias et al, 2011)

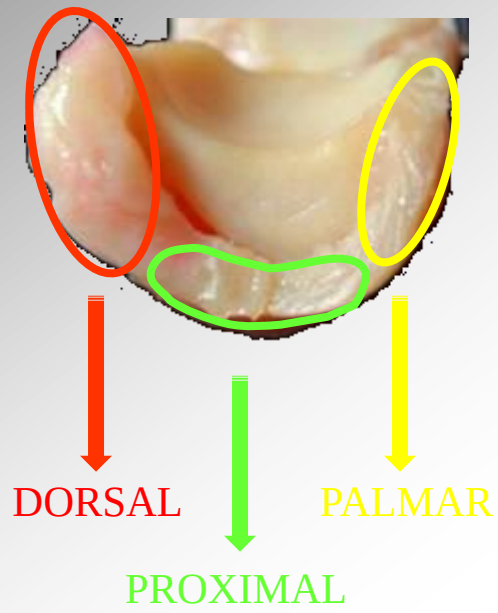
EWAS
European Wrist Arthroscopy Society

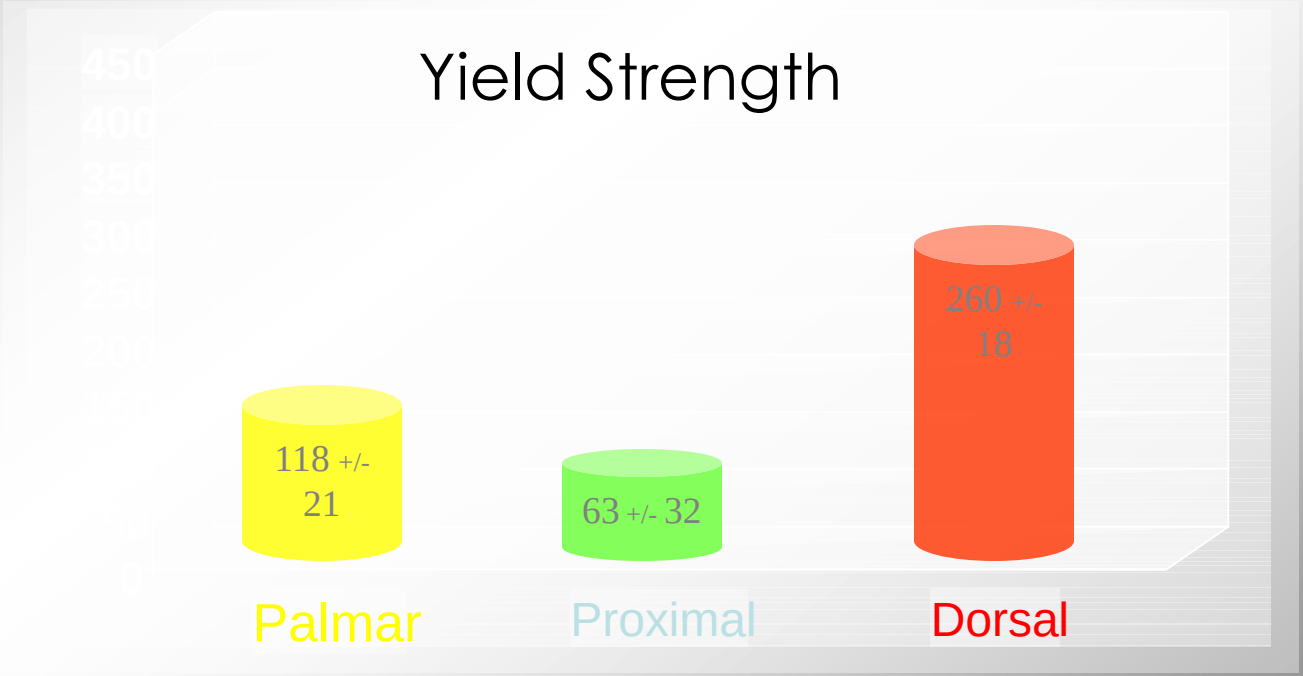
Institut de la Main

SCAPHOLUNATE LIGAMENT

Main scapholunate joint stabilizer

Meade et al 1990 – Short et al. – Looi et al. 2001





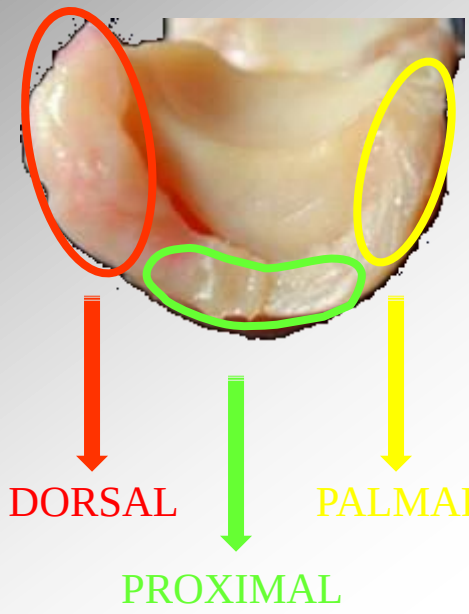
Berger et al. '99

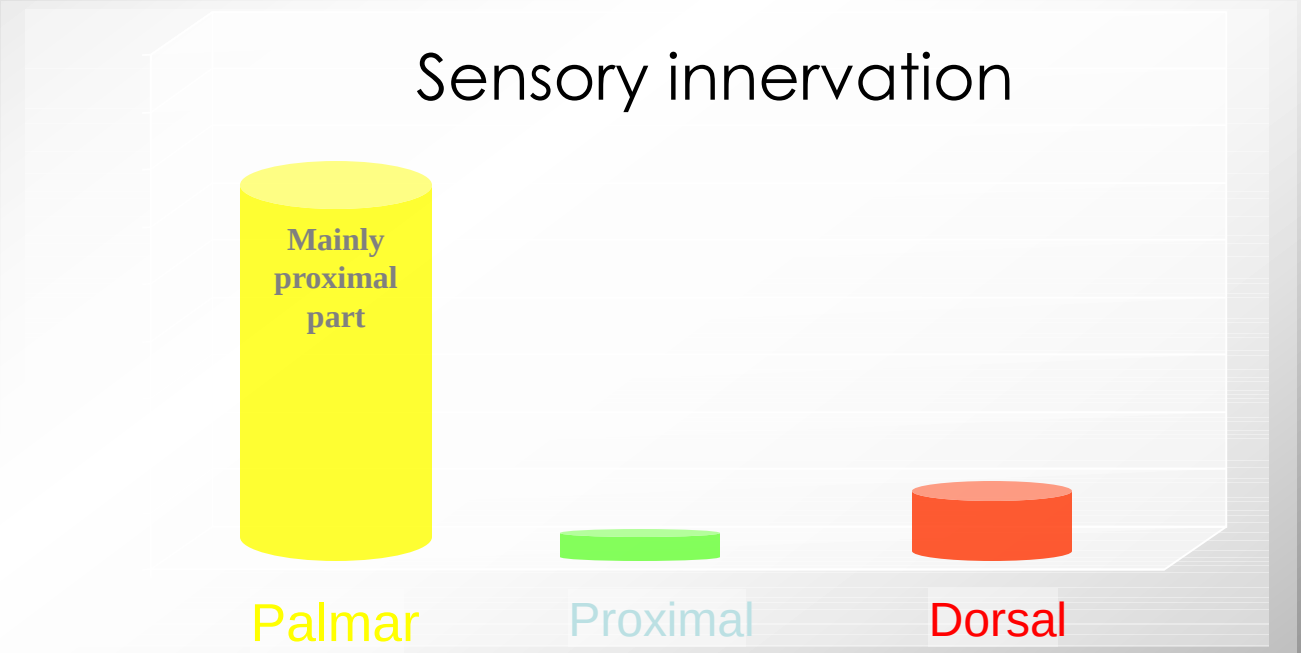
European Wrist Arthroscopy Society

Institut de la Main

SCAPHOLUNATE LIGAMENT

Contributes to carpal proprioception





Mataliotakis et al. ’11, Hagert; Garcia-Elias 13

Importance of AIO nerve and PIO nerve too !!!!

EWAS
European Wrist Arthroscopy Society

Institut de la Main

ANATOMY

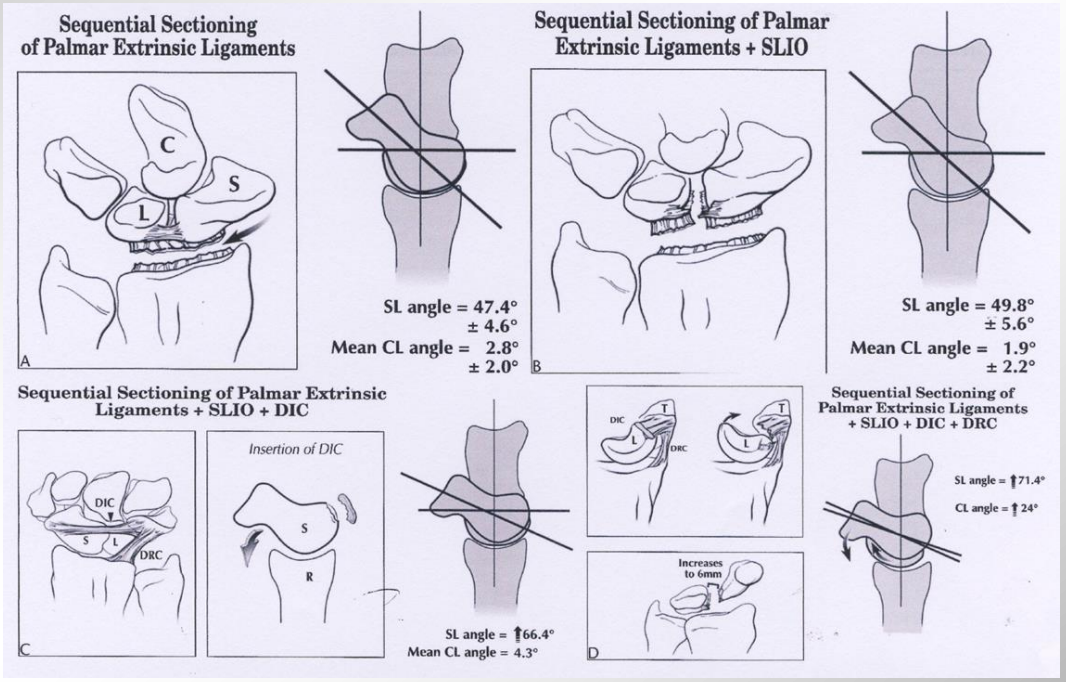
CLINICAL ORTHOPAEDICS AND RELATED RESEARCH
Number 425, pp. 152–157

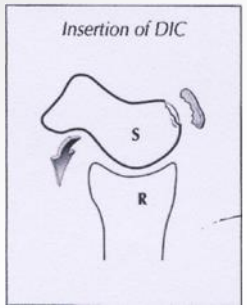
SECTION II
ORIGINAL ARTICLES

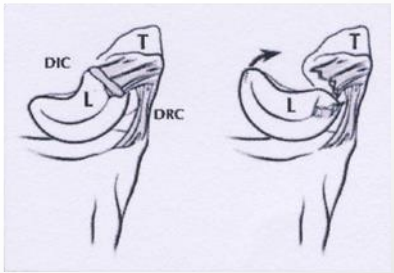
Dorsal Wrist Ligament Insertions Stabilize the Scapholunate Interval

Cadaver Study

Gamal A. Elsaidi, DO; David S. Ruch, MD; Gary R. Kuzma, MD; and Beth Paterson Smith, PhD







« Only with sectionning insertion of the DIC a dorsal intercalated scapholunate instability deformity (DISI) ensued »

EWAS
European Wrist Arthroscopy Society

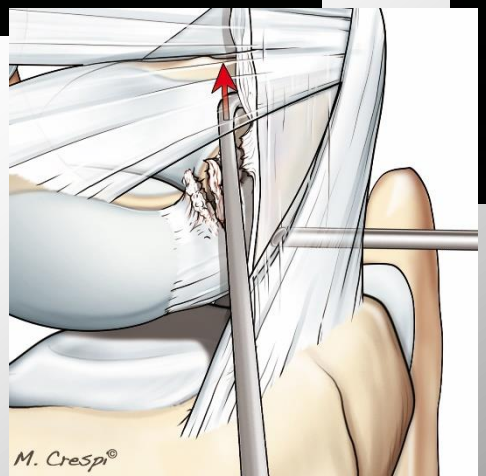
Institut de la Main

ANATOMY

Isolated dorsal capsule tear
with midcarpal SL spacing

Normal aspect

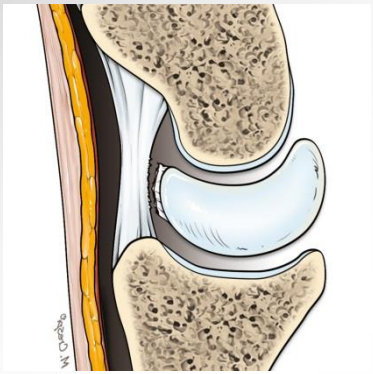
Midcarpal



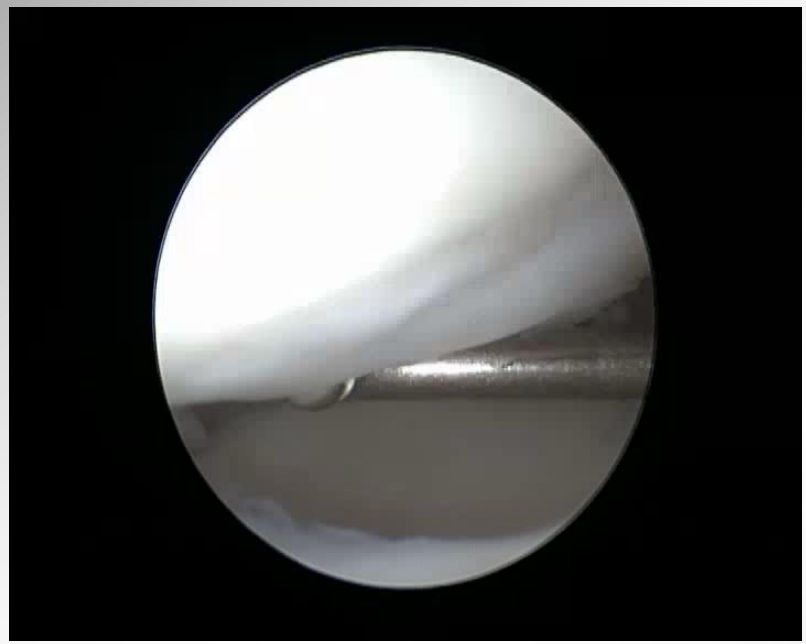
EWAS
European Wrist Arthroscopy Society

Institut
de la Main

ANATOMY



Normal aspect



Radiocarpal

Midcarpal

EWAS
European Wrist Arthroscopy Society

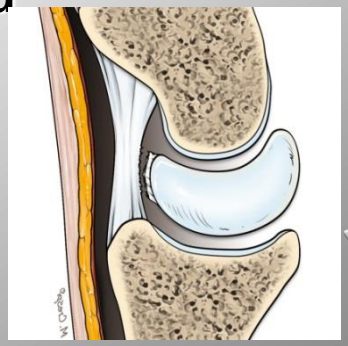
Institut de la Main

ANATOMY

Two days of laboratory work, 10 young fresh cadaver

Arthroscopic testing and X-Rays measuring with and without load

1/ Normal wrist,
2/ section of Dorsal Capsulo-SL attachment (DCSS)
3/ section of SLIOL
4/ DIC section



EWAS
European Wrist Arthroscopy Society

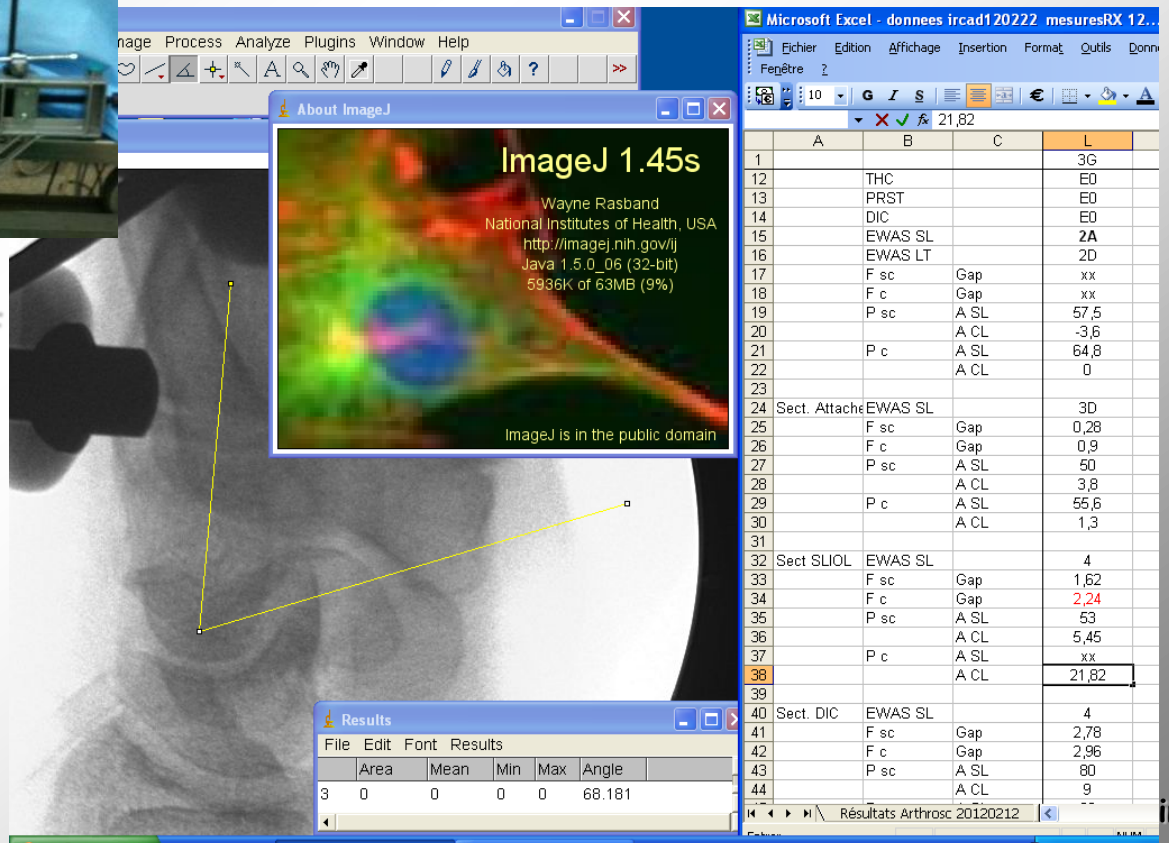
(J. Messina (I), L. Van Overstraeten (B), E. Camus (F), A. Wahegaonkar (In), A. Tandara (G), A. Cambon-Binder (F), C. Mathoulin (F))

Institut de la Main

Frontal and Lateral X-Rays without and with calibrated load (10 kg).

Double blind measures of

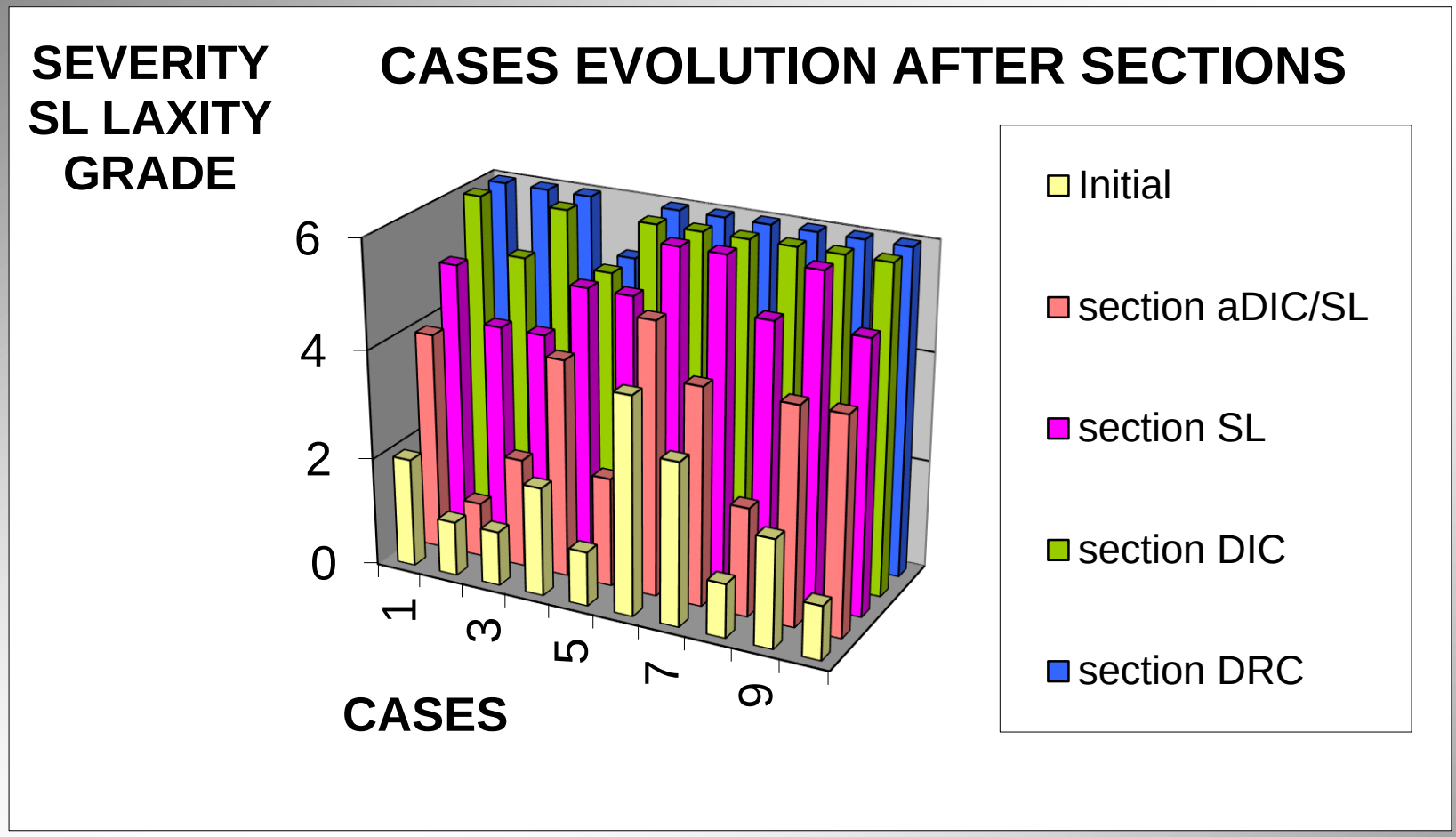
- SL Gap
- SL Angle
- RL Angle



	A	B	C	L
1				3G
12		THC		E0
13		PRST		E0
14		DIC		E0
15		EWAS SL		2A
16		EWAS LT		2D
17		F sc	Gap	xx
18		F c	Gap	xx
19		P sc	A SL	57,5
20			A CL	-3,6
21		P c	A SL	64,8
22			A CL	0
23				
24	Sect. Attache	EWAS SL		3D
25		F sc	Gap	0,28
26		F c	Gap	0,9
27		P sc	A SL	50
28			A CL	3,8
29		P c	A SL	55,6
30			A CL	1,3
31				
32	Sect SLIOL	EWAS SL		4
33		F sc	Gap	1,62
34		F c	Gap	2,24
35		P sc	A SL	53
36			A CL	5,45
37		P c	A SL	xx
38			A CL	21,82
39				
40	Sect. DIC	EWAS SL		4
41		F sc	Gap	2,78
42		F c	Gap	2,96
43		P sc	A SL	80
44			A CL	9

EWAS
European Wrist Arthroscopy Society

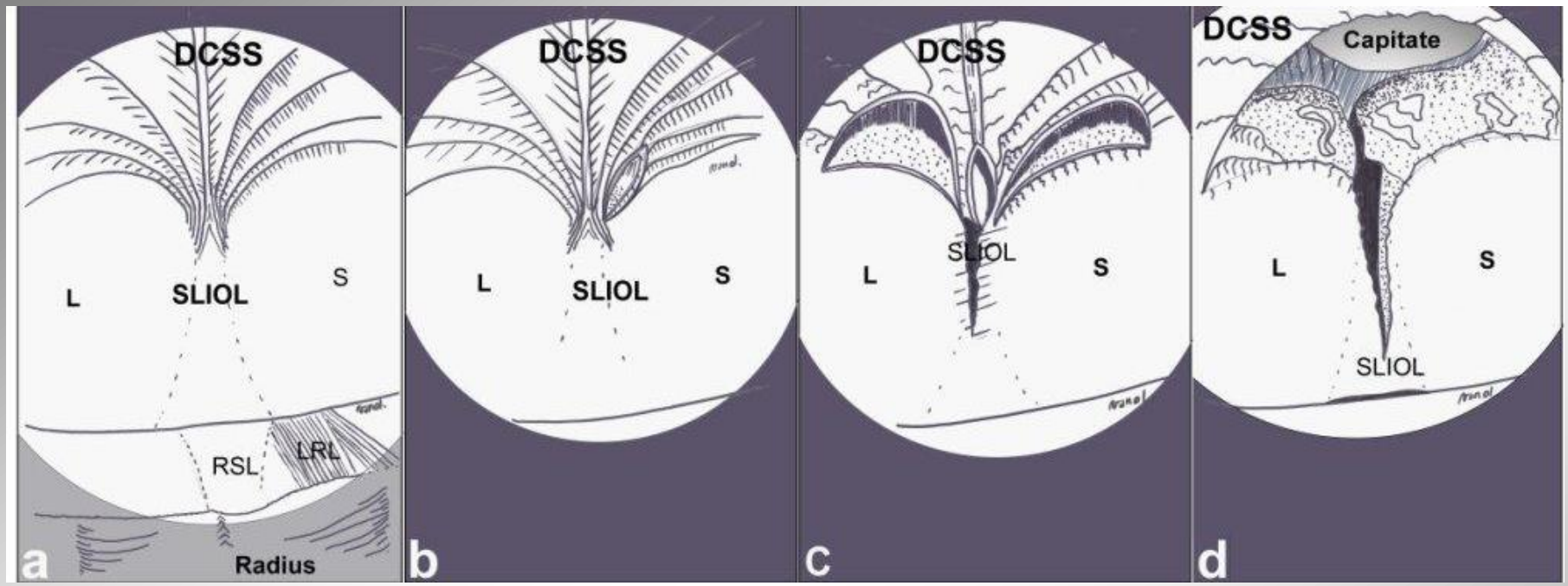
ANATOMY



Systematic worsening of SL diastasis after simple detachment of DCSS from dorsal SL

EWAS
European Wrist Arthroscopy Society

Institut de la Main



Anatomical description of the dorsal capsulo scapholunate septum (dcss)
Anatomical staging of scapholunate instability after DCSS sectionning

Van Overstraeten, Camus, Wahegaonkar, Messina , Tandara , Cambon Binder Mathoulin , JWS 2013 (2) : 149-54

EWAS
European Wrist Arthroscopy Society

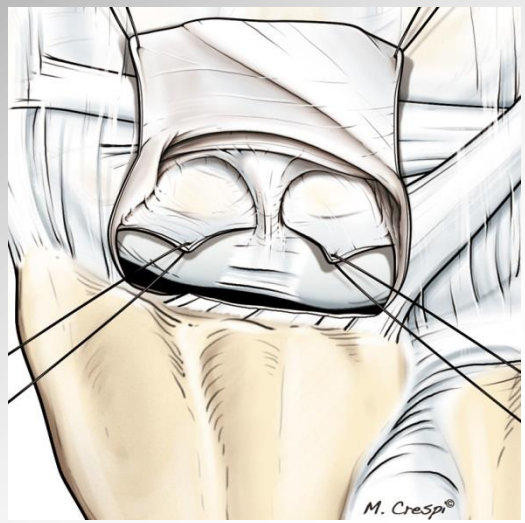
Institut de la Main

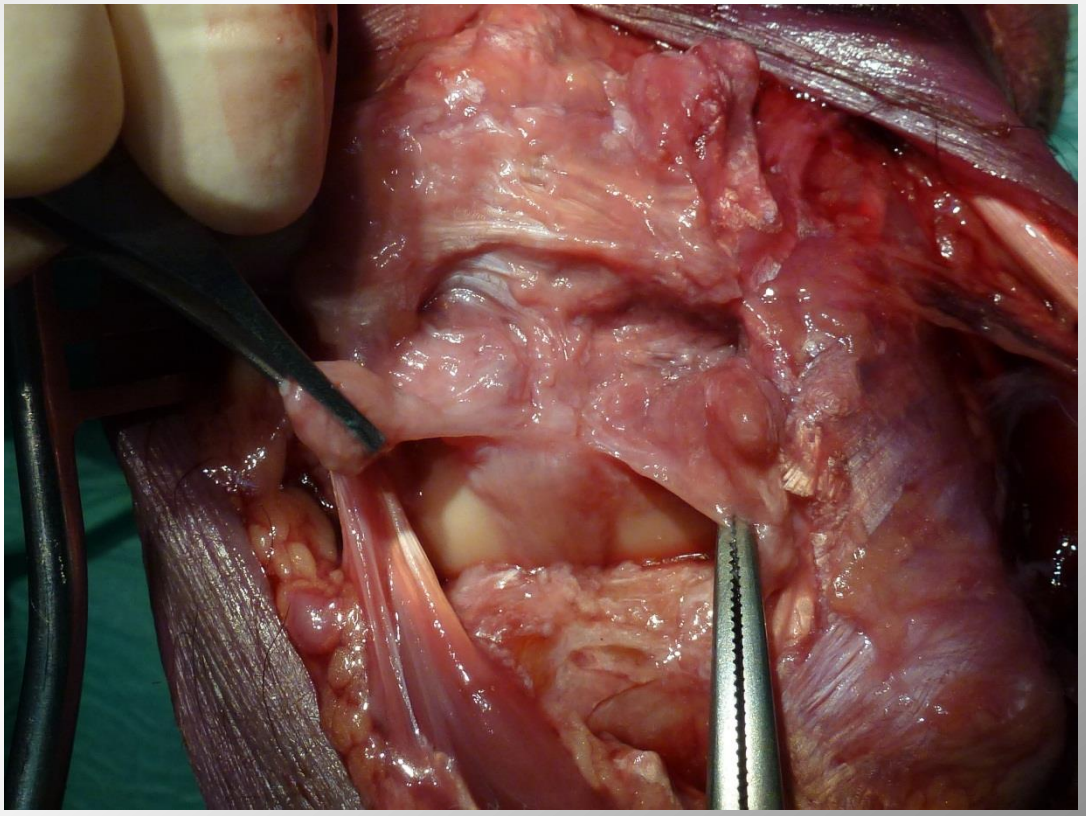
ANATOMY

Four months of laboratory work, 17 fresh cadavers

The DCSS structure was identified between the scapholunate ligament and the DIC

DCSS always identified, consisting of three arches (two transverse arches in series along the distal line of the scapholunate interval, forming a confluence into the third which was larger than the previous mentioned)





(M. Carrara (Bra), T. Burgess (Aus), C. Mathoulin (F)) (on press)

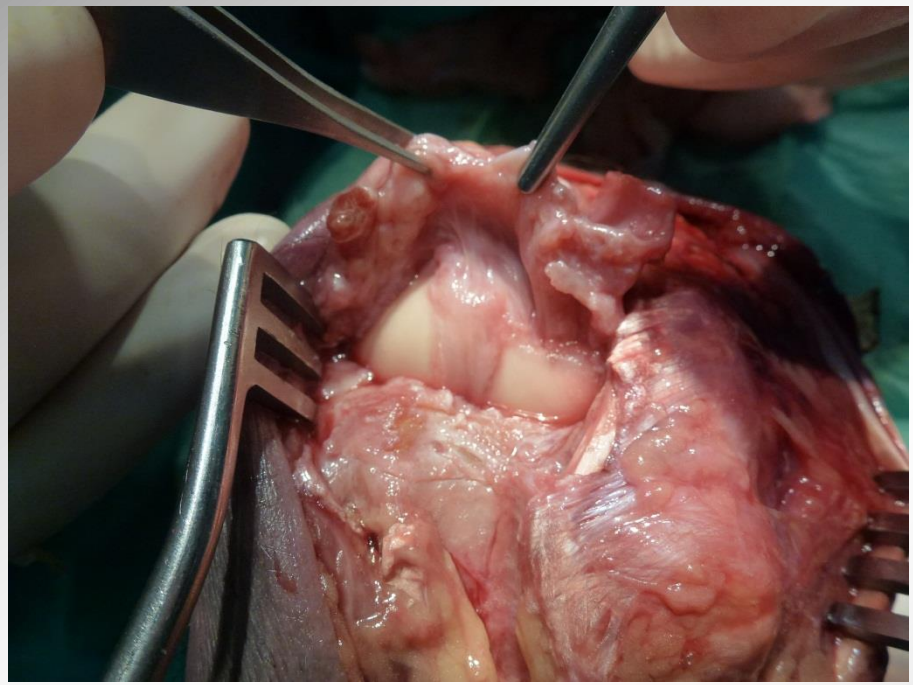
EWAS
European Wrist Arthroscopy Society

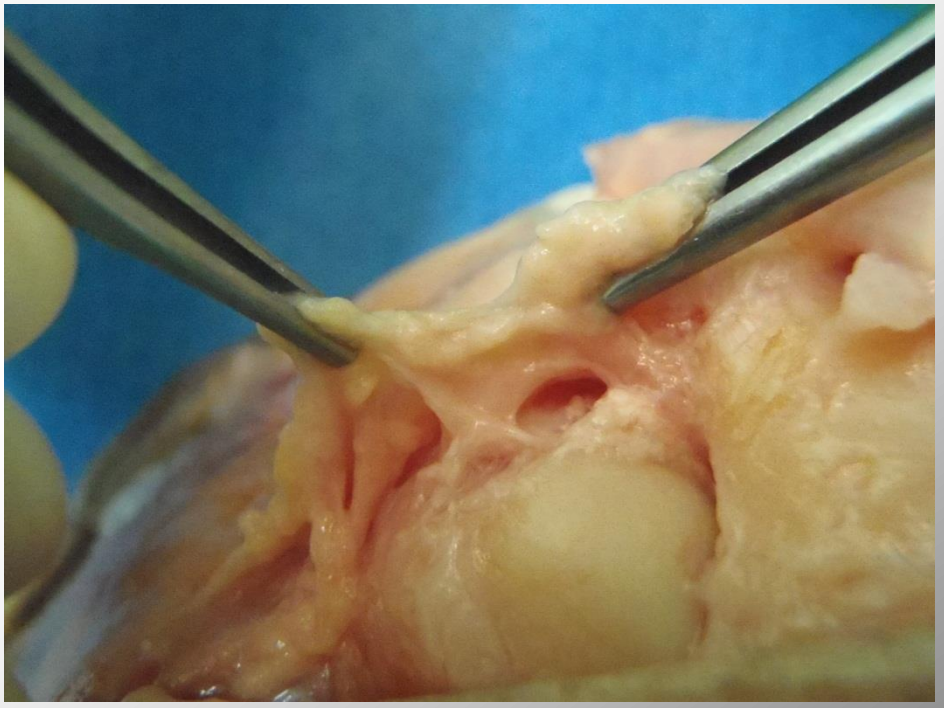
Institut de la Main

ANATOMY

Four months of laboratory work, 17 fresh cadavers

It demonstrated a wide diffuse attachment along the scapholunate ligament and then arced dorsally fanning out to a longer insertion into the dorsal capsule.



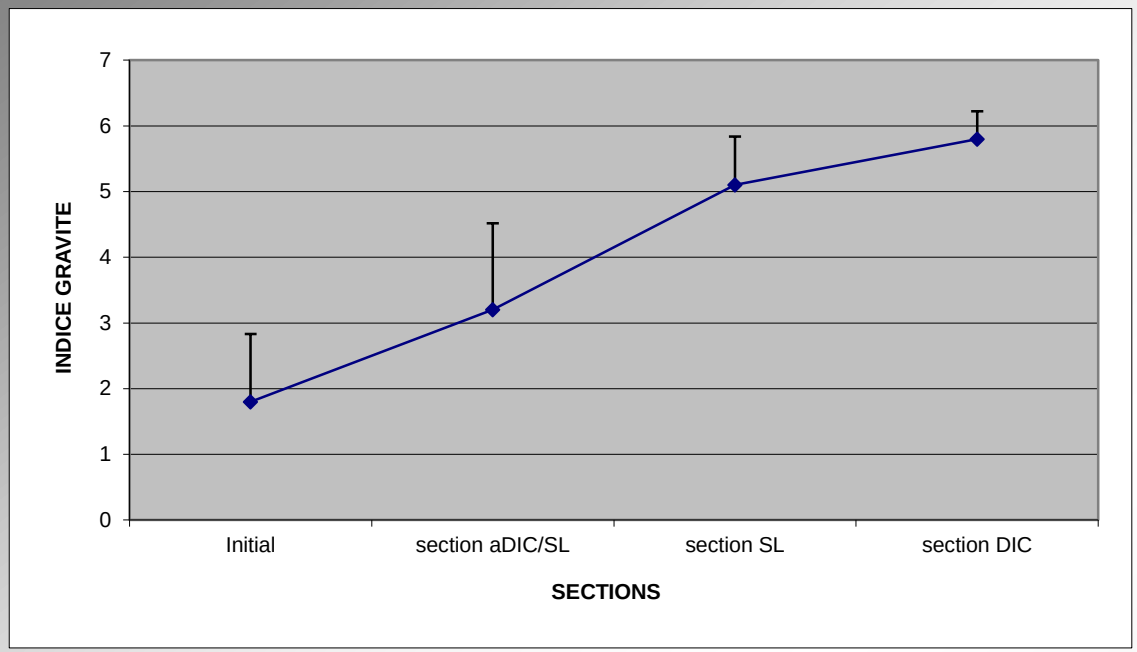


EWAS
European Wrist Arthroscopy Society

The Anatomy of the Dorsal Capsulo-Scapholunate Septum: a cadaveric study.
M.Tommasini Carrara de Sambuy, T. M. Burgess,A. Cambon-Binder, C Mathoulin, Arthroscopy (2016-on press)

Institut de la Main

ANATOMY

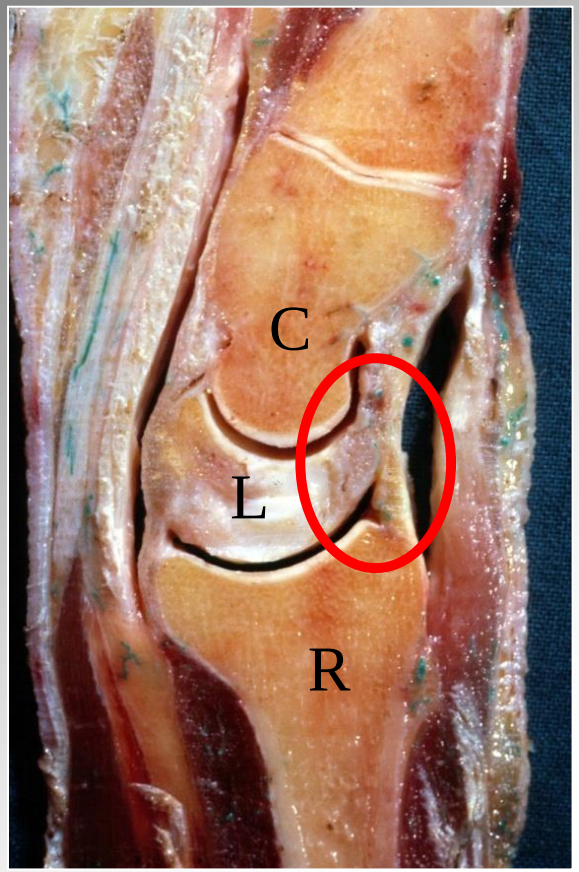


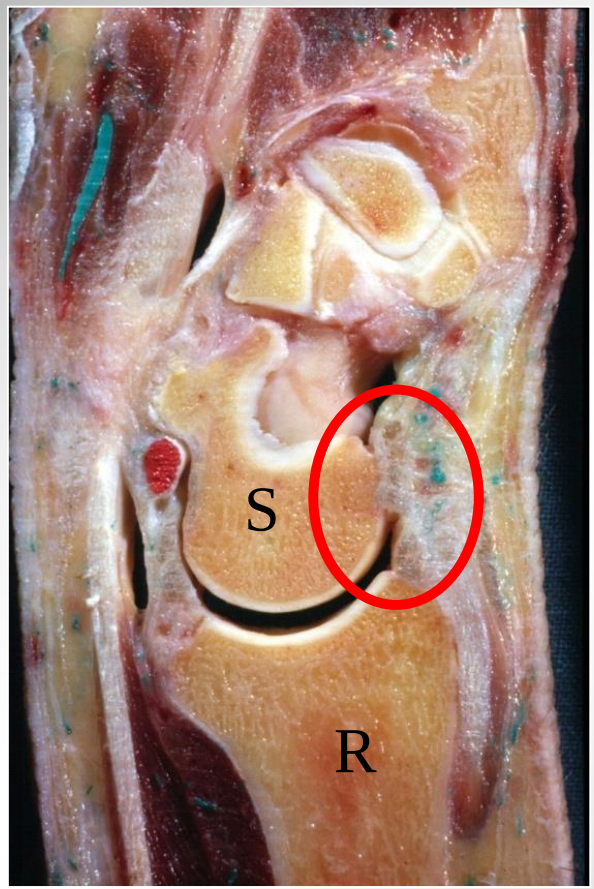
This structure (Dorsal capsulo-scapholunate Septum) is a bridge between the DST ligt and the dorsal SL ligt, and seems to be essential to the SL stability, and probably its tears could be considered as a first stage of SL instability…!!!

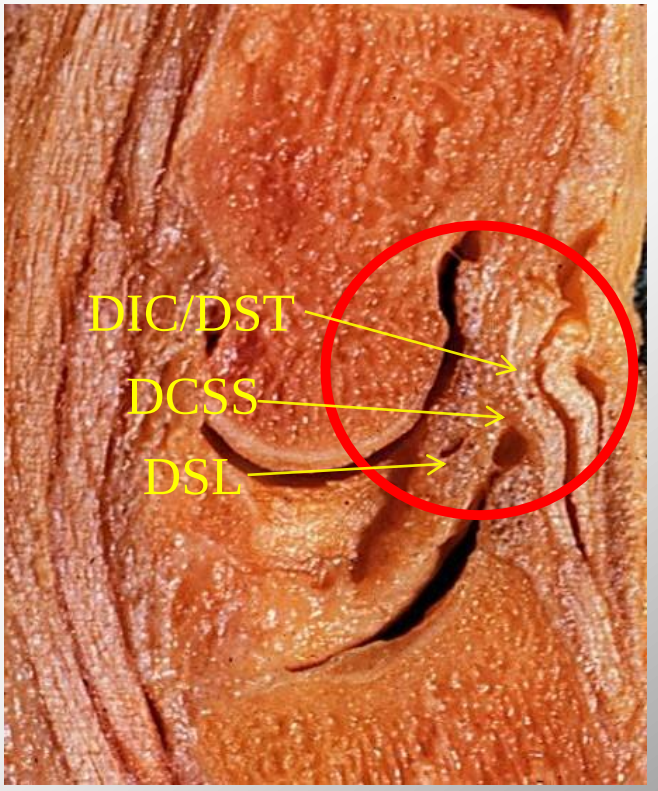
EWAS
European Wrist Arthroscopy Society

Institut de la Main

ANATOMY







Prominent role of dorsal radiocarpal ligaments:

DIC/Dorsal Scapho-Triquetral Ligt
Dorsal Scapholunate Ligt
Dorsal Capsulo-Scapholunate Septum

EWAS
European Wrist Arthroscopy Society

Institut de la Main

	I	II	III	IV	V	VI
✓Partial injury	yes	no	no	no	no	no
✓Repairable	yes	yes	no	no	no	no
✓Normal alignment	yes	yes	yes	no	no	no
✓Reducible	yes	yes	yes	yes	no	no
✓Normal cartilage	yes	yes	yes	yes	yes	no

	I	II	III	IV	V	VI
✓Partial injury	yes	no	no	no	no	no
✓Normal alignment	yes	yes	no	no	no	no
✓Reducible	yes	yes	yes	no	no	no
✓Repairable	yes	yes	yes	yes	no	no
✓Normal cartilage	yes	yes	yes	yes	yes	no

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Staging of scapho-lunate tears

	I	II	III	IV	V	VI
Partial injury	yes	no	no	no	no	no
Repairable	yes	yes	no	no	no	no
Normal alignment	yes	yes	yes	no	no	no
Reducible	yes	yes	yes	yes	no	no
Normal cartilage	yes	yes	yes	yes	yes	no

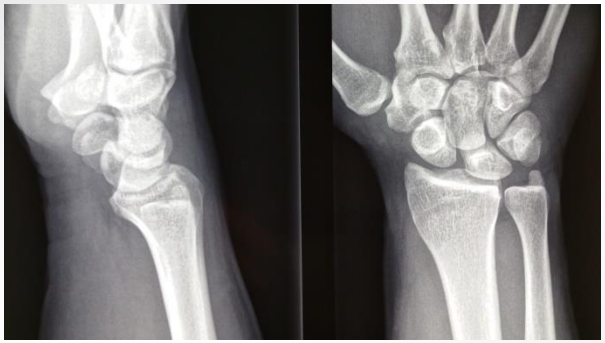
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7
Is the dorsal SL ligament intact?	YES	NO	NO	NO	NO	NO	NO
If repaired, has it good chances of healing?	YES	YES	NO	NO	NO	NO	NO
Is the radioscaphoid angle normal?	YES	YES	YES	NO	NO	NO	NO
Is the lunate uncovering index normal?	YES	YES	YES	YES	NO	NO	NO
Is the misalignment easily reducible?	YES	YES	YES	YES	YES	NO	NO
Are the joint cartilages normal?	YES	YES	YES	YES	YES	YES	NO

CLASSIFICATION

PREDYNAMIC
Dorsal ganglion(!?)

DYNAMIC
EWAS 1-4

STATIC
GE 5 – EWAS 4+ ou 5 (?!)



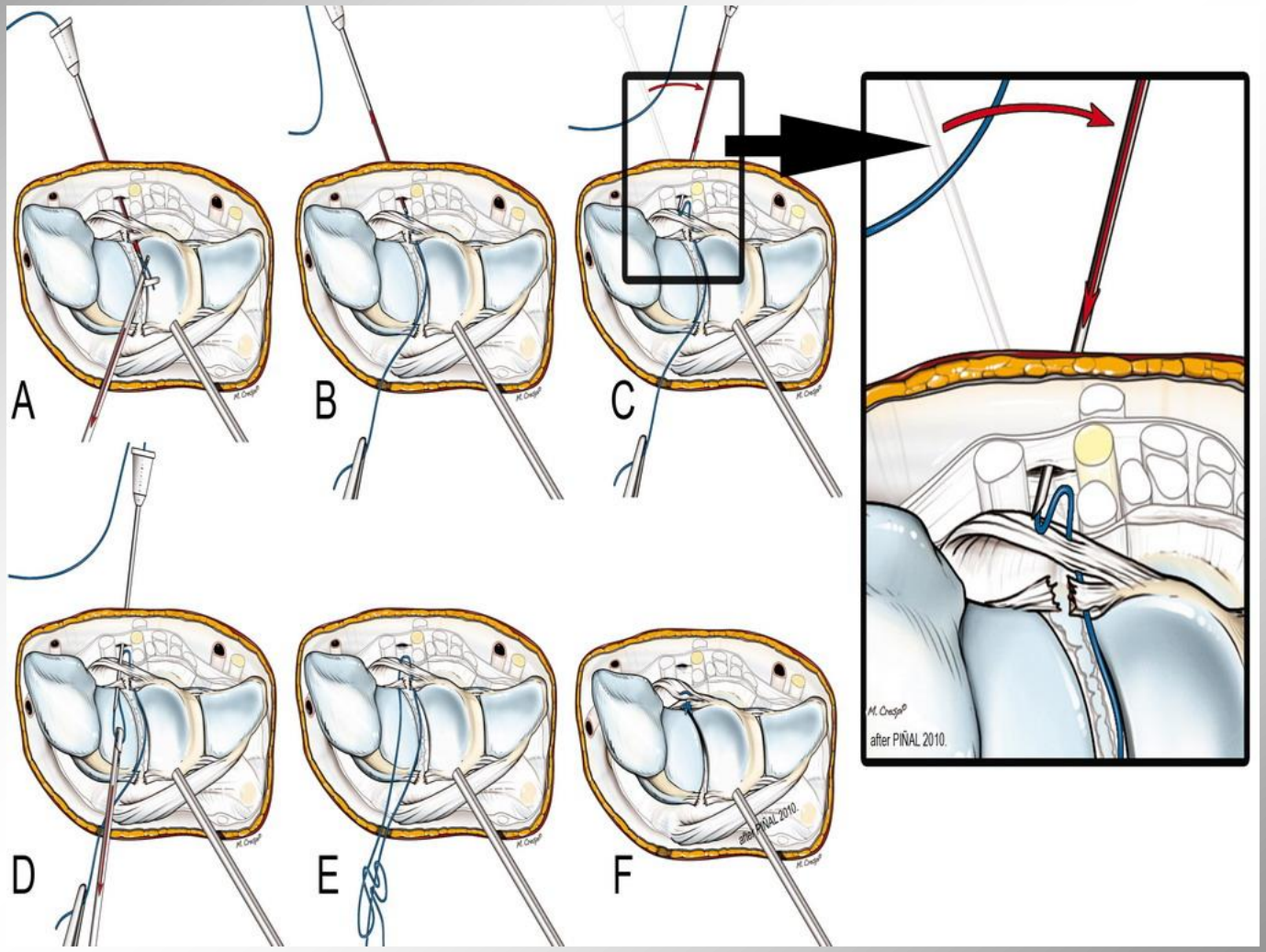
X-RAYS +++
CT-ArthroScan
MRI
ARTHROSCOPY ++++

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Volar Capsuloligamentous Repair

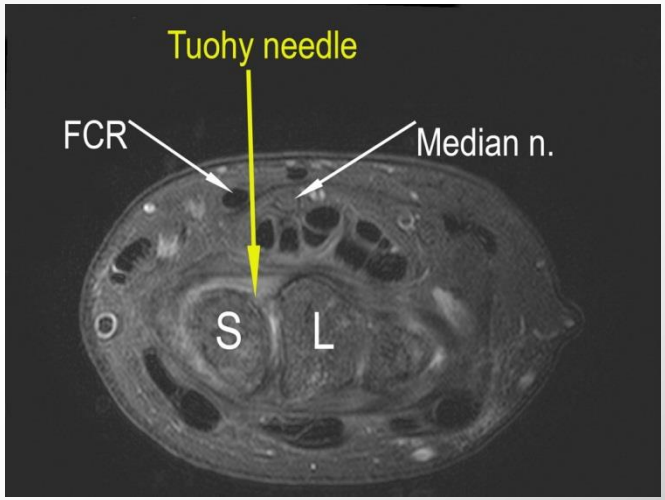
AVCLR (Paco Pinal)

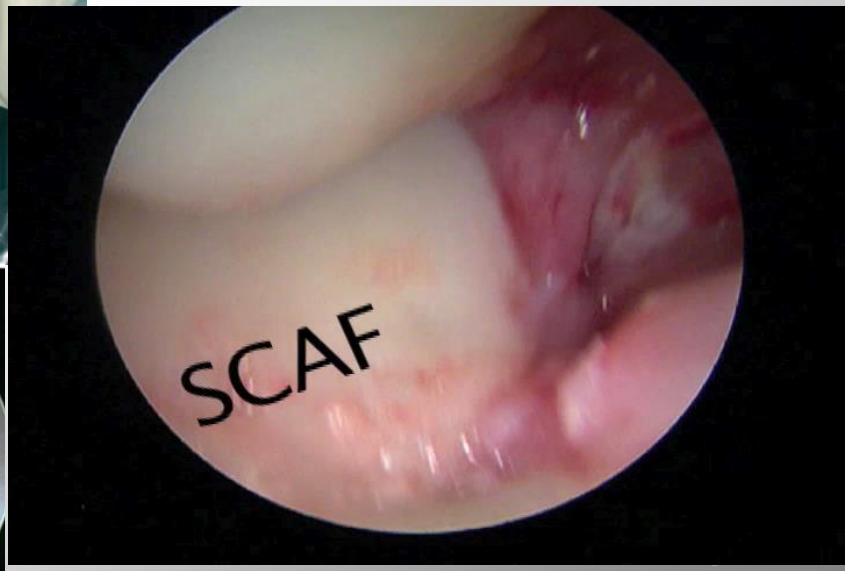


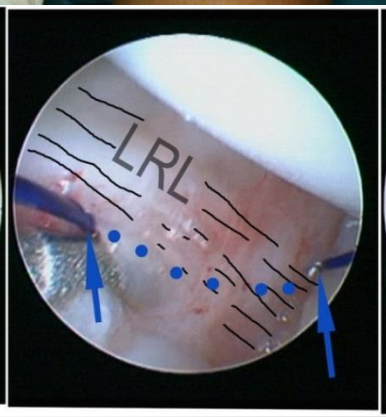
EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Arthroscopic Volar Capsuloligamentous Repair AVCLR (Paco Pinal)



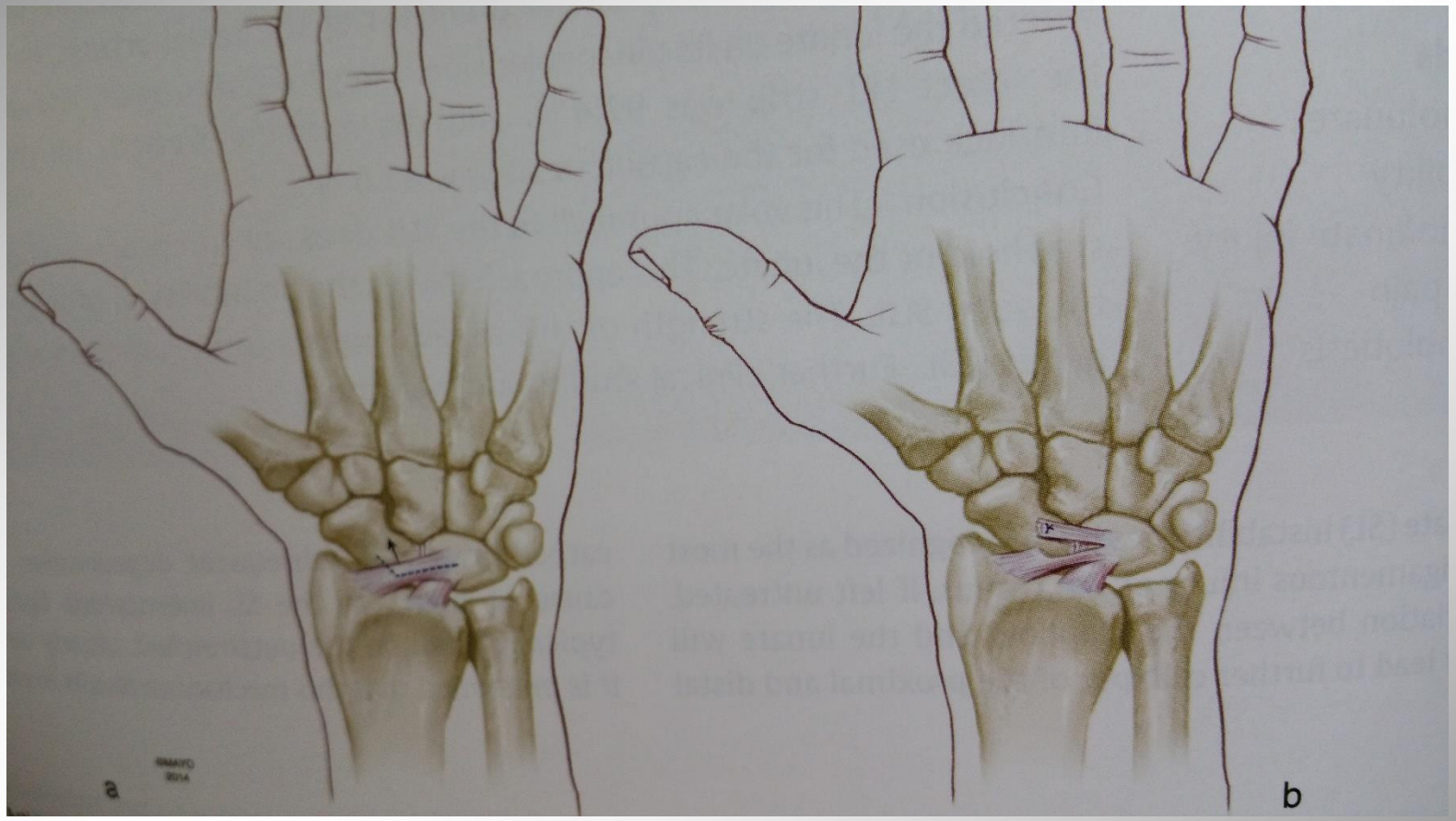




Institut de la Main

Volar capsulodesis for isolated palmar SL injuries

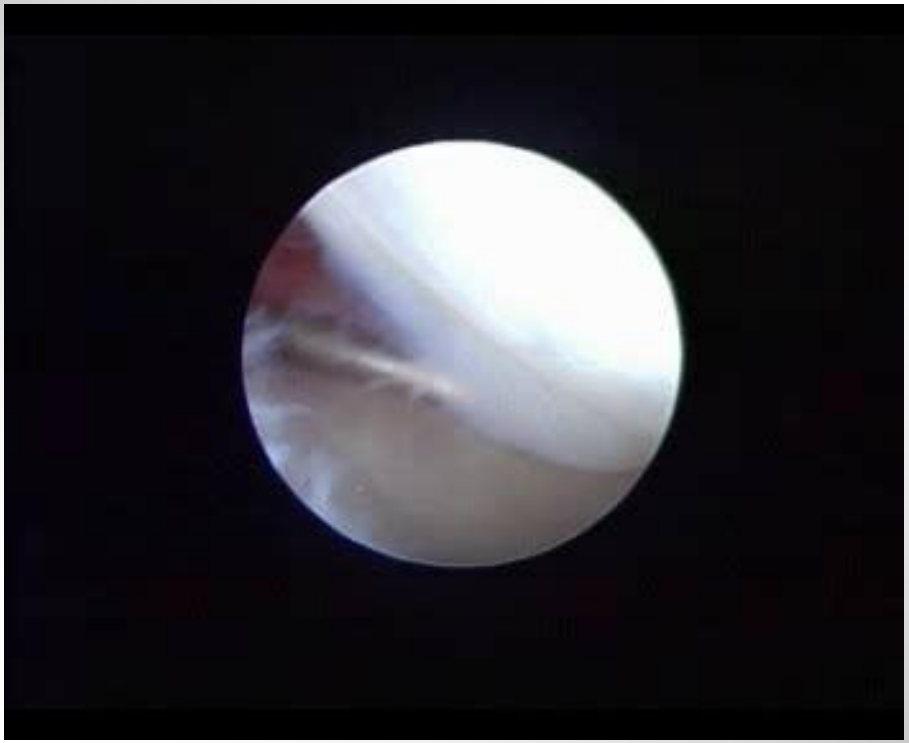
Van Kampen, Bayne, Moran (Mayo Clinic) JWS 2015;4;239-245



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

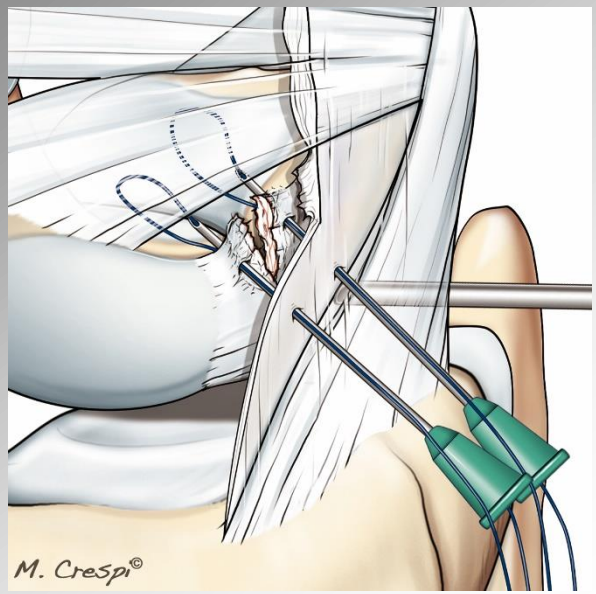
Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

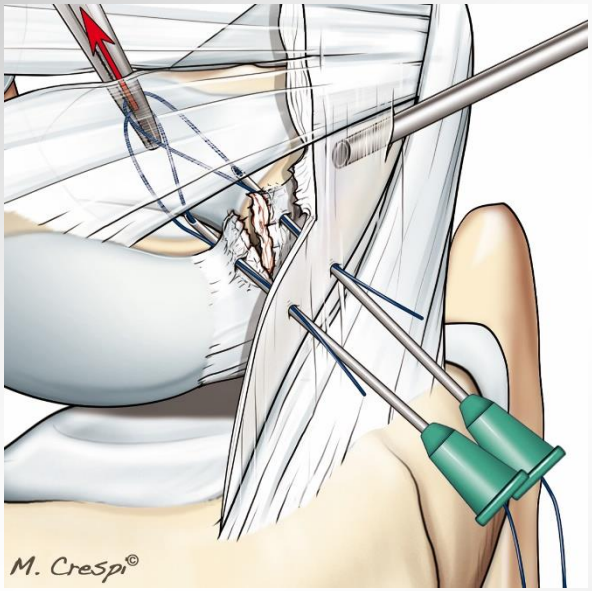


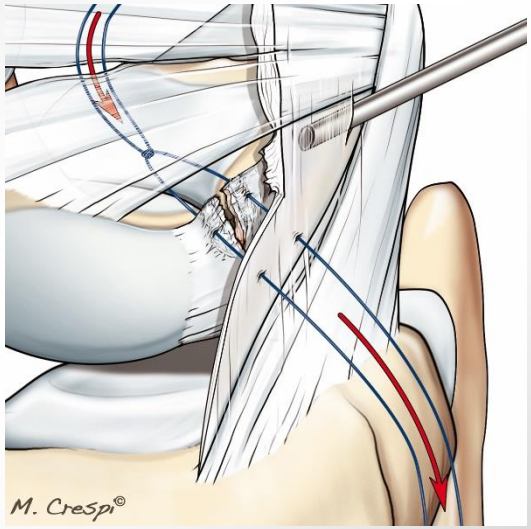
EWAS
European Wrist Arthroscopy Society

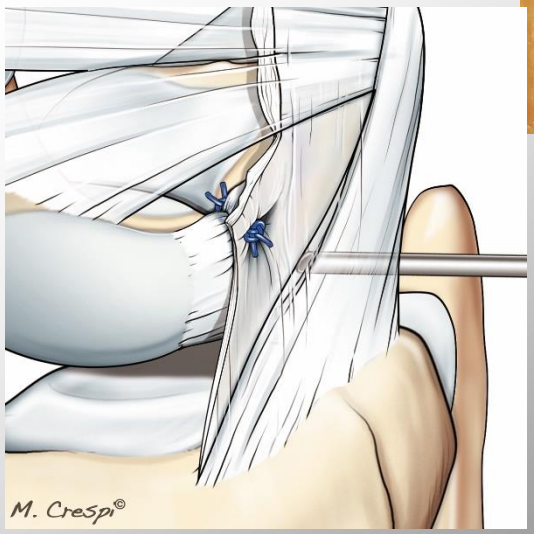
Institut
de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR







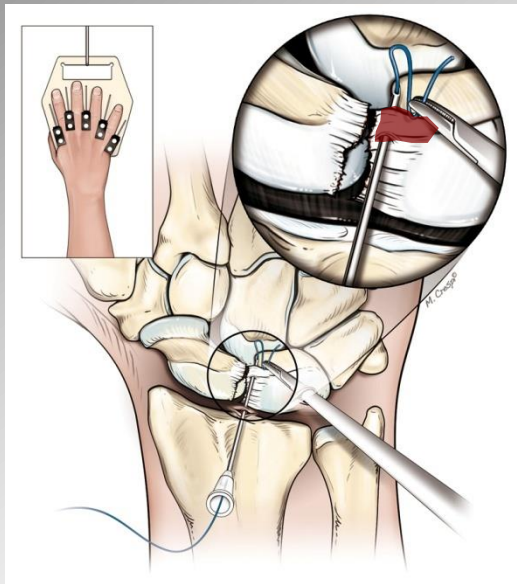


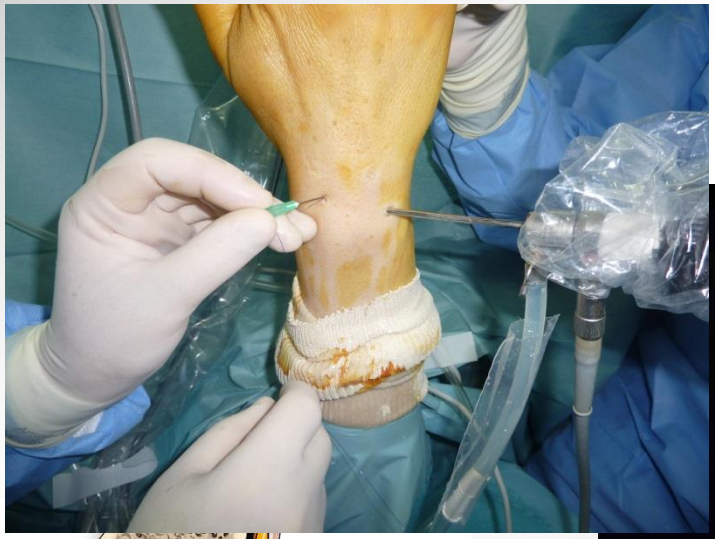
EWAS
European Wrist Arthroscopy Society

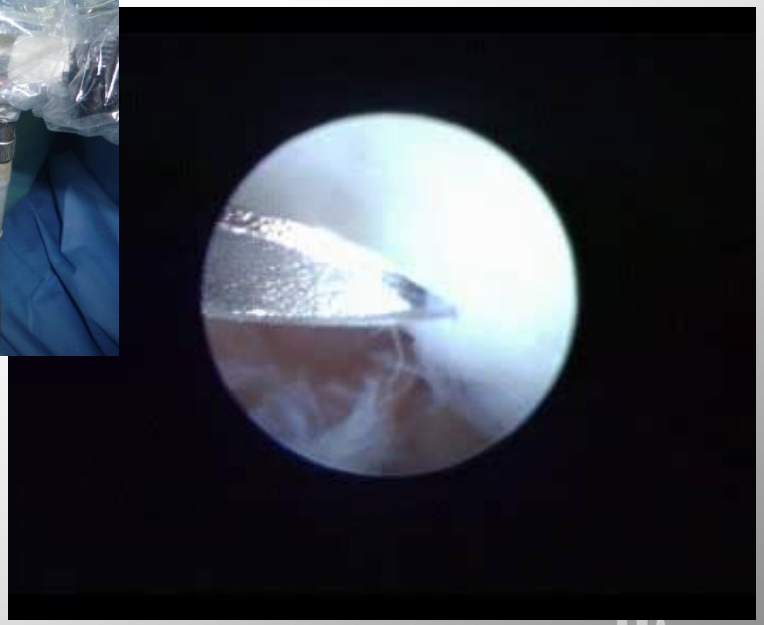
Institut de la Main

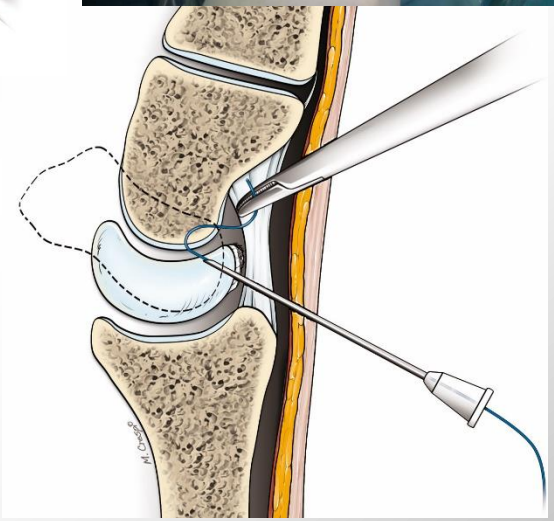
Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

1 thread through 3,4 P, then DWC and ULNAR remnant







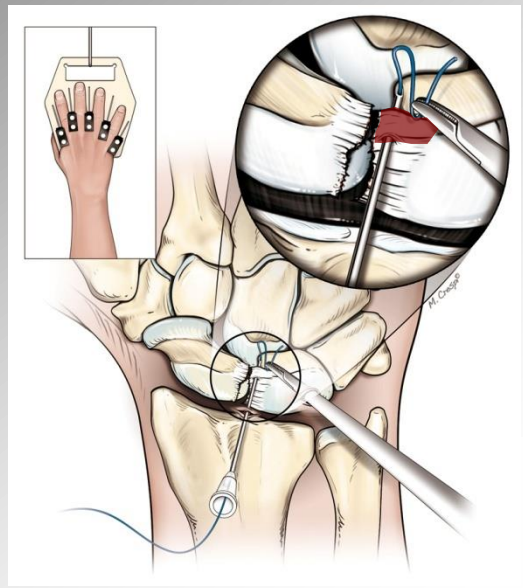


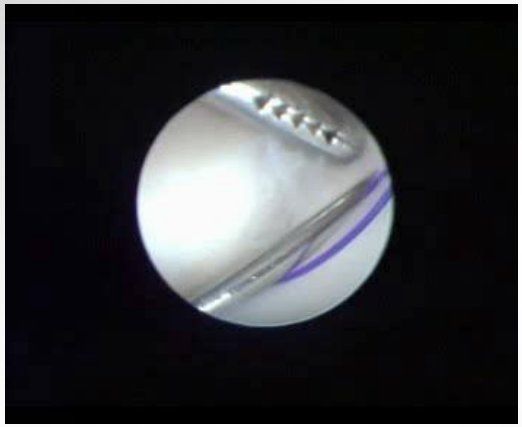
EWAS
European Wrist Arthroscopy Society

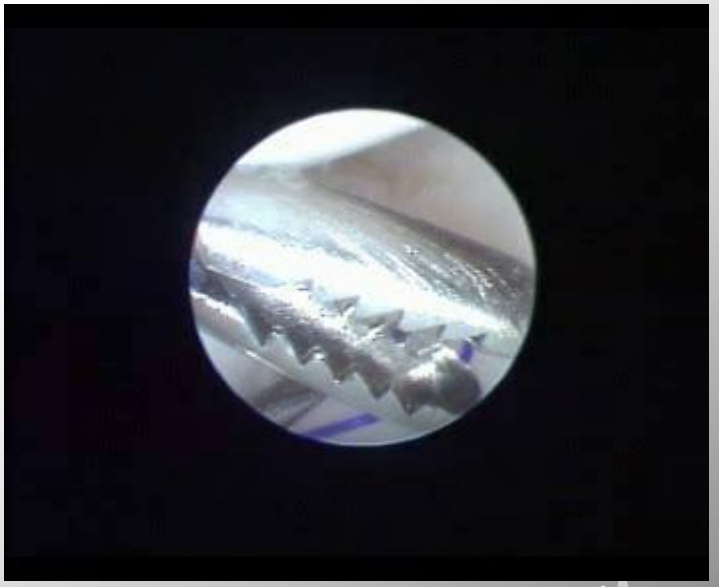
Institut de la Main

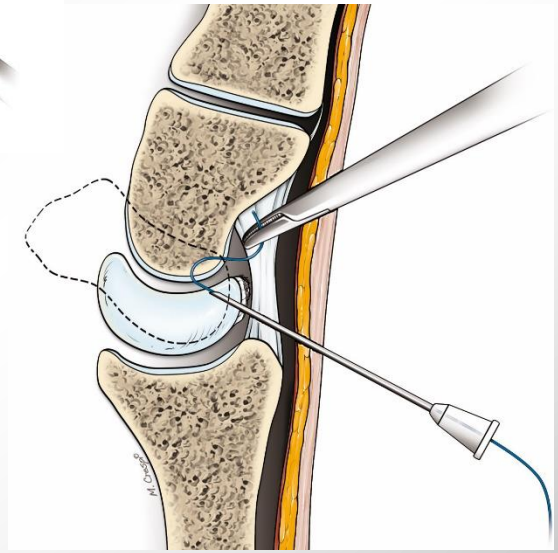
Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

Retrieval through RMCP







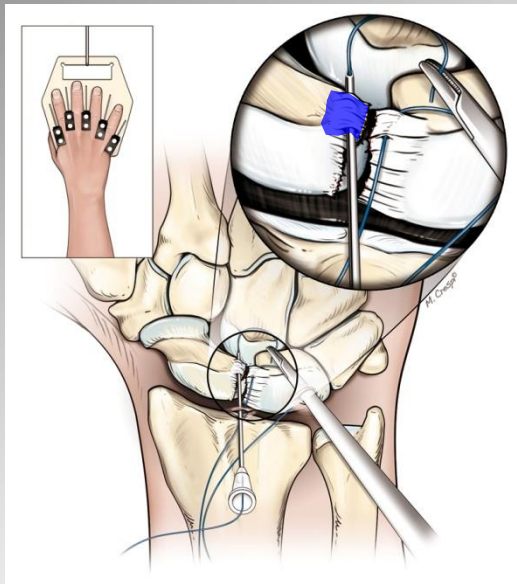


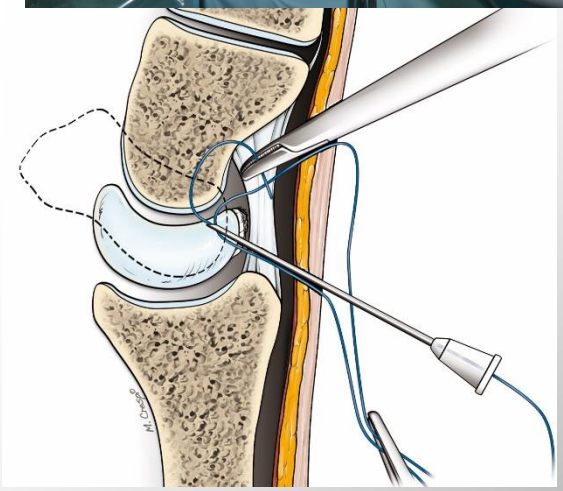
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

2nd thread through DWC and RADIAL remnant



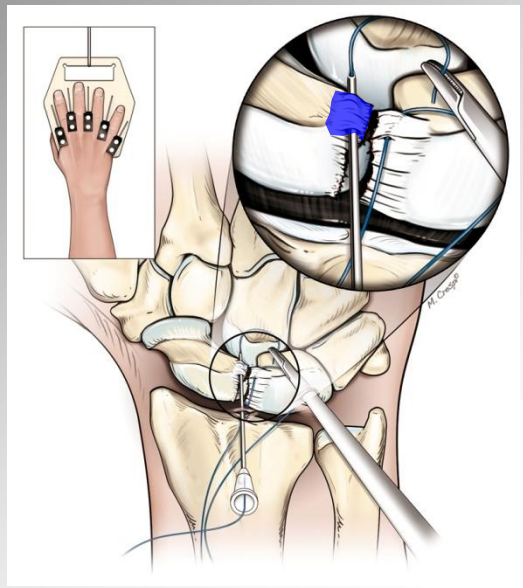


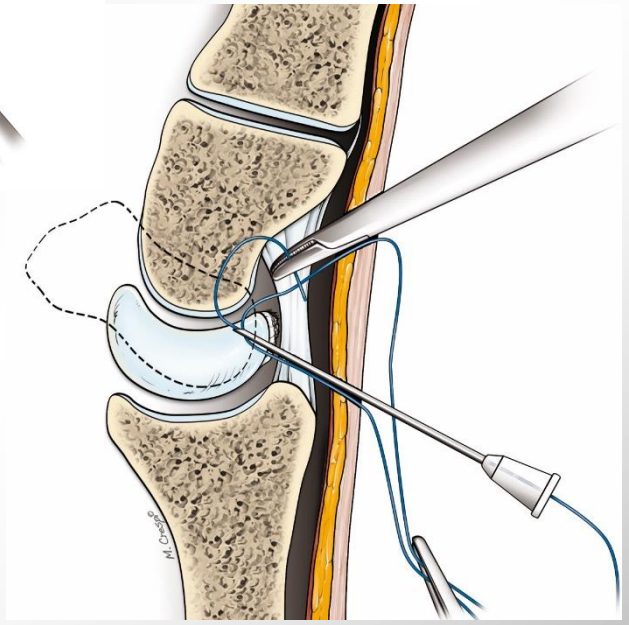
EWAS
European Wrist Arthroscopy Society

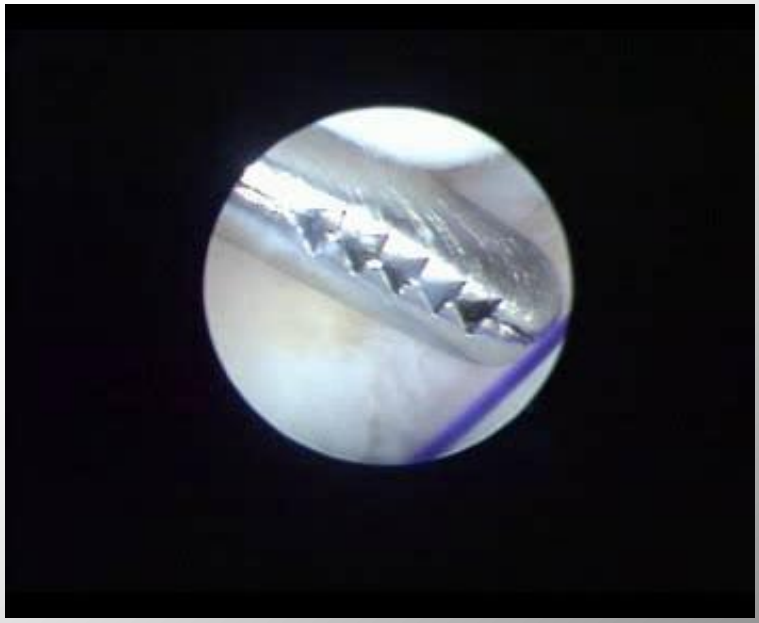
Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

Retrieval through the same RMCP





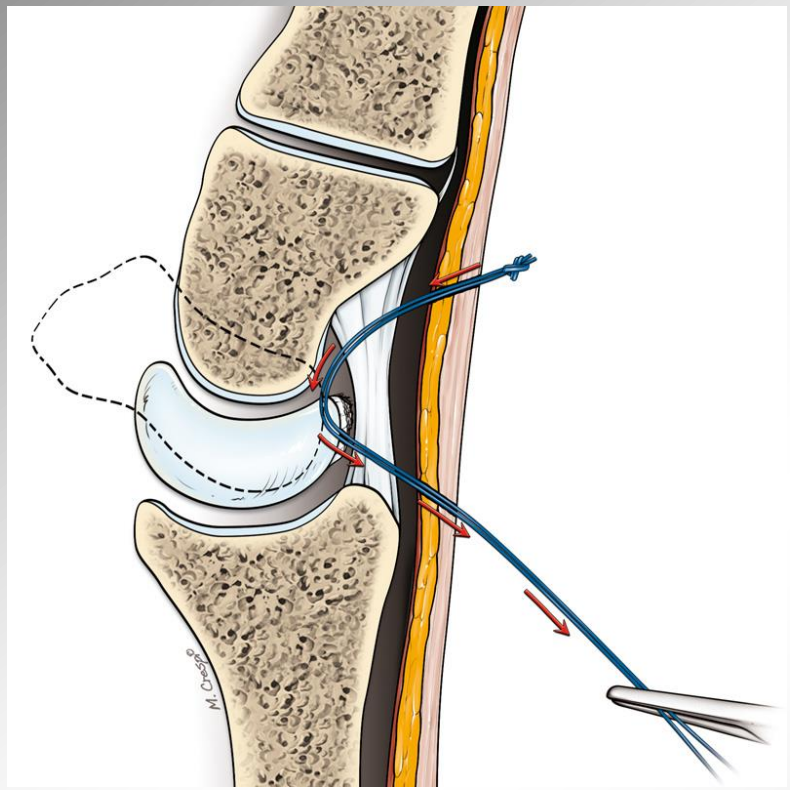


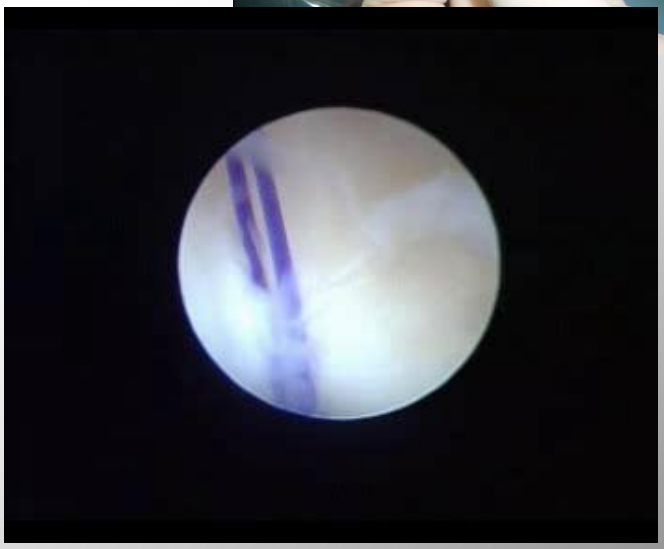
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

Knot made outside patient (Nicky's knot)





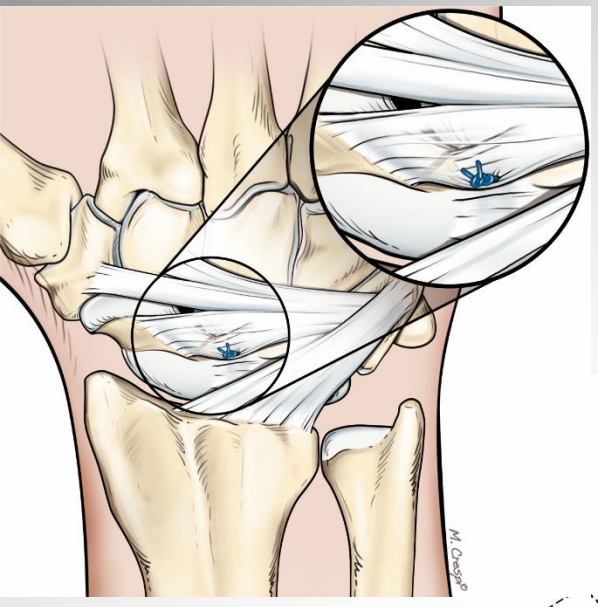
Pulled inside MCJ by proximal traction

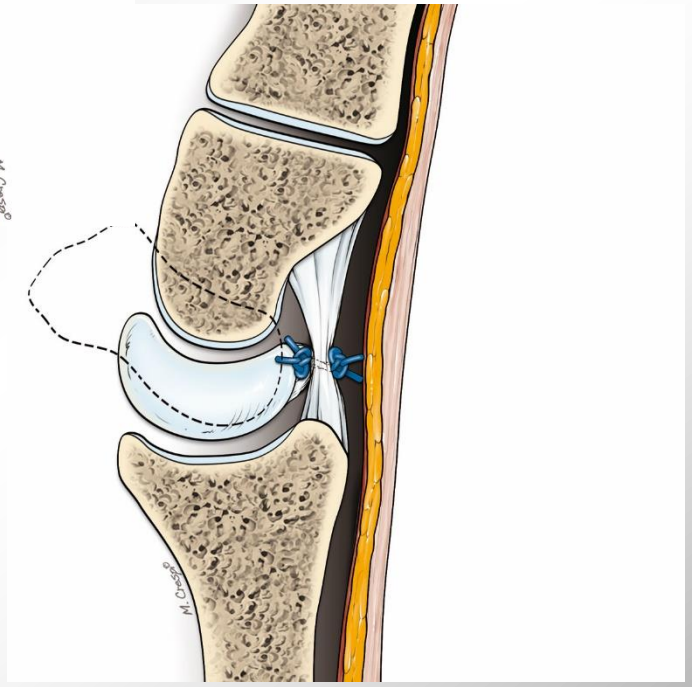
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

Second knot subcutaneous in 3,4 Portal



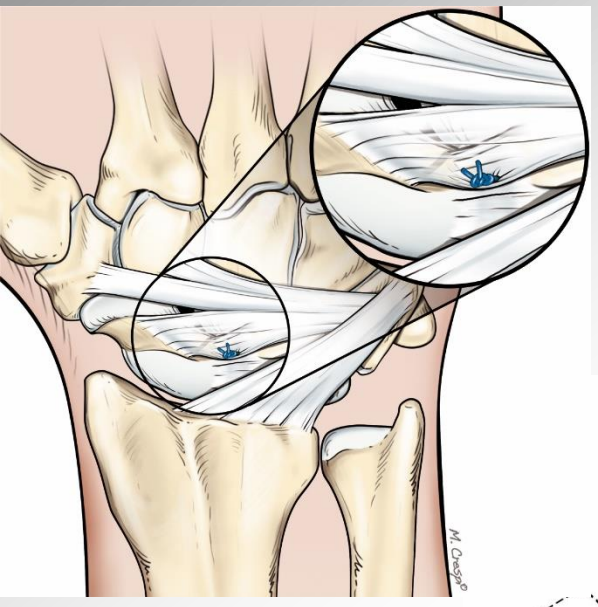


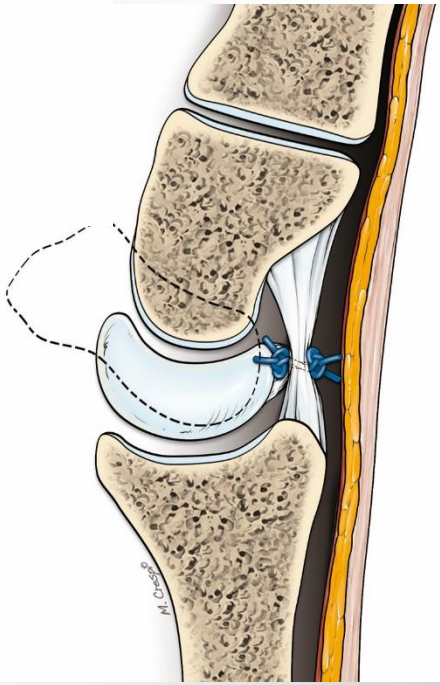
EWAS
European Wrist Arthroscopy Society

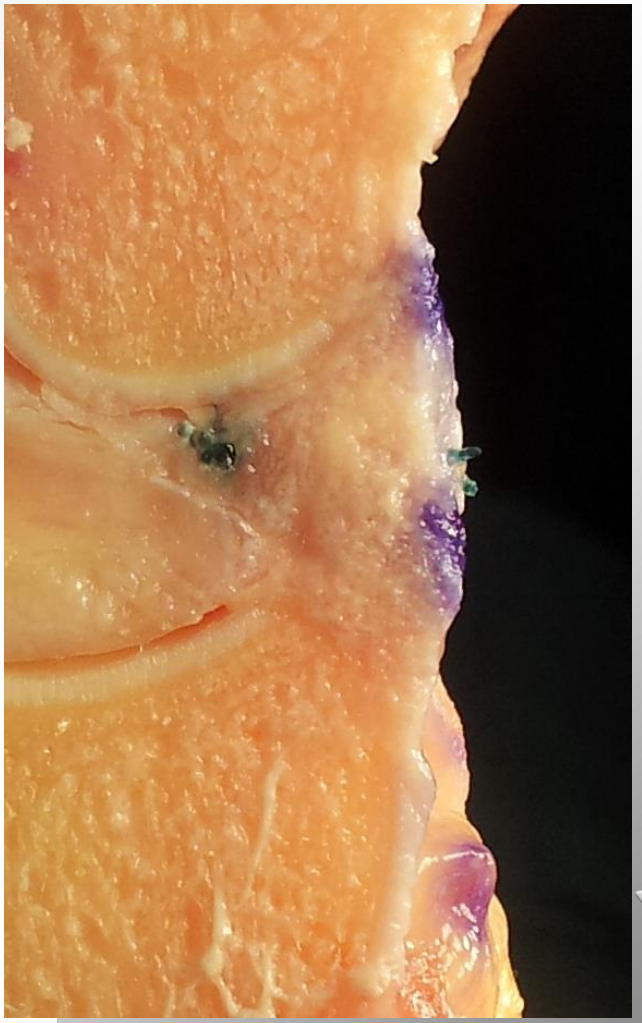
Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

Second knot subcutaneous in 3,4 Portal



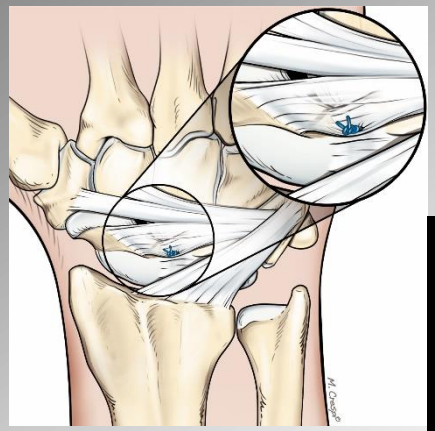


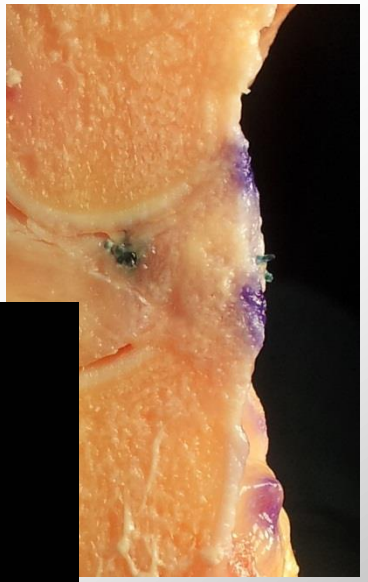


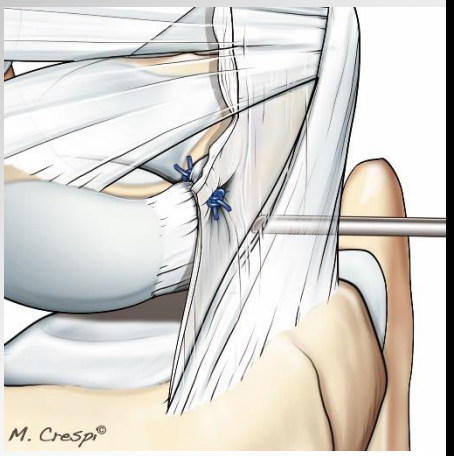
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR







W.A.D.C.L.R

Mathoulin Christophe, MD

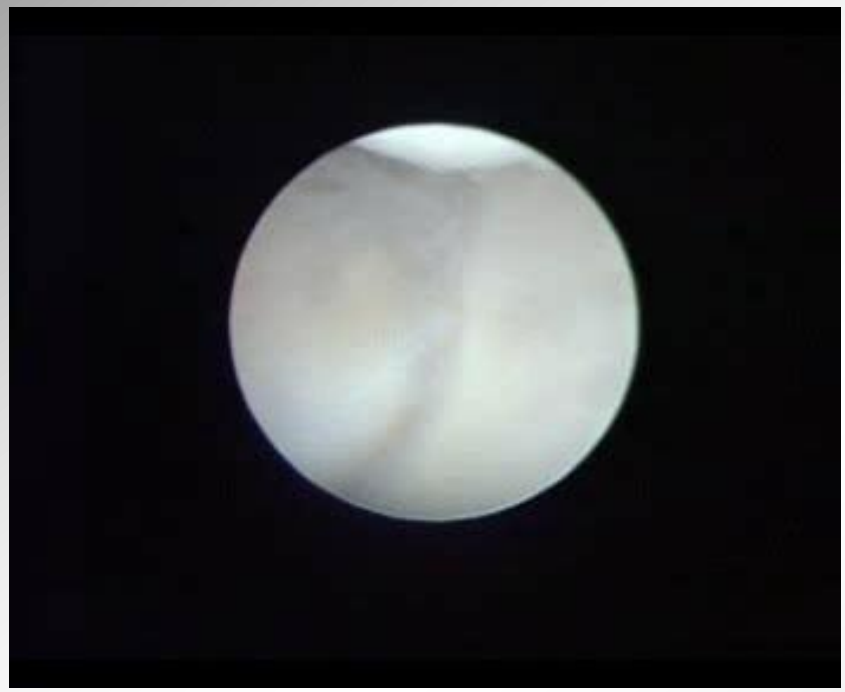
Paris, France

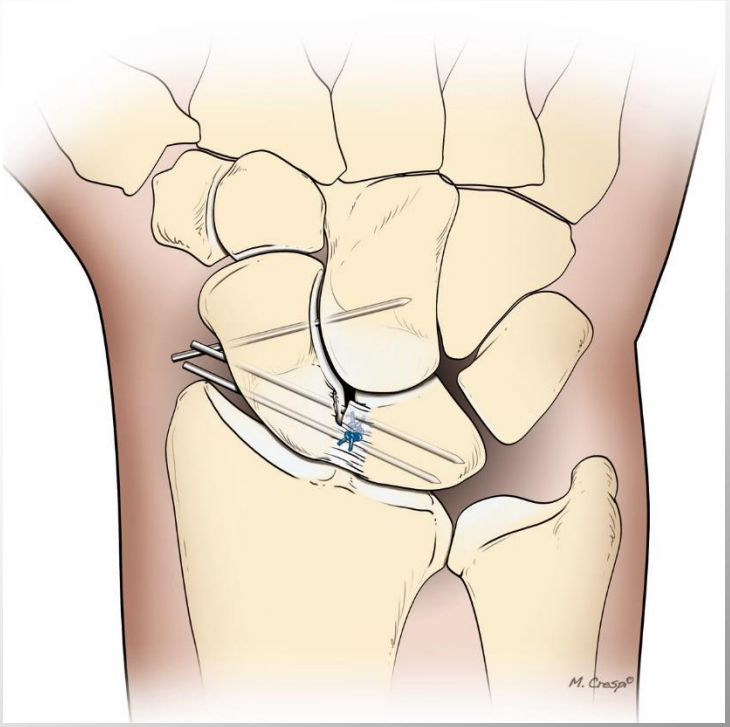
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

SL K-Wires +/- SC K-Wires **only** if unreductible





Without pinning!!!

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Material

- *Between 2008 – end of 2013*
  1308 wrist arthroscopies
  221 scapholunate tears
  (17% !!! Significant increase in indications last 3 years)
- 139 men 82 women
- Mean age : 38.1 yo (range 17 to 63)
- Sports injuries : 192 cases
  high level : 61 cases
- Average time between injury and surgery: 7.13 months (range 3 to 26)

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Material

EWAS Classification

- Stage 2 : 9 cases
- Stage 3A : 1 case
- Stage 3B : 66 cases
- Stage 3C : 65 cases
- Stage 4 : 80 cases
  (*Stage 4+: 11 cases)*

Garcia-Elias' Suggestion

- Stage 2 : 54 cases
- Stage 3 : 65 cases
- Stage 4 : 95 cases
- Stage 5 : 7 cases

EWAS
European Wrist Arthroscopy Society

Institut de la Main

RESULTS

Follow-up : 39.43 months (range 12 to 83)

- **Pain :**
  Preop VAS : 7.01 Postop VAS : 0.9
  Failure 5 cases (5/7 Stage 5 according Garcia-Elias)
  (Considered as "Static" Ewas 4+ 5/11)

- **ROM :**
  normal flexion–extension in 186 cases (84,1%)
  normal pronation-supination in all cases (100%)

- **Strength** :
  Preop: 23.05 kgf Postop: 42.32 kgf

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Total functional outcomes (2015)

	Pre-op	post-op	controlateral
Flexion	51.41	64.54**(p<0,01)**	71.43(p=0,26)
Extension	50.58	75.66 **(p<0,01)**	77.89 (p=0,35)
Radial deviation	15.7	21.82 **(p<0,01)**	27.36 (p=0,48)
Ulnar deviation	26.75	35.52 **(p<0,01)**	37.28 (p=0,27)
Pronation supination	0-160	0-178 **(p<0,02)**	0-179 (p=0,16)
Wrist strength	23.05	42.32 **(p<0,01)**	40.81(p=0,18)

No problem with sporty level +++

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Total functional outcomes (2013)

	Pre-op	*post-op*	*controlateral*
Flexion	*53.45*	*66.58* ***(p<0,01)***	*67.45 (p=0,26)*
Extension	*64.56*	*73.05* ***(p<0,01)***	*74.58 (p=0,35)*
Radial deviation	*15*	*27.25* ***(p<0,01)***	*28.75 (p=0,48)*
Ulnar deviation	*30*	*37,14* ***(p<0,01)***	*38,85 (p=0,27)*
Pronation supination	*0-160*	*0-178* ***(p<0,02)***	*0-179 (p=0,16)*
Wrist strength	*25.41*	*42.27* ***(p<0,01)***	*43.86(p=0,18)*

•Wahegaonkar A.L, Mathoulin C.L.
Arthroscopic Dorsal Capsulo-Ligamentous Repair in the Treatment of Chronic Scapho-lunate Ligament Tears.
J Wrist Surg. 2013; 2:141-148.

EWAS
European Wrist Arthroscopy Society

Institut de la Main

A. Meo
World champion 2015 of enduro
Operated 8 months before (EWAS 4)

M.Nissima
World champion 2010 of sword
Operated 1 year before (EWAS 4)

B. Guyart
Gold Olympic fencing champion 2008
Operated 6 months before (EWAS 3C)

S. Guenot
Silver Olympic GR wrestling champion 2012
Operated 8 months before (EWAS 4)

EWAS
European Wrist Arthroscopy Society

No problem with sporty level +++

Institut de la Main

Results

Outcome **was** related to :

– **Stage:** Garcia-Elias 5 (5/7) - EWAS 4+ (5/11)

Outcome **was** related to :

– delay surgery (better outcome if short delay)

Complications:

- Slight flexion stiffness 25 cases (range 40° to 60°)
- 4 Sudeck (healed)

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Results

DASH:

PreOp : Average 51.04 (range 13.64 to 90.91)

PostOp : Average 9.13 (range 0 to 40.91)

Mayo WS:

Excellent :	118 cases
Good:	72 cases
Average :	26 cases
Poor:	5 cases

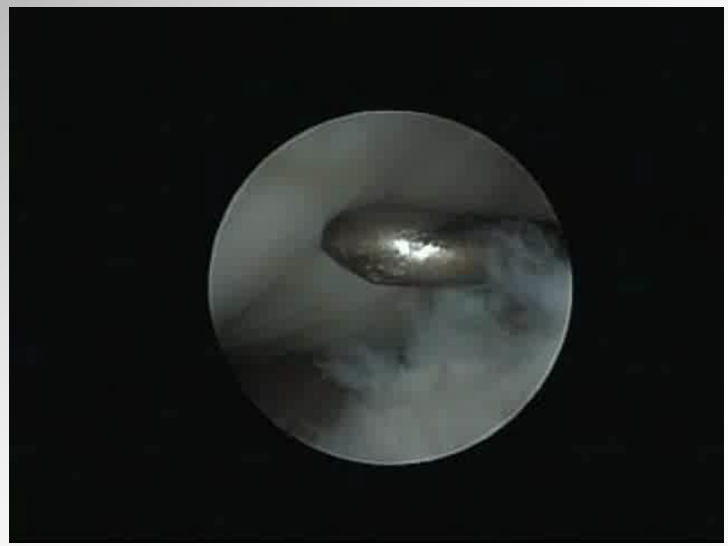
EWAS
European Wrist Arthroscopy Society

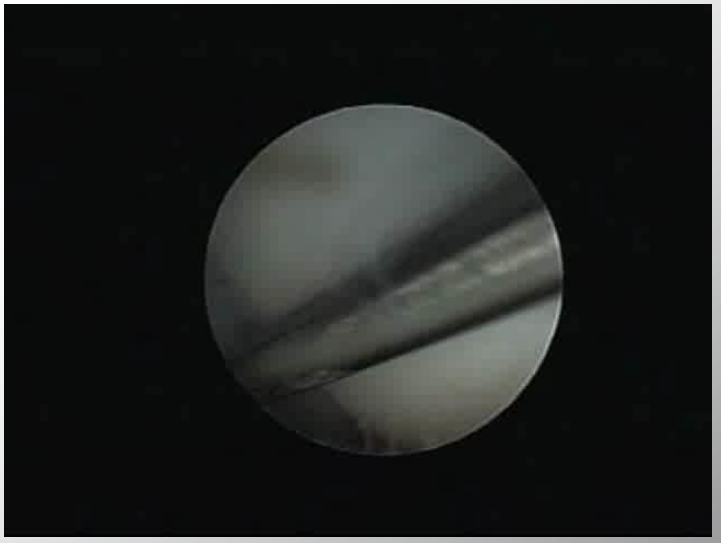
Institut de la Main

Clinical case

Clinical case

ADCLR
Stage EWAS 4, Geissler 4, Garcia-Elias 4



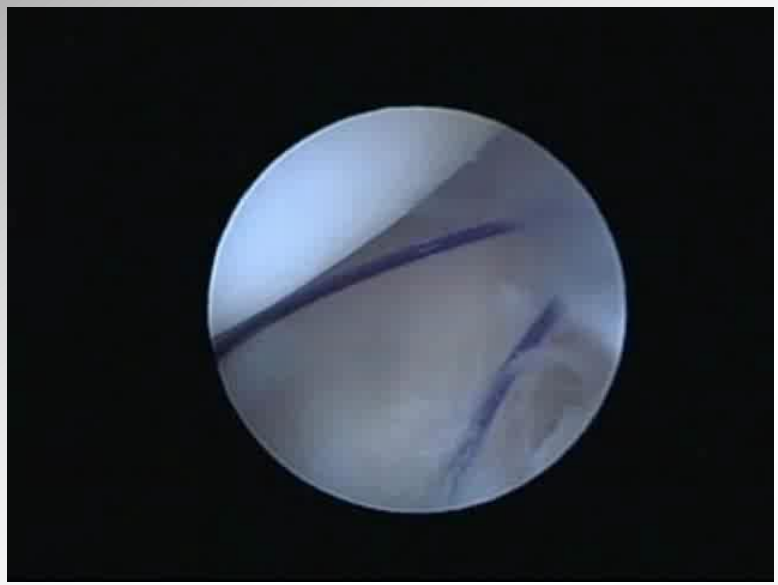


EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Clinical case

ADCLR
SL pinning + Scapho-capitate pinning

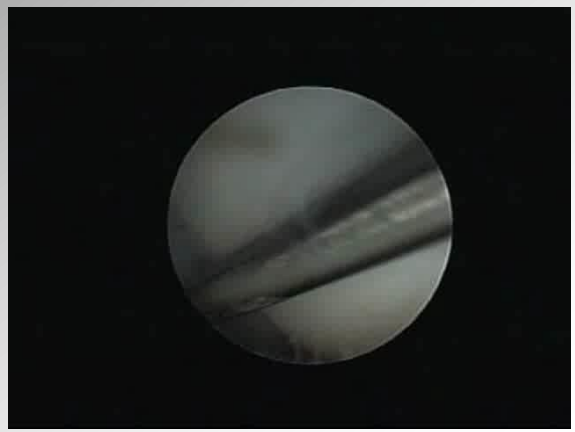


EWAS
European Wrist Arthroscopy Society

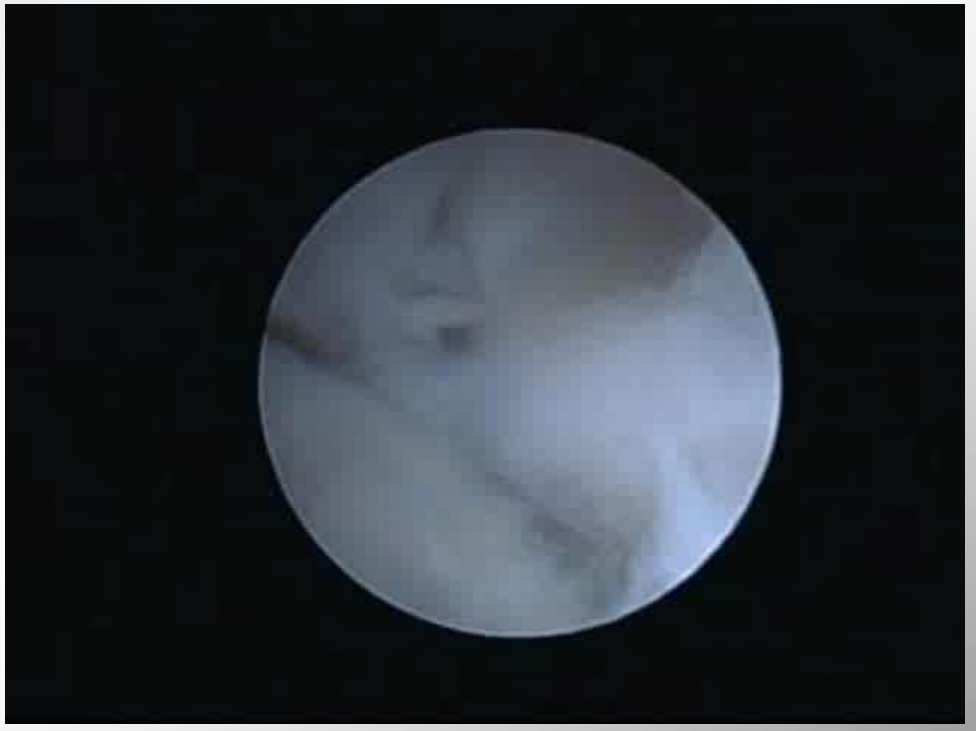
Institut
de la Main

Clnical case

ADCLR
SL pinning + Scapho-capitate pinning



Pre ADCLR



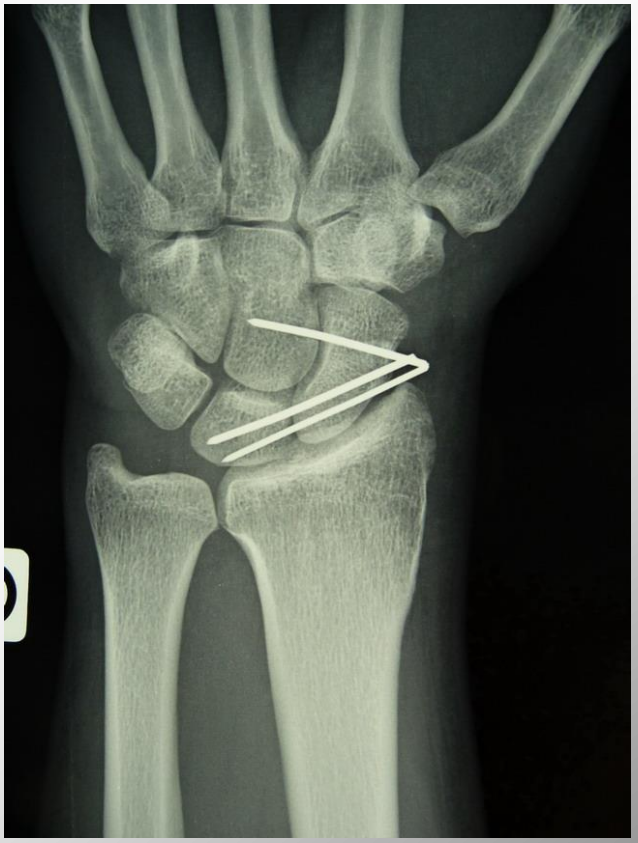
Post ADCLR

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Clinical case

ADCLR
SL pinning + Scapho-capitate pinning



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

RESULTS

Normal aspect

D + 2 months

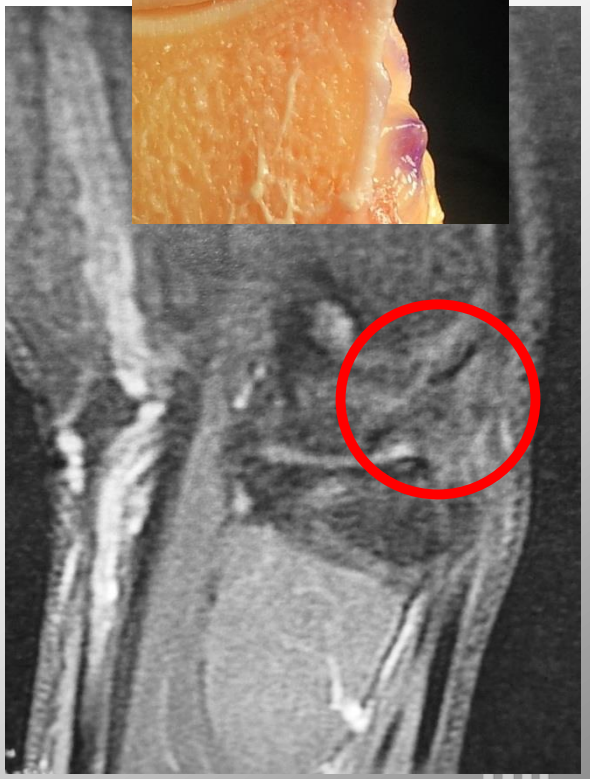
SLIOL unrepaired, Stability of dorsal part

EWAS
European Wrist Arthroscopy Society

Institut de la Main

RESULTS

D + 9 months



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

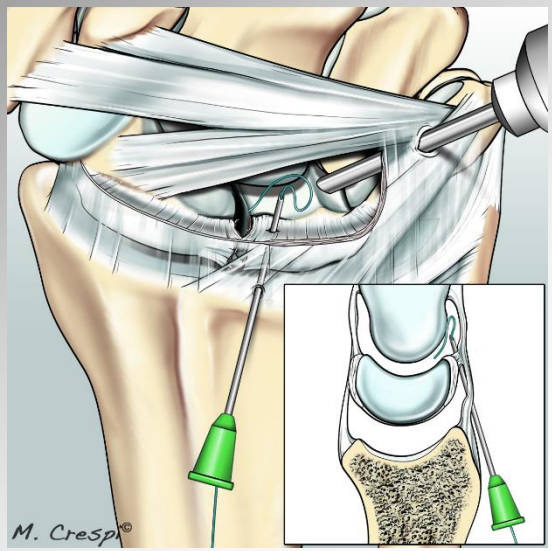
RESULTS

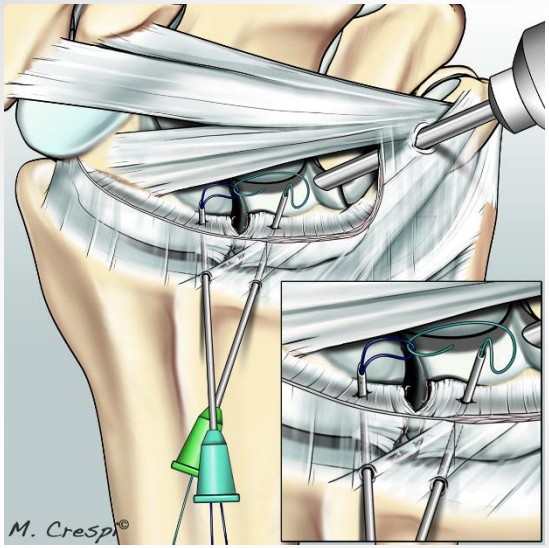
D + 38 months

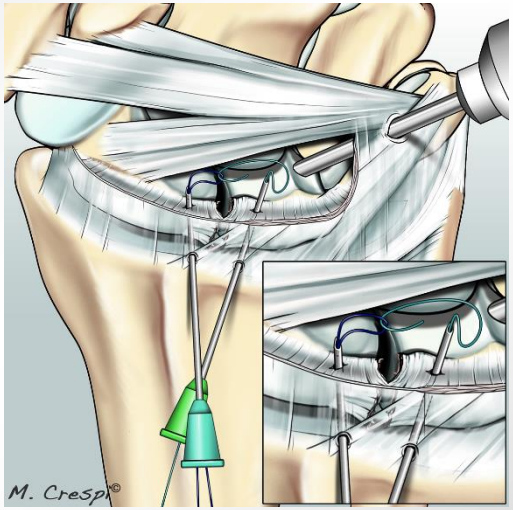
EWAS
European Wrist Arthroscopy Society

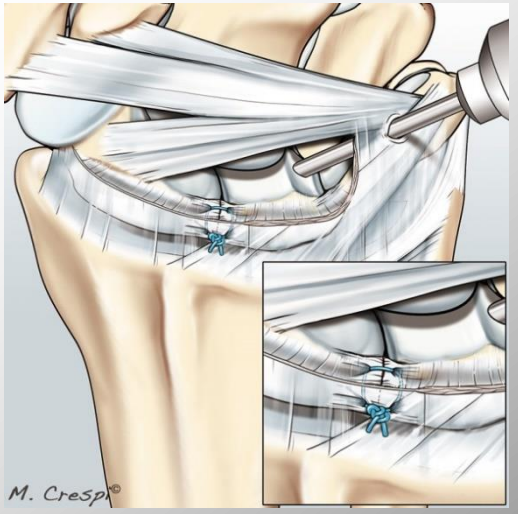
Institut de la Main

ADCLR Haerle's modification is EWAS 4









EWAS
European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure

Garcia-Elias stage 5- Ewas Stage 4+
ADCLR
SL pinning + Scapho-capitate pinning

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Clinical case - Failure

Garcia-Elias stage 5- Ewas Stage 4+
ADCLR
SL pinning + Scapho-capitate pinning

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

When the dorsal radial scaphoid remnant part of SL doesn't exist

Use of K-Wires!!! (Garcia-Elias proposal)

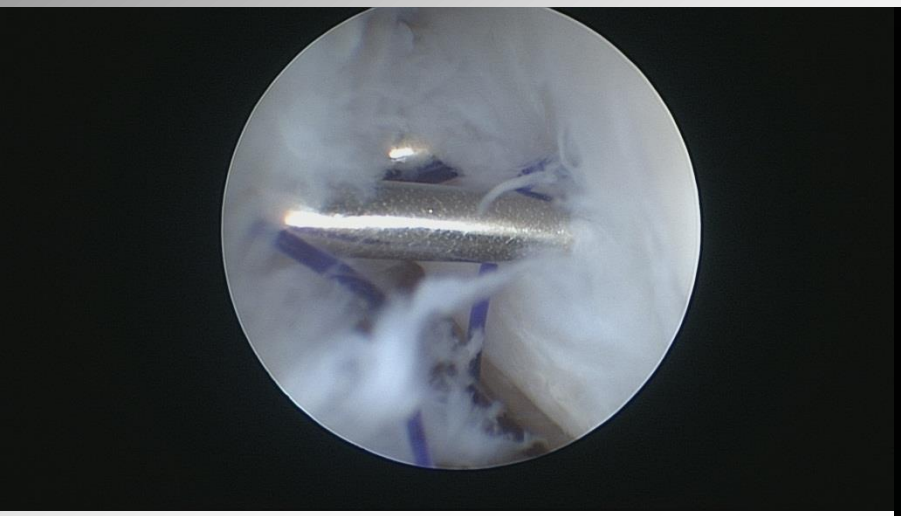
EWAS
European Wrist Arthroscopy Society

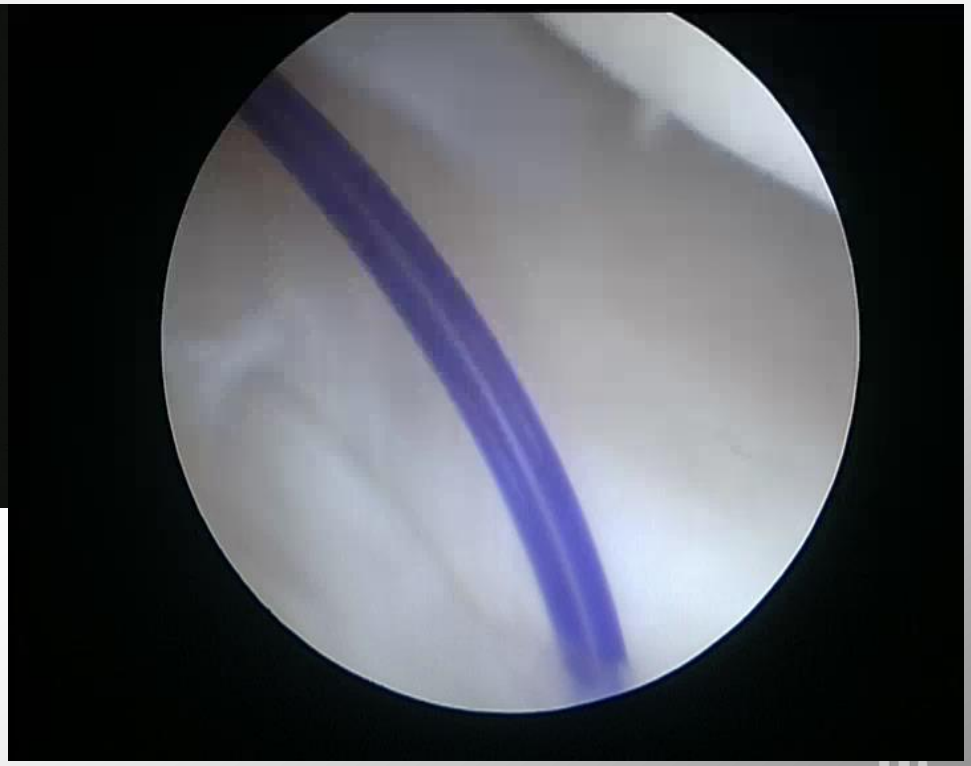
Institut de la Main

Arthroscopic Dorsal Capsuloligamentous Repair ADCLR

When the dorsal radial scaphoid remnant part of SL doesn't exist

Use of K-Wires!!! (garcia-Elias proposal)





EWAS
European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure

Garcia-Elias stage 5- Ewas Stage 4+
ADCLR
SL pinning + Scapho-capitate pinning

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Clinical case - Failure

Garcia-Elias stage 5- Ewas Stage 4+
ADCLR
SL pinning + Scapho-capitate pinning

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure

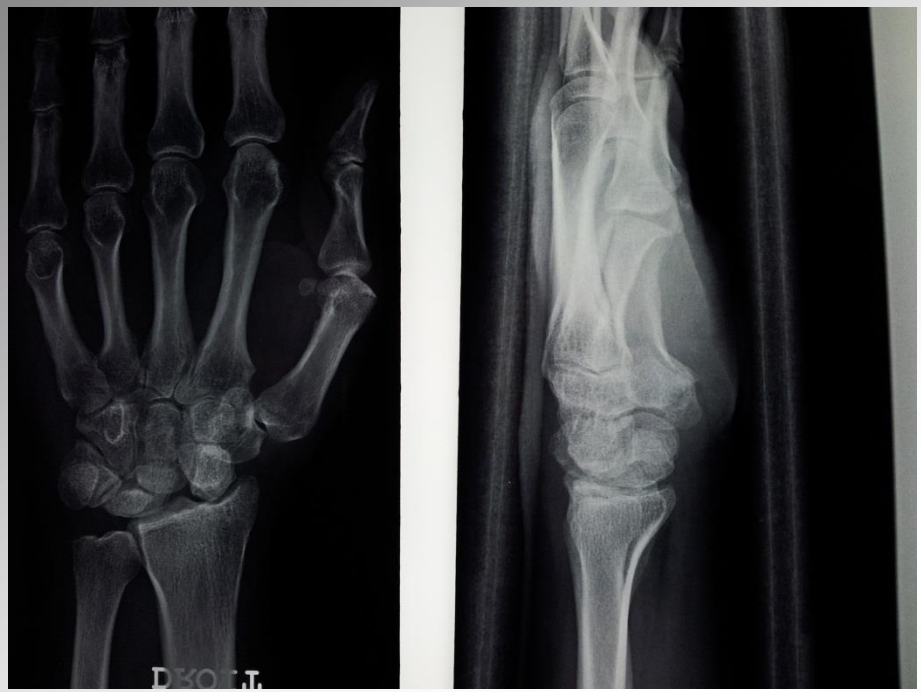
Garcia-Elias stage 5- Ewas Stage 4+
ADCLR
SL pinning + Scapho-capitate pinning

D + 1 years

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure



D + 1 years

European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure

Small Pain ! No chondral change yet!

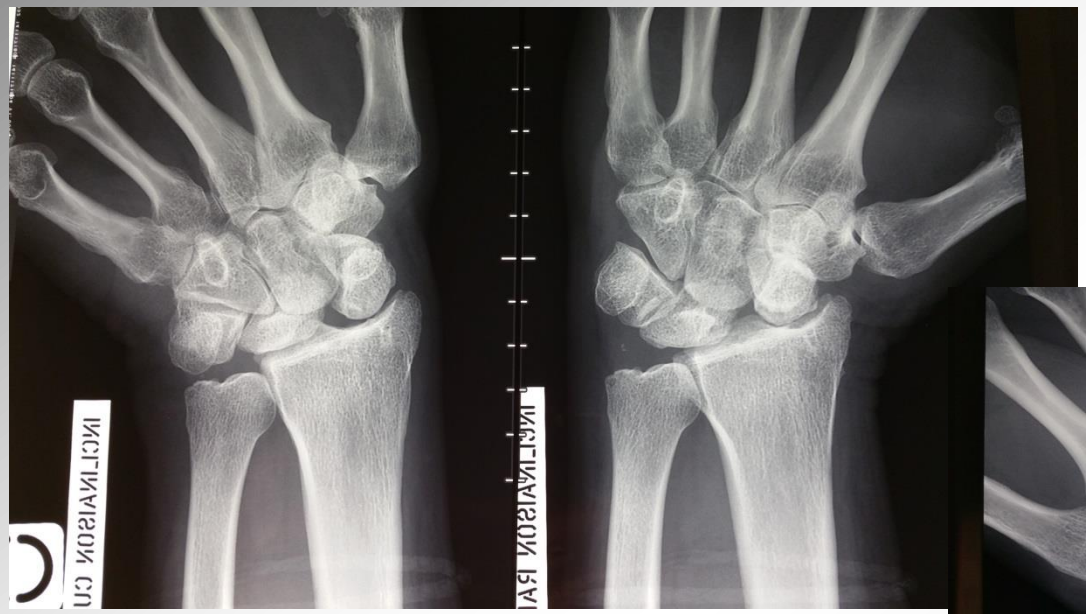
D + 4 years

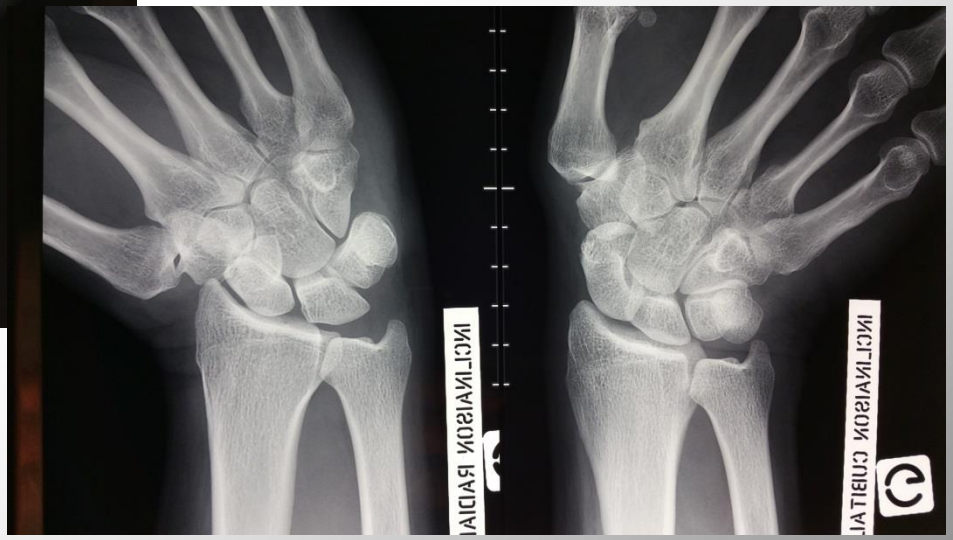
European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure

ROM: E 60/85 ; F 45/75; RD 10/25; UD 30/35





Play Tennis 3 times a week
Play golf regularly!
VAS = 2 ; Dash = 4.55

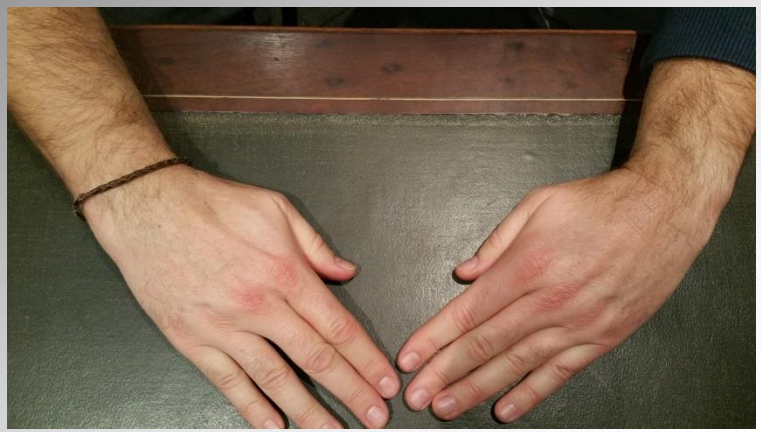
D + 4 years

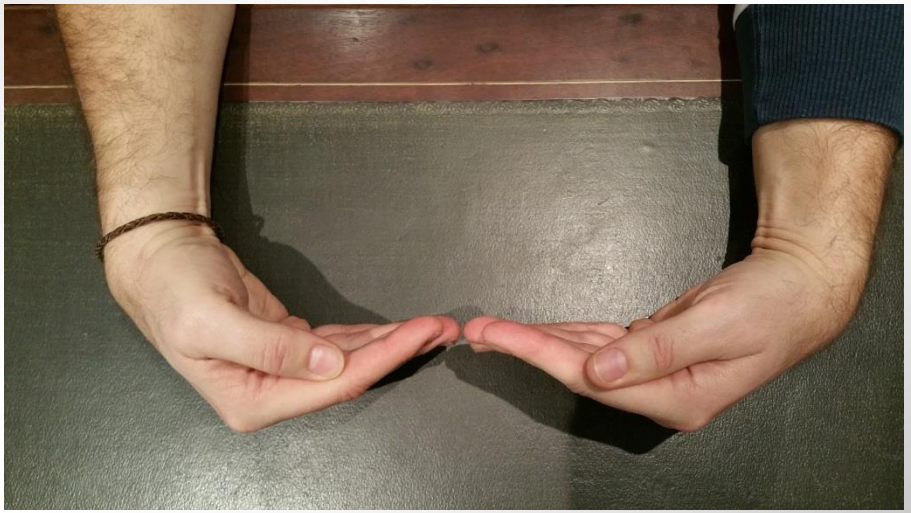
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Clinical case - Failure

ROM: E 60/85 ; F 45/75; RD 10/25; UD 30/35





D + 4 years

EWAS
European Wrist Arthroscopy Society

Institut de la Main

New Procedure for stage 5-6: ADCLR-2

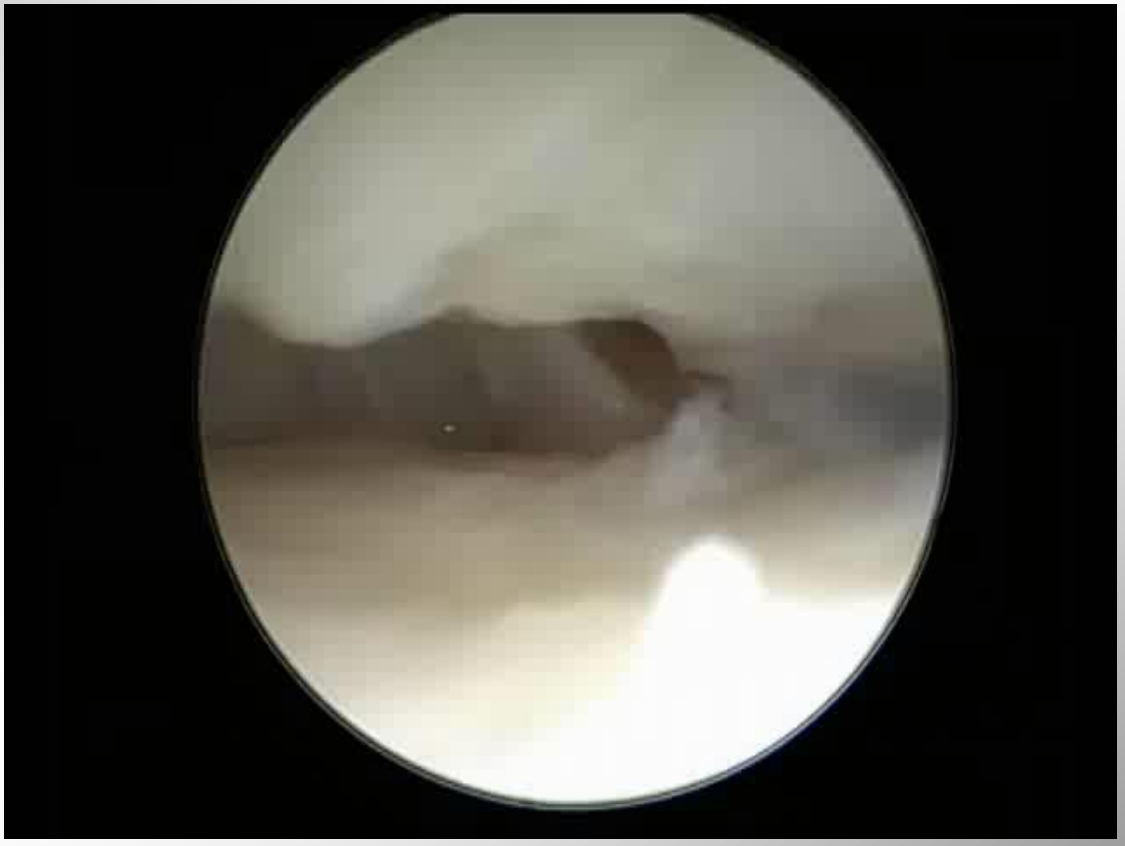
Garcia-Elias stage 5 (modified 6)
Ewas Stage 4+

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

New Procedure for stage 5-6: ADCLR-2

Garcia-Elias stage 5 (modified 6)
Ewas Stage 4+
No ligament attached to Scaphoid

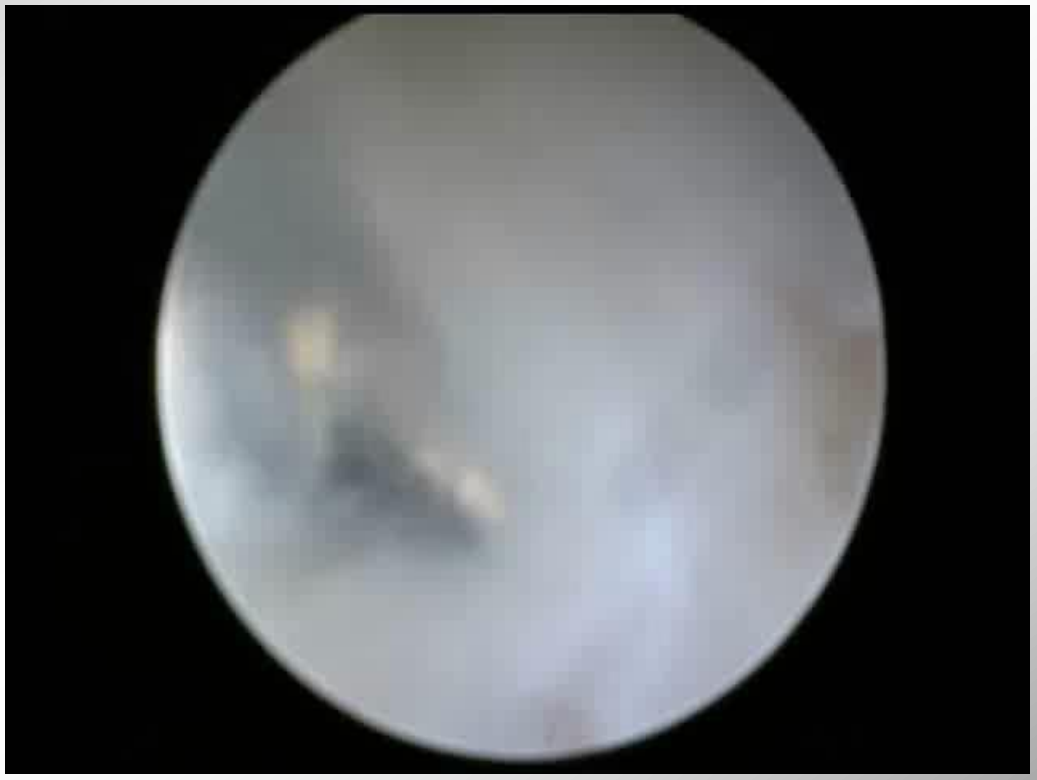


EWAS
European Wrist Arthroscopy Society

Institut
de la Main

New Procedure for stage 5-6: ADCLR-2

Garcia-Elias stage 5 (modified 6)
Ewas Stage 4+
Self drilling anchor into dorsal proximal pole



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

New Procedure for stage 5-6: ADCLR-2

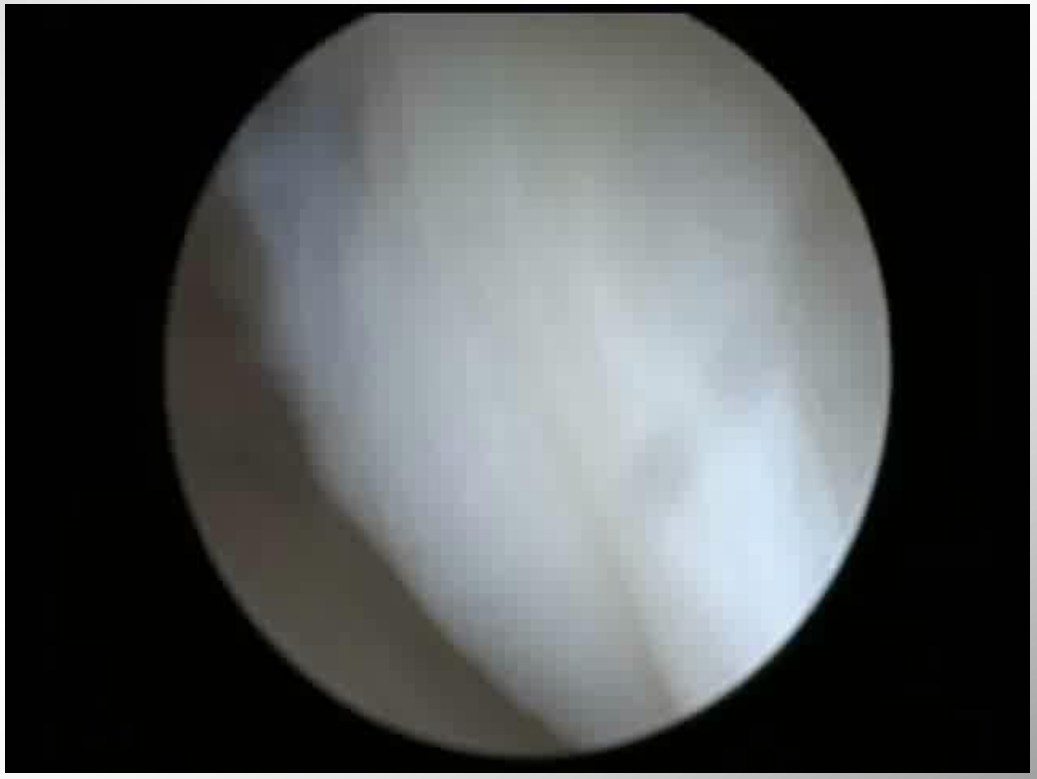
Garcia-Elias stage 5 (modified 6)
Ewas Stage 4+
« Classical » dorsal capsulo-ligamentous repair

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

New Procedure for stage 5-6: ADCLR-2

Garcia-Elias stage 5 (modified 6)
Ewas Stage 4+
« Classical » dorsal capsulo-ligamentous repair



EWAS
European Wrist Arthroscopy Society

Institut
de la Main

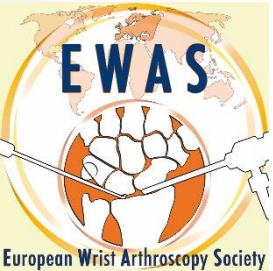
New Procedure for stage 5-6: ADCLR-2

Good scapholunate reduction

EWAS
European Wrist Arthroscopy Society

Institut
de la Main

Where are we now?



Institut
de la Main

OUTSTANDING ISSUES

Is the SLIOL really useless ?

What is the real importance of proprioception? Do we act on proprioception with arthroscopic repair?

Does the distal volar ligamentous lesions (stt) exist?

Are isolated lesions of the dorsal capsule pre-unstable lesions, or are they another entity?

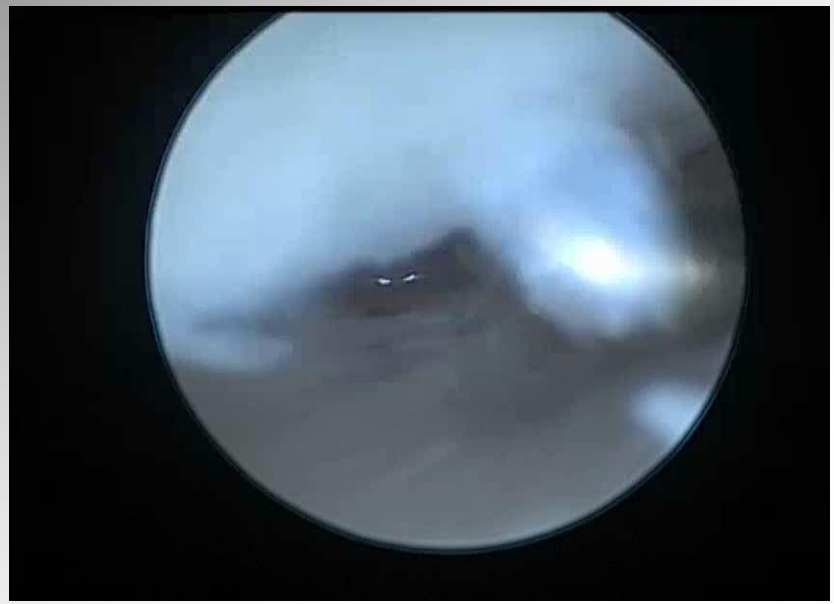
What is the real place of extrinsic ligaments? SLLComplex?!

EWAS
European Wrist Arthroscopy Society

Institut de la Main

OUTSTANDING ISSUES

Probably yes….D+9 years after dorsal ECRB open surgery for stage V…..
SLIOL unrepaired, DIC/DST-Dorsal SL perfect!, SL midcarpal EWAS 2A



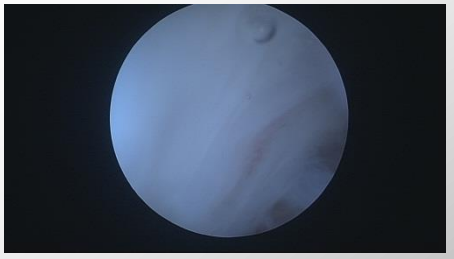
EWAS
European Wrist Arthroscopy Society

Institut de la Main

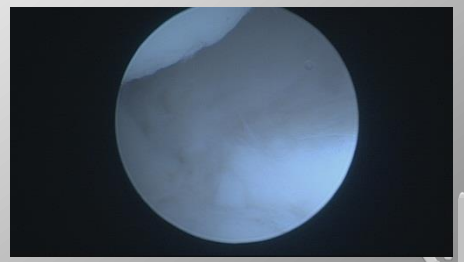
OUTSTANDING ISSUES

Another case: SL dissociation EWAS 3C, D+3 years after ADCLR…
SLIOL unrepaired, DIC/DST-Dorsal SL perfect!, SL midcarpal EWAS 1

SL RC



DCSL



SL MC

EWAS
European Wrist Arthroscopy Society

Institut de la Main

OUTSTANDING ISSUES

Is the SLIOL really useless ?

What is the real importance of proprioception? Do we act on proprioception with arthroscopic repair?

Does the distal volar ligamentous lesions (stt) exist?

Are isolated lesions of the dorsal capsule pre-unstable lesions, or are they another entity?

What is the real place of extrinsic ligaments? SLLComplex?!

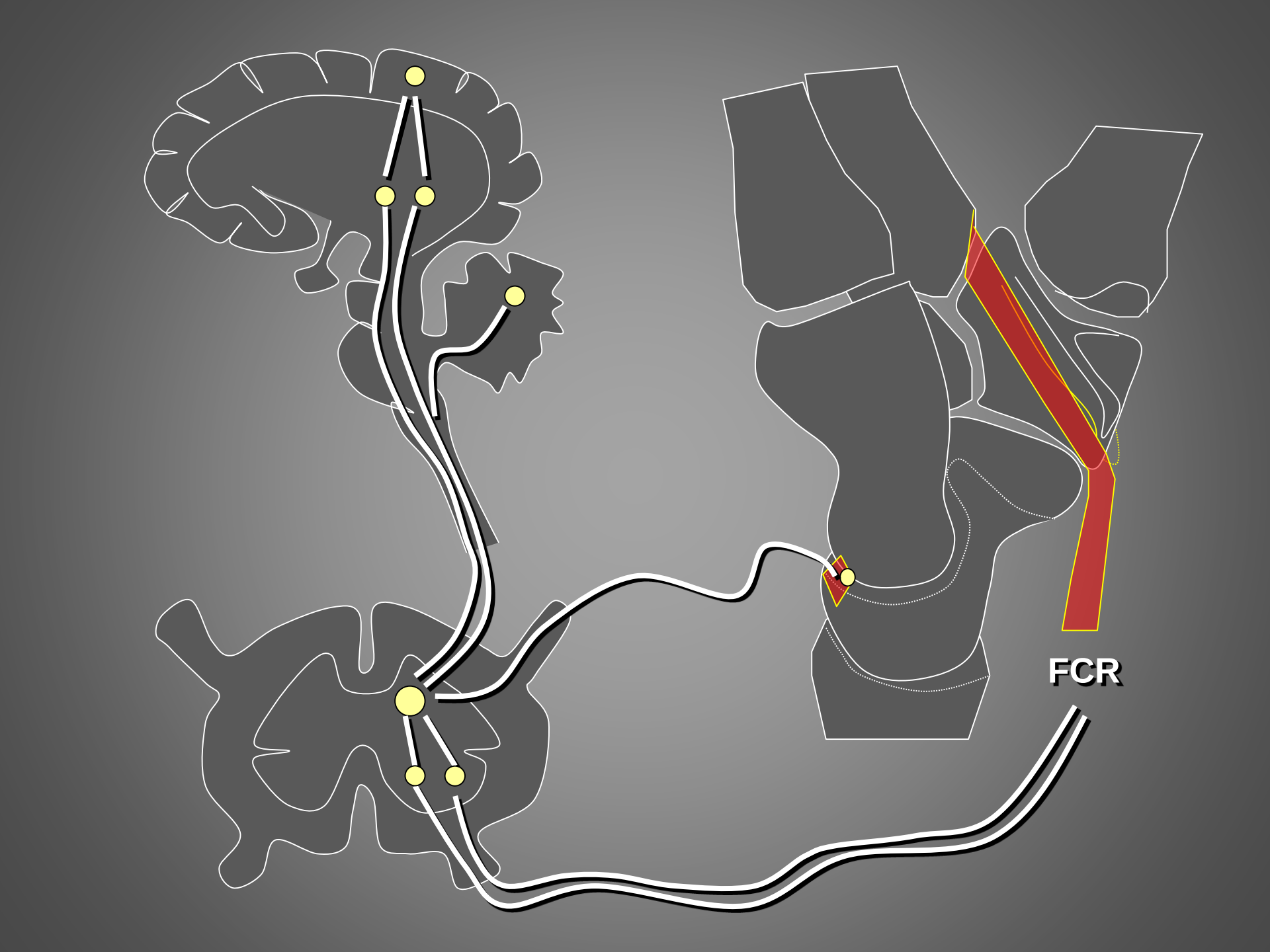
EWAS
European Wrist Arthroscopy Society

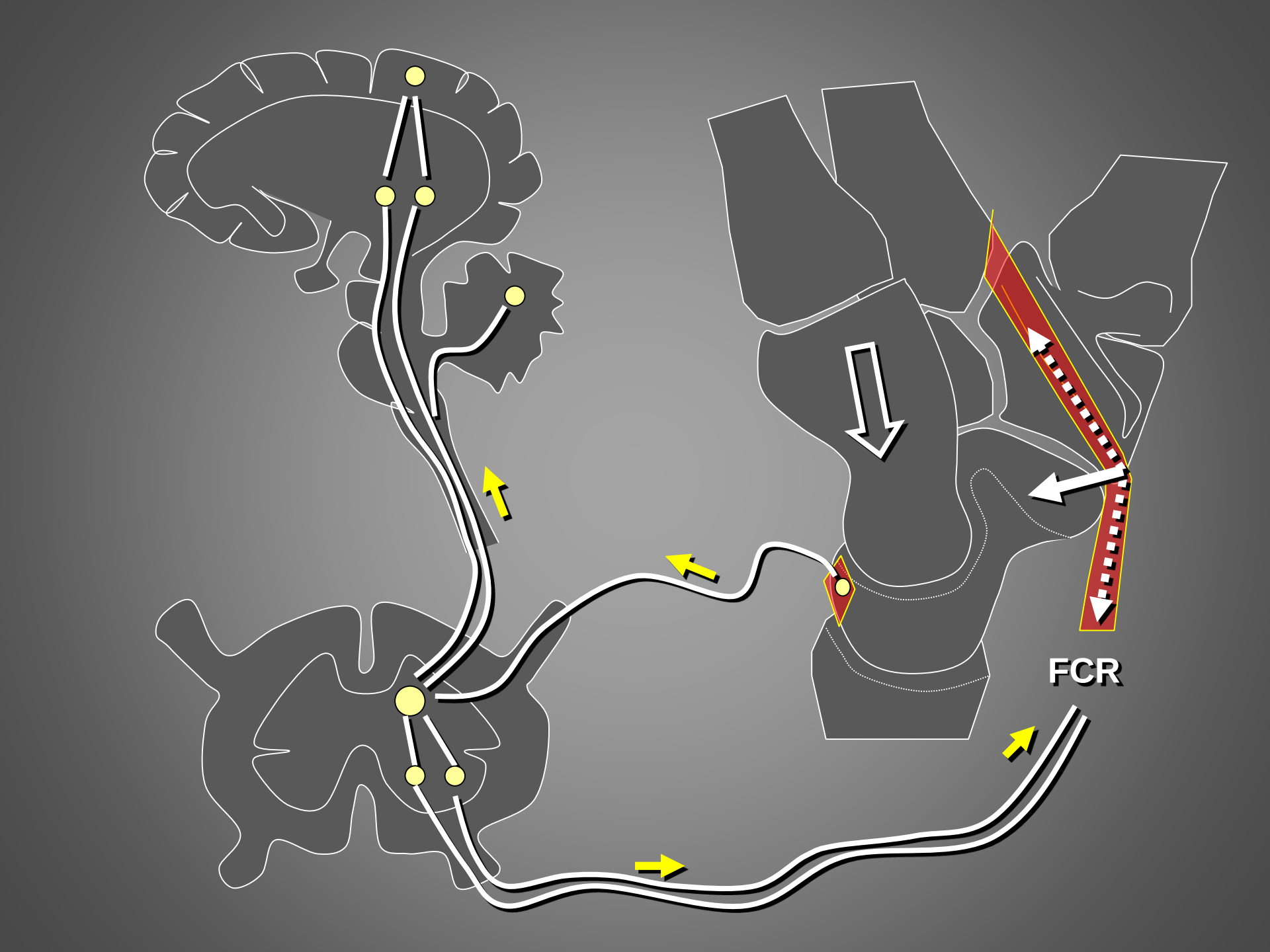
Institut de la Main

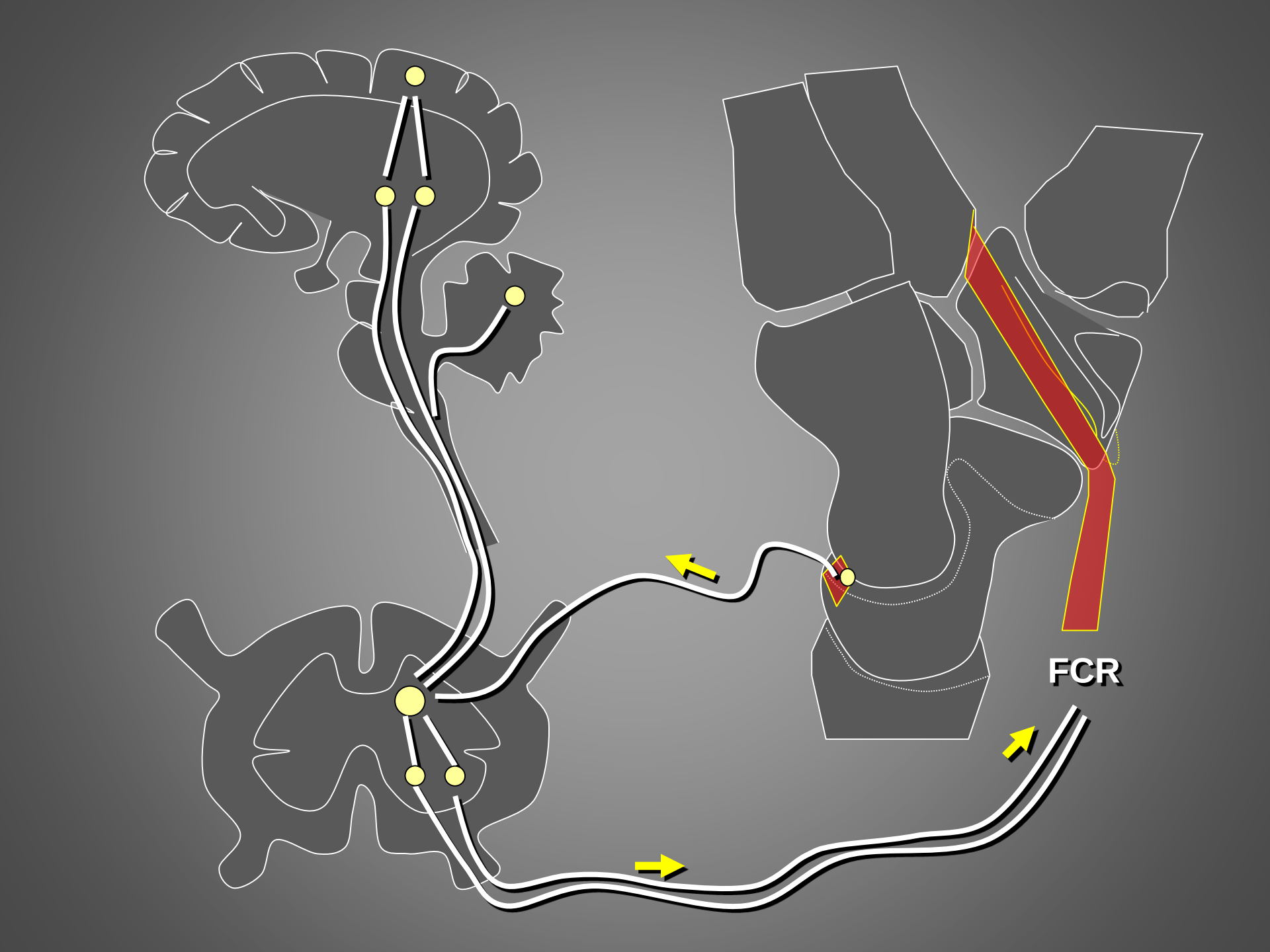
Open surgery is fine, but it has an important drawback

it may denervate partially or totally some areas of the wrist

altering the mechanisms of proprioceptive neuromuscular control of the wrist

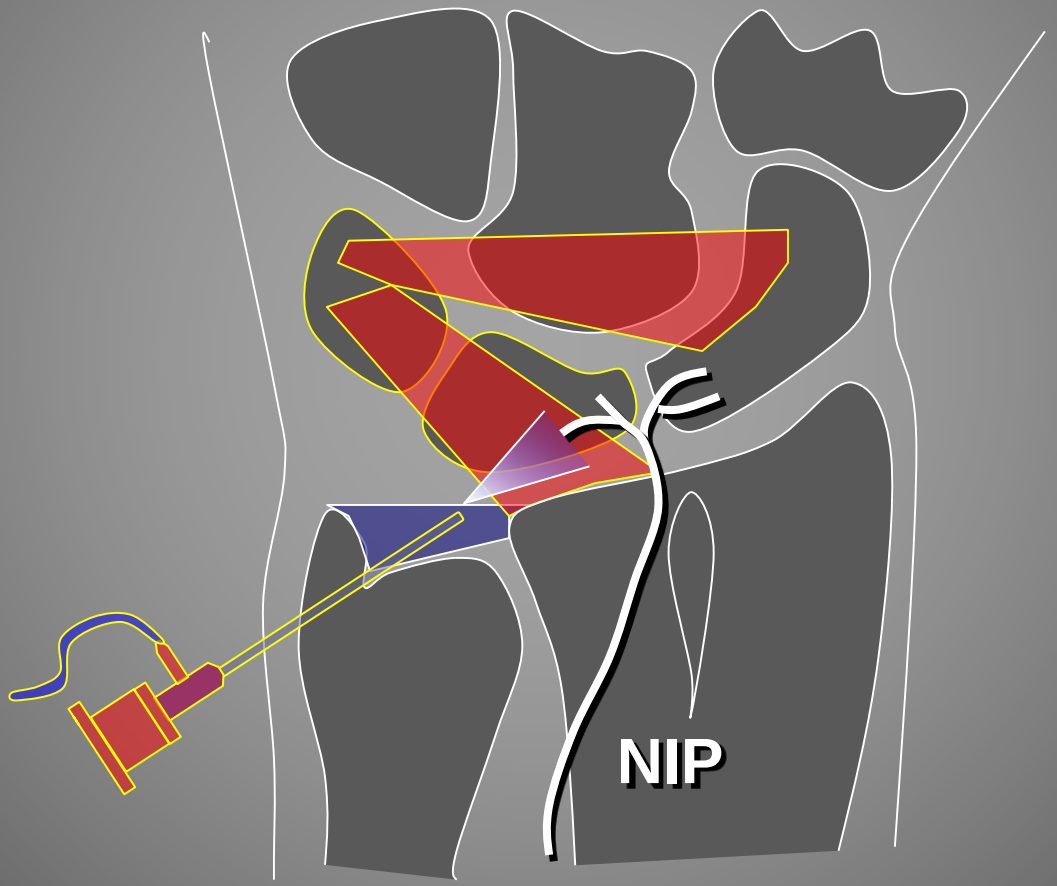

FCR


FCR


FCR

Arthroscopy

The least denervating intervention !



OUTSTANDING ISSUES

Is the SLIOL really useless ?

What is the real importance of proprioception? Do we act on proprioception with arthroscopic repair?

Does the distal volar ligamentous lesions (stt) exist?

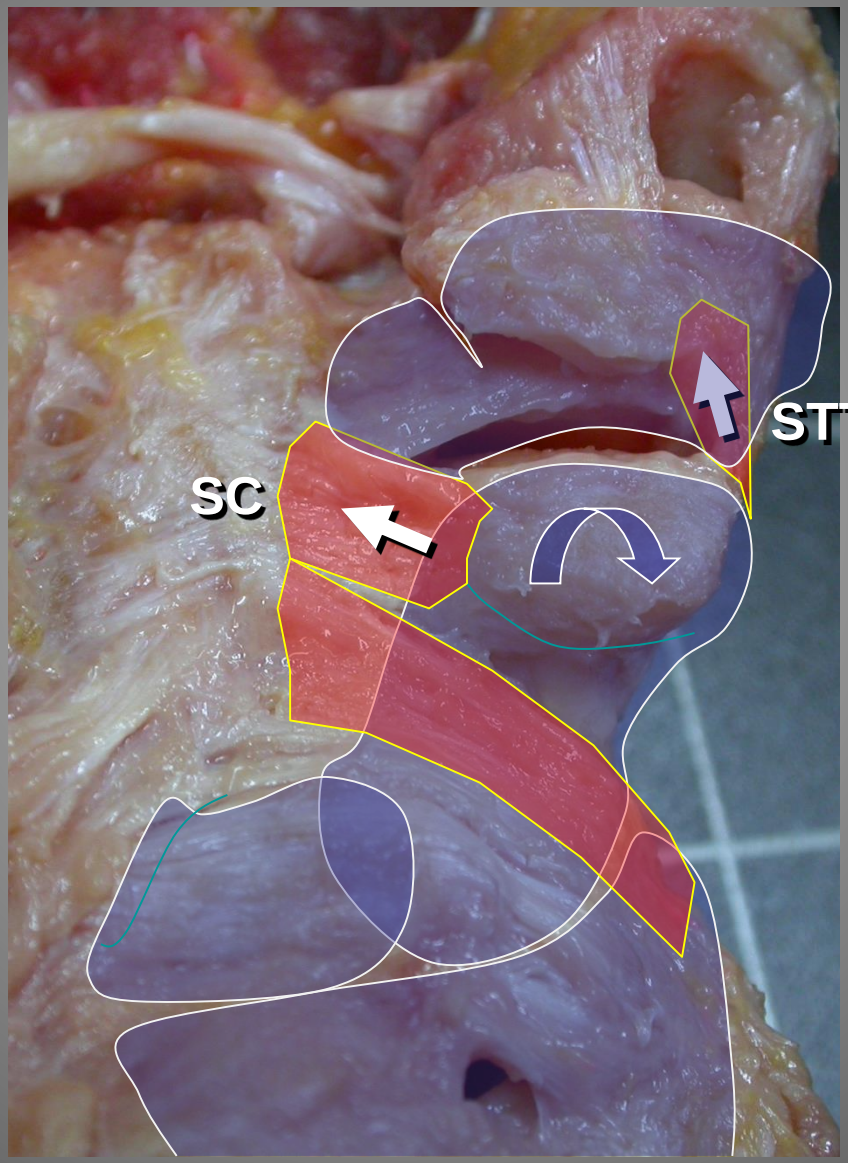
Are isolated lesions of the dorsal capsule pre-unstable lesions, or are they another entity?

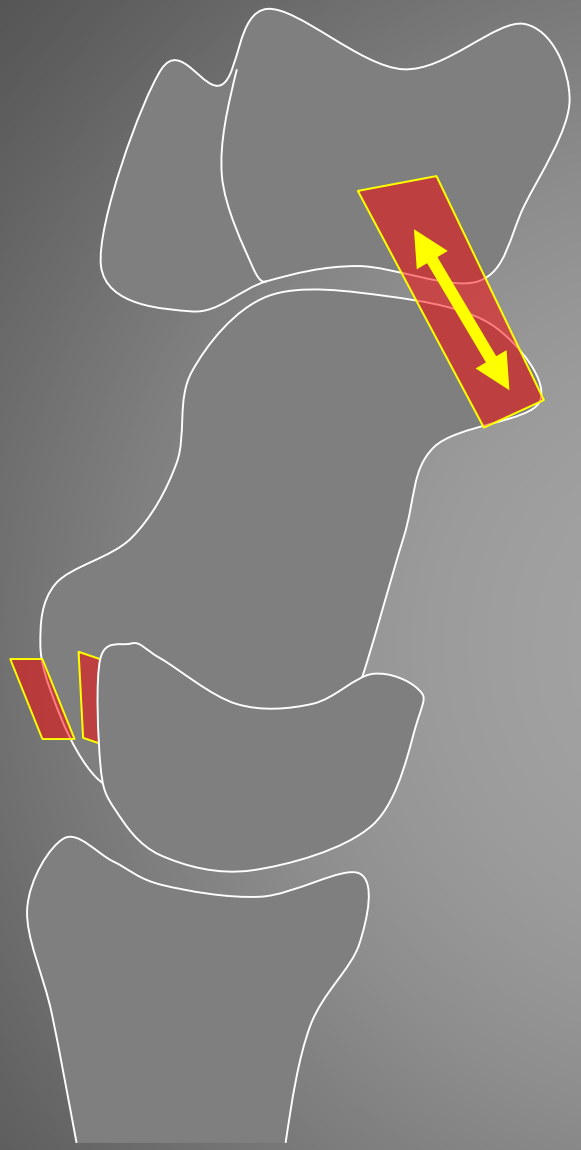
What is the real place of extrinsic ligaments? SLLComplex?!

EWAS
European Wrist Arthroscopy Society

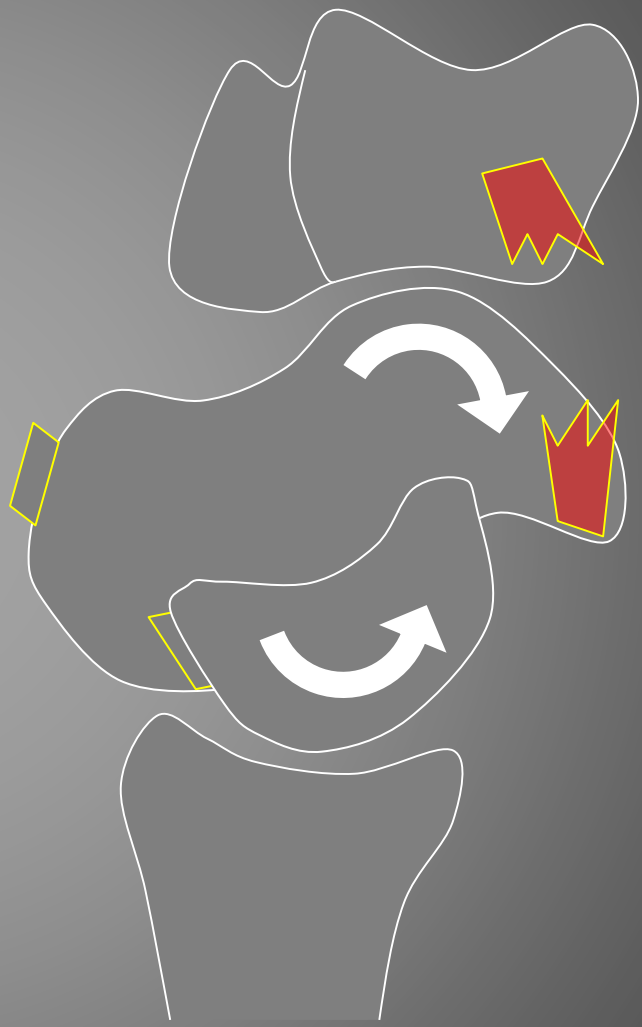
Institut de la Main

Are the secondary stabilizers OK ?

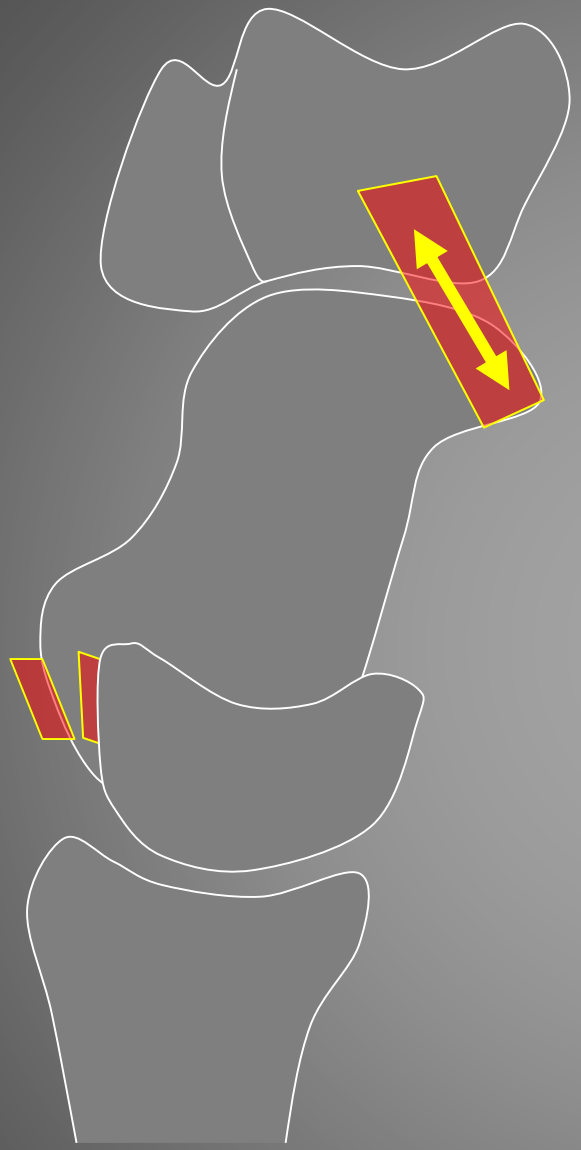




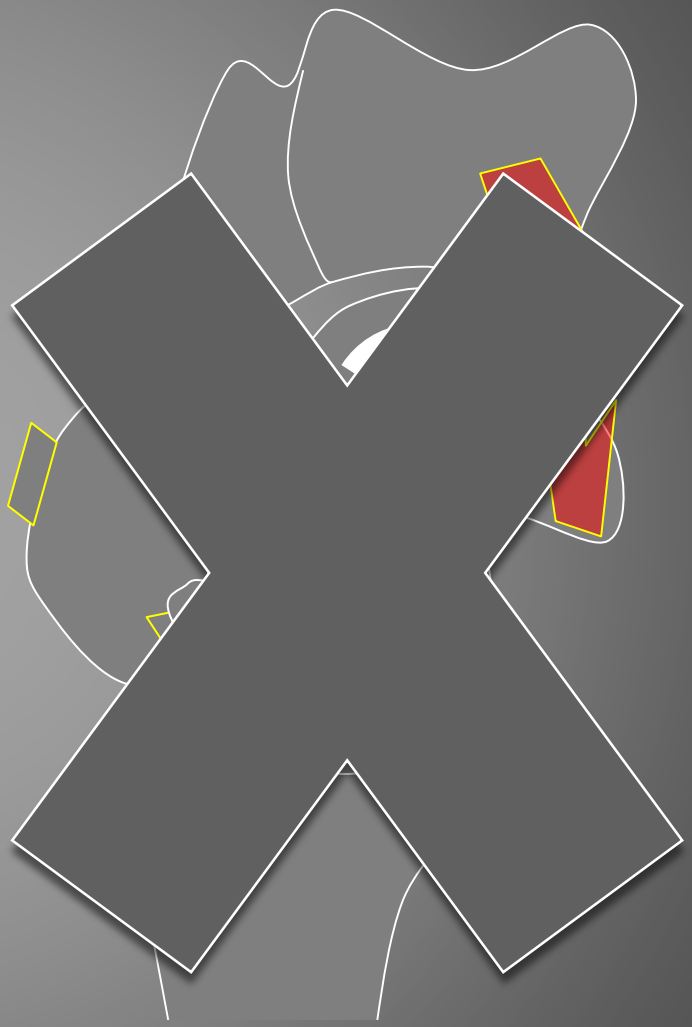
Isolated SL injury



Rotary subluxation



Isolated SL injury



Elongation; Elsaidi’s work!!!

OUTSTANDING ISSUES

Is the SLIOL really useless ?

What is the real importance of proprioception? Do we act on proprioception with arthroscopic repair?

Does the distal volar ligamentous lesions (stt) exist?

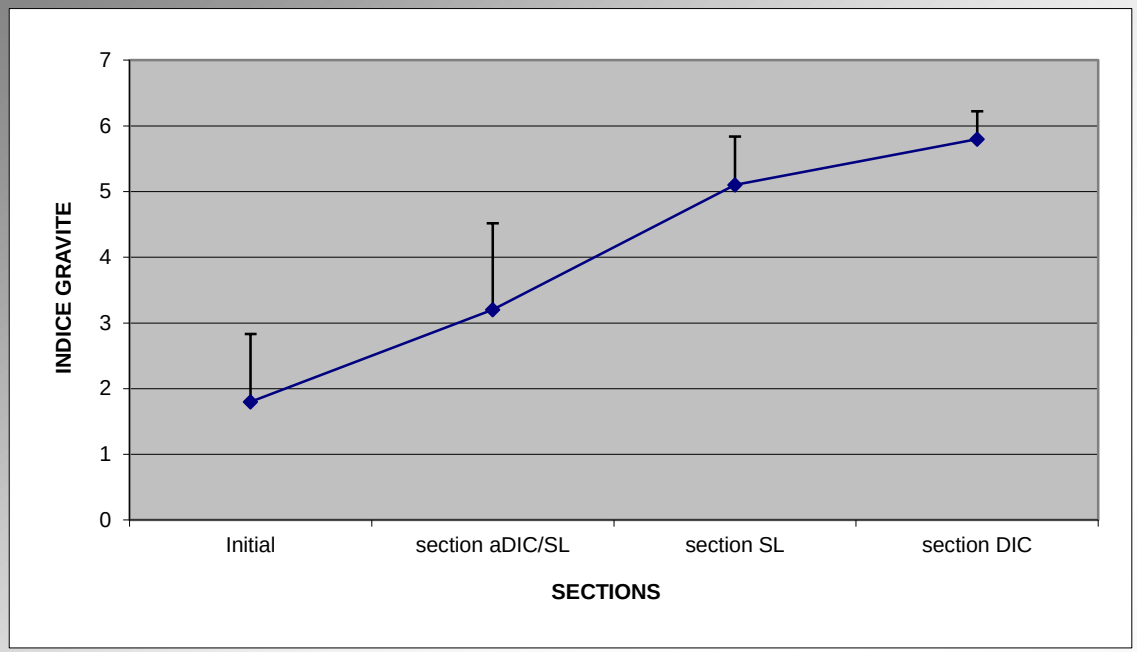
Are isolated lesions of the dorsal capsule pre-unstable lesions, or are they another entity?

What is the real place of extrinsic ligaments? SLLComplex?!

EWAS
European Wrist Arthroscopy Society

Institut de la Main

ANATOMY



This structure (Dorsal capsulo-scapholunate ligament) is a bridge between the DST and the dorsal SL, and seems to be essential to the SL stability, and probably its tears could be considered as a first stage of SL instability…!!!

EWAS
European Wrist Arthroscopy Society

Institut de la Main

OUTSTANDING ISSUES

Is the SLIOL really useless ?

What is the real importance of proprioception? Do we act on proprioception with arthroscopic repair?

Does the distal volar ligamentous lesions (stt) exist?

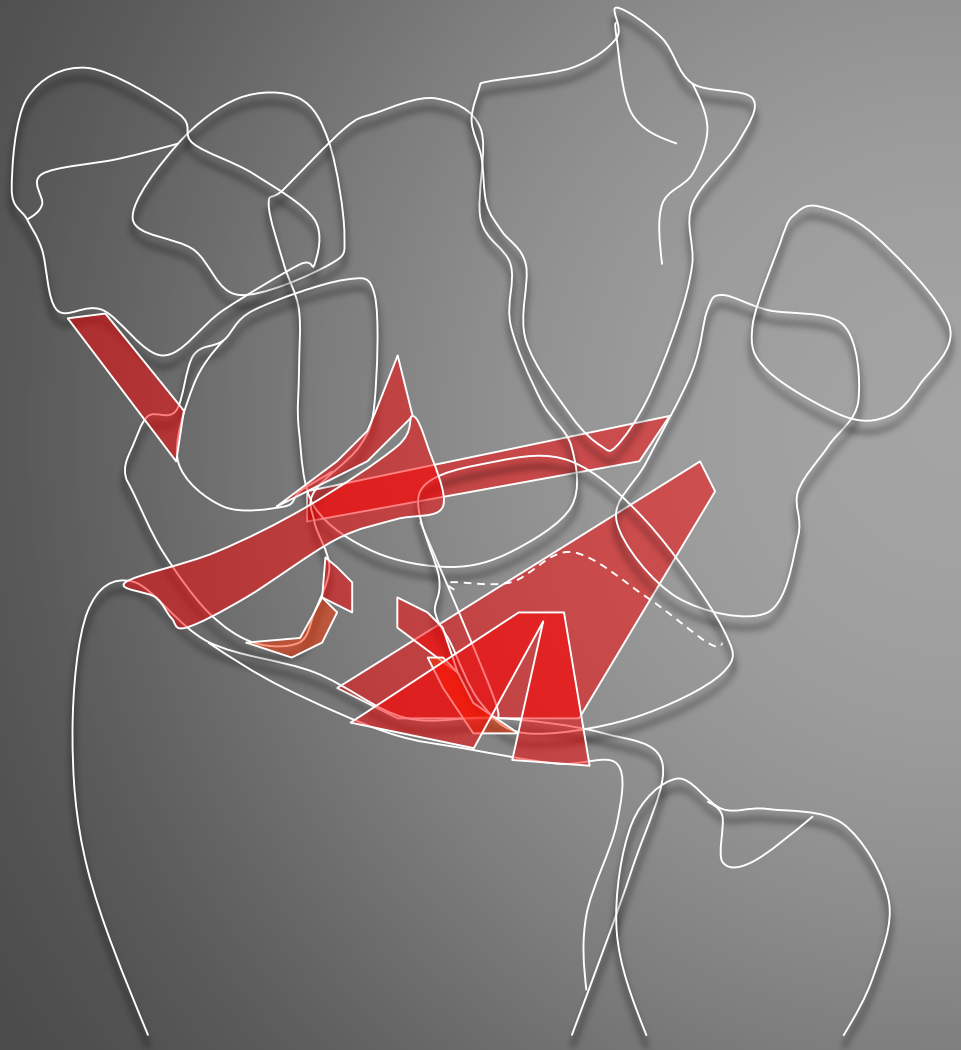
Are isolated lesions of the dorsal capsule pre-unstable lesions, or are they another entity?

What is the real place of extrinsic ligaments? SLLComplex?!

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Secondary stabilisers
(Luc Van Overstraeten, Emmanuel Camus)



- ✓ Dorsal & Palmar SL ligs.
- ✓ Proximal SL membrane
- ✓ Palmar SC ligament
- ✓ Dorsal STq (DIC) ligament
- ✓ Long & short RL ligament
  - ✓ Dorsolateral STT lig.
- ✓ Dorsal RC ligament
- ✓ Palmar RSC ligament
- ✓ Dorsal CSSeptum

OUTSTANDING ISSUES

Is the SLIOL really useless ? **YES**

What is the real importance of proprioception? Do we act on proprioception with arthroscopic repair? **YES**

Does the distal volar ligamentous lesions (stt) exist? **??**

Are isolated lesions of the DCSS pre-unstable lesions, or are they another entity? **YES**

What is the real place of extrinsic ligaments? **SLLComplex**

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Proposed treatment algorithm

STAGE ACUTE/ CHRONIC	Proposed treatment	
I A only	Cast	Predynamic, Dynamic
IIA,B,C A/C **Lesion of volar, dorsal or central part**	A/ ADCLR, Arthroscopic K-Wire C/ ADCLR (AVCLR if IIA)	Predynamic, Dynamic
IIIA A/C **Lesion of anterior part**	A/ AVCLR, Arthroscopic K-Wire C/ AVCLR, Volar Capsulodesis	Dynamic
IIIB A/C **Lesion of dorsal part**	A/ ADCLR C/ ADCLR	Dynamic
IIIC A/C **Complete SL lesion + DIC**	A/ ADCLR +/- AVCLR C/ ADCLR +/- AVCLR	Dynamic
IV A/C **Complete SL + extrinsic ligt lesion**	A/ ADCLR + AVCLR C/ ADCLR + AVCLR or Open ligamentoplasty	Dynamic, Static
IV+ C **Complete SL + bald scaphoid Reducible**	ADCLR 2 + AVCLR or open surgery or ?	Static

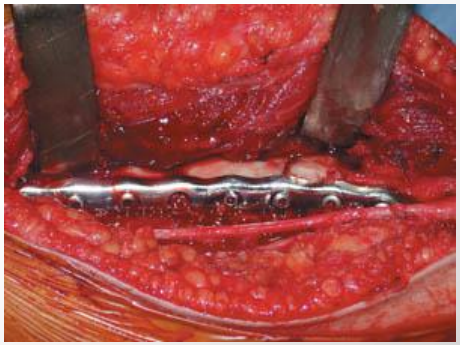
EWAS
European Wrist Arthroscopy Society

Institut de la Main

Philosophical and metaphysical question

What is the difference between God and a surgeon ...?
God never thought he was a surgeon!!!

Believe in “Nature”, which is, of course, stronger than us, and learn to use it !!!



When you put a plate on a bone, which heals the bone ?
the plate or the bone itself?

EWAS
European Wrist Arthroscopy Society

Institut de la Main

Conclusion

DSL, DST, DCSS ligts seem essential in SL stability.

SLLComplex: a new concept!!!!!!

Early diagnosis is requested!!!!!!!

Arthroscopic capsuloligamentous repair, DORSAL +/- VOLAR, is a simple and reliable procedure convenient for the patient with chronic scapho-lunate tears.

If bald scaphoid, anchor could be requested.

Place of open ligamentoplasties is reduced

Institut de la Main