Klinikum rechts der Isar
Technische Universität München

Instabilitäten des Handgelenks

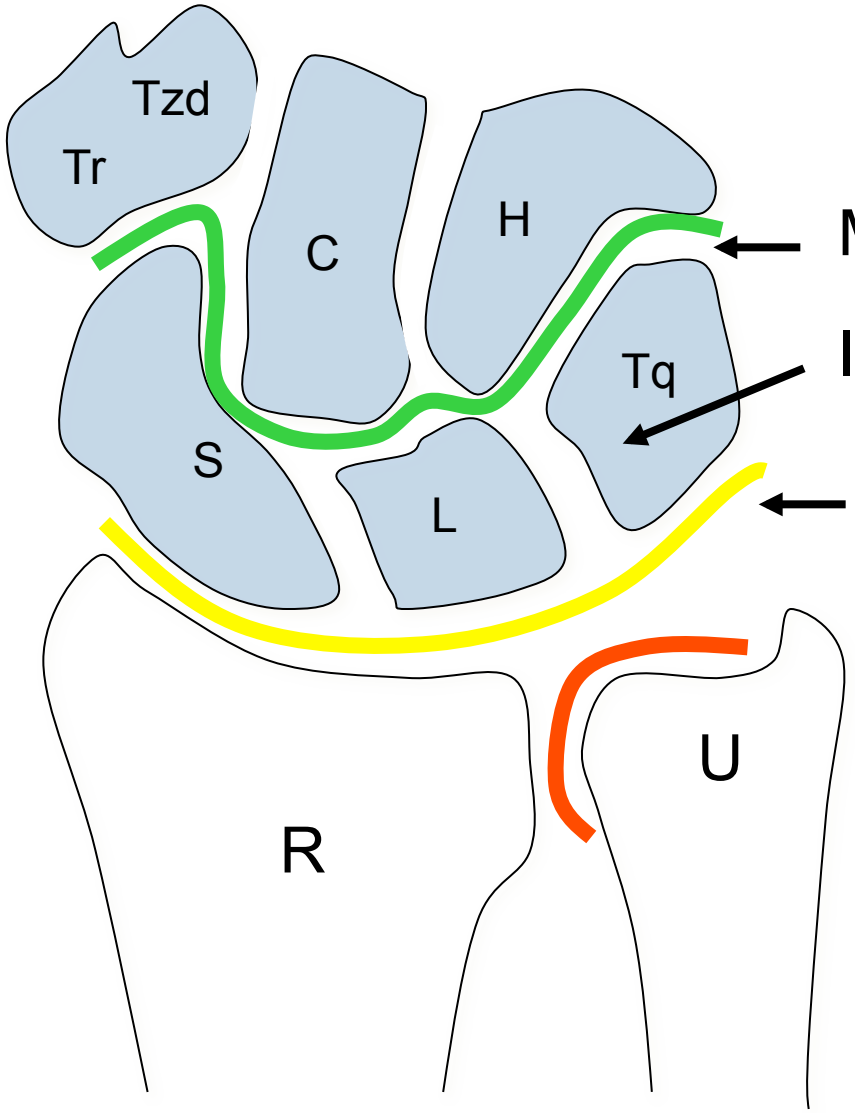
PD. Dr. med. K. Megerle

kai.megerle@mri.tum.de

TRADITION

Just Because You've Always Done It That Way
Doesn't Mean It's Not Incredibly Stupid.

Anatomie des Karpus



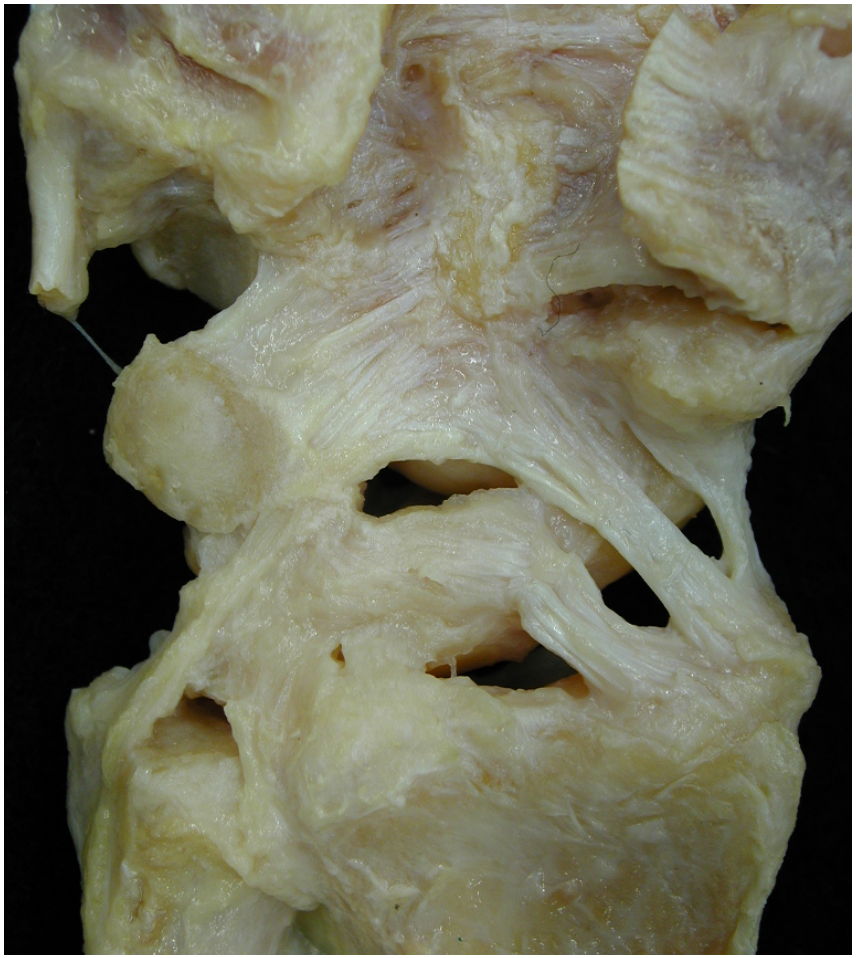
Midkarpales Gelenk

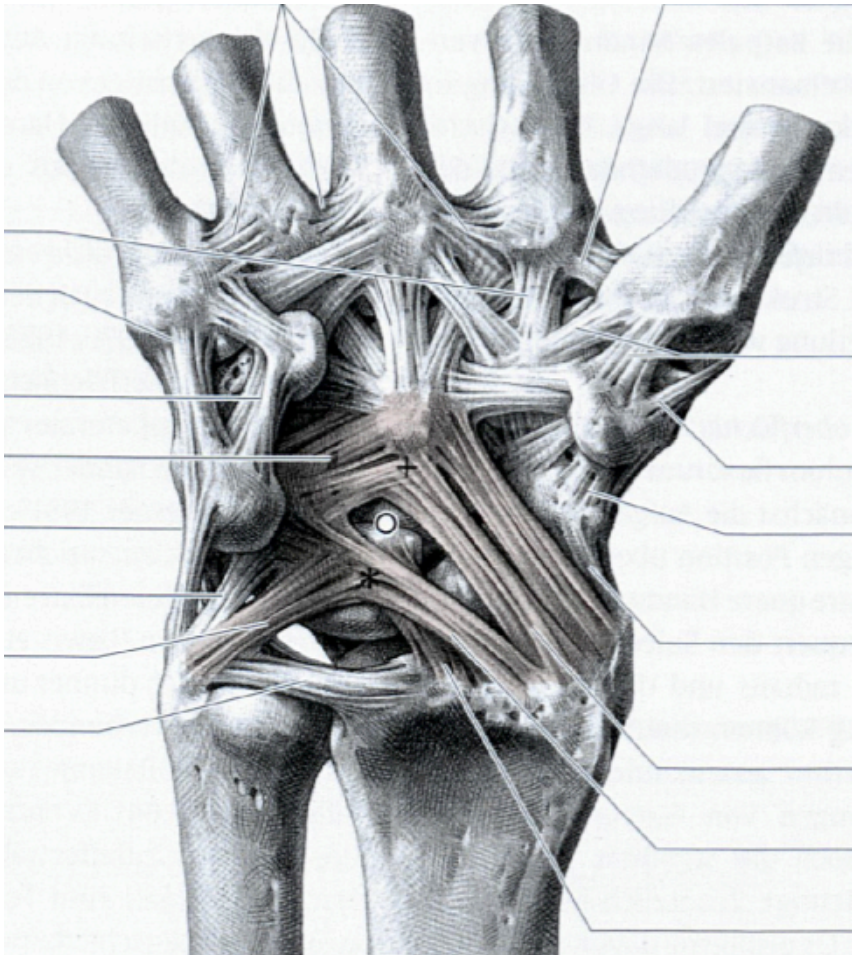
Interkarpale Gelenke

Radiokarpales Gelenk

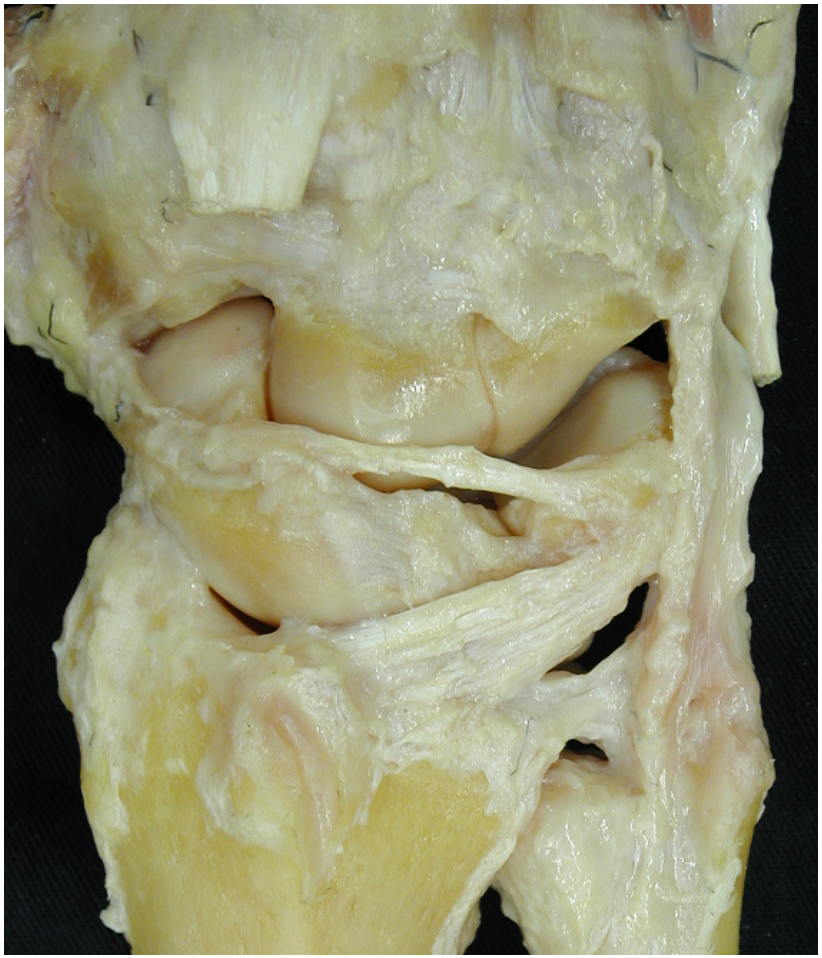
Distales Radioulnar-gelenk

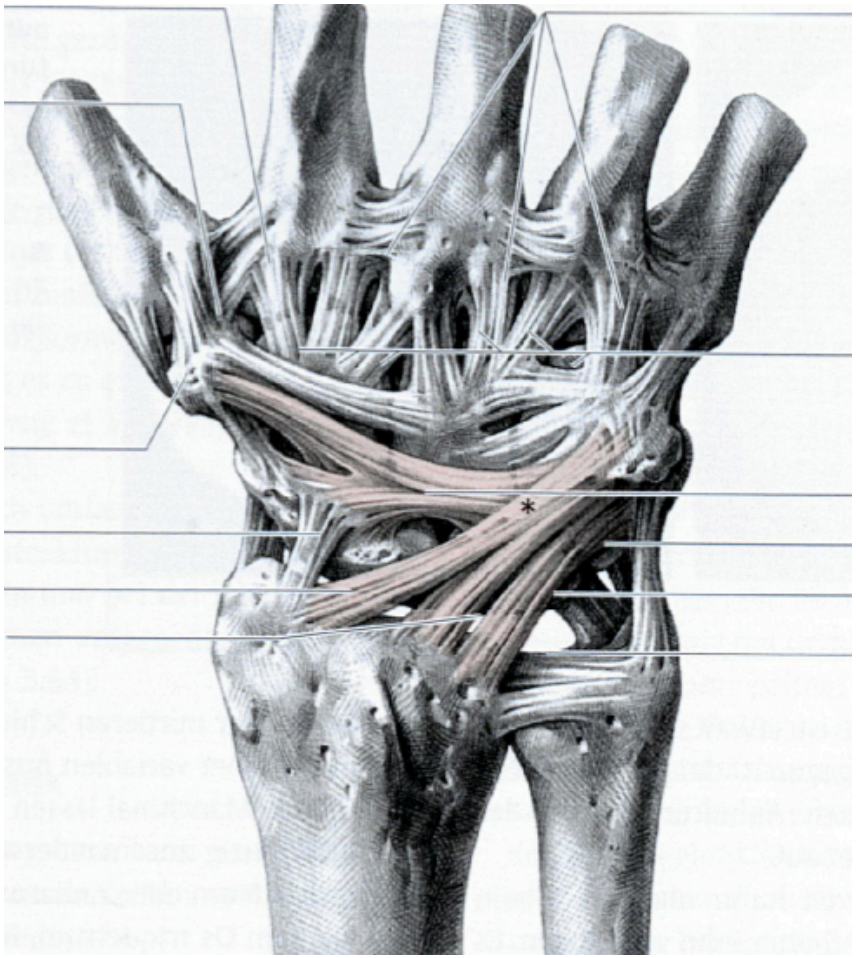
Palmare V-Bänder



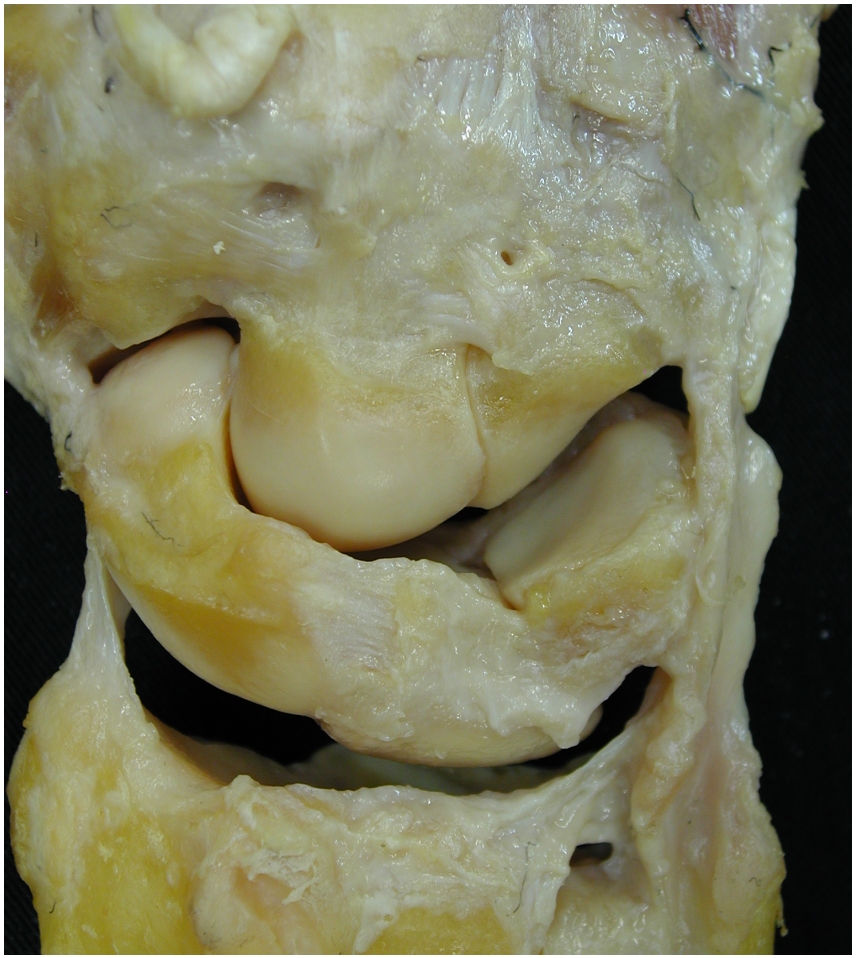


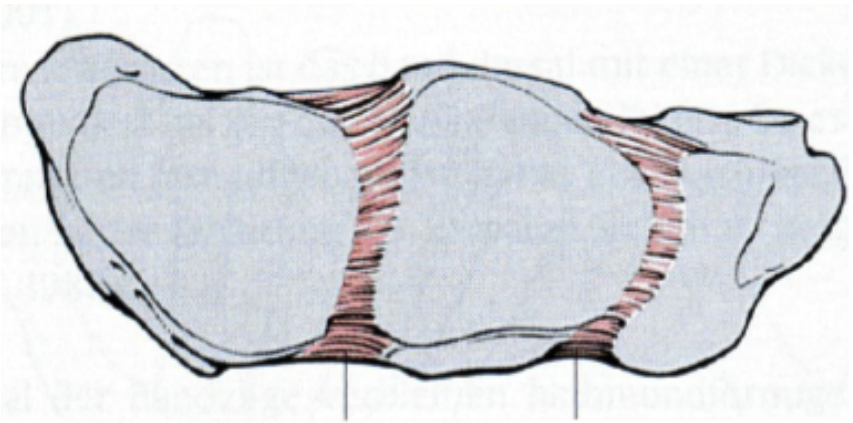
Dorsales V-Band

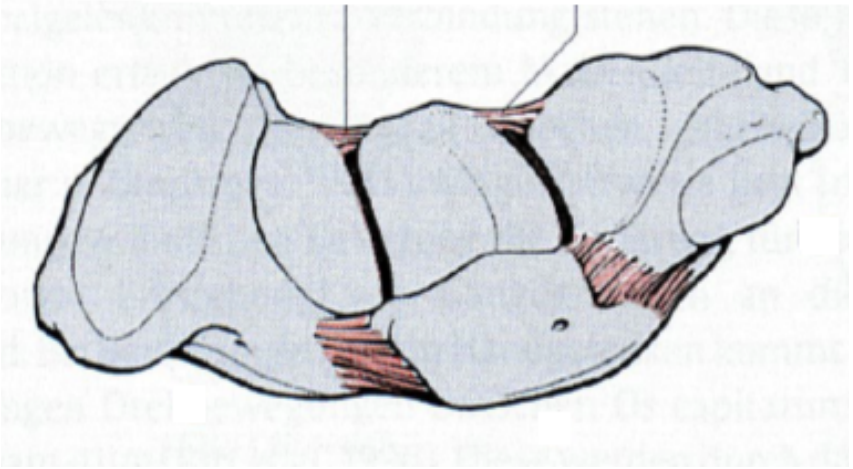


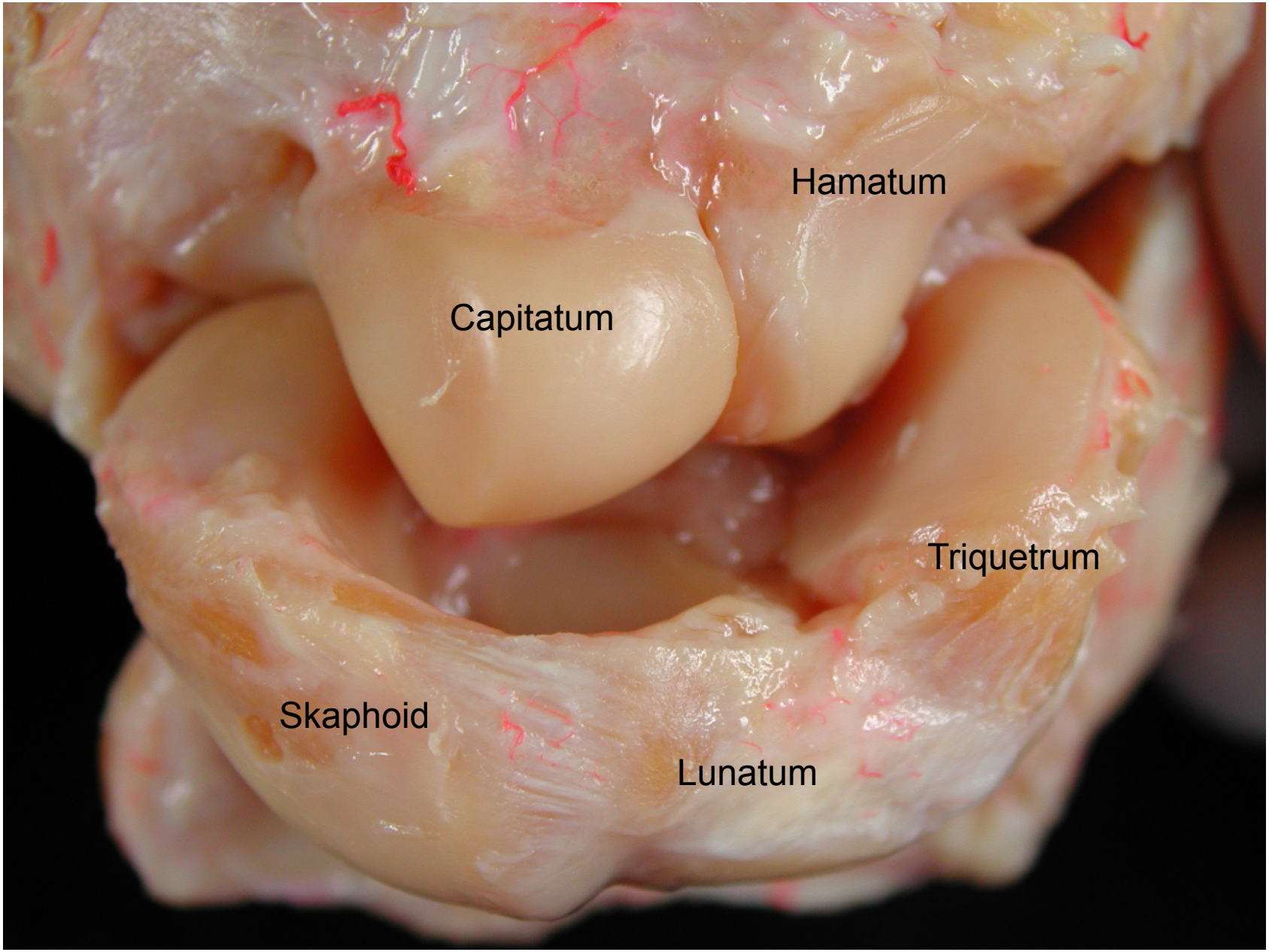


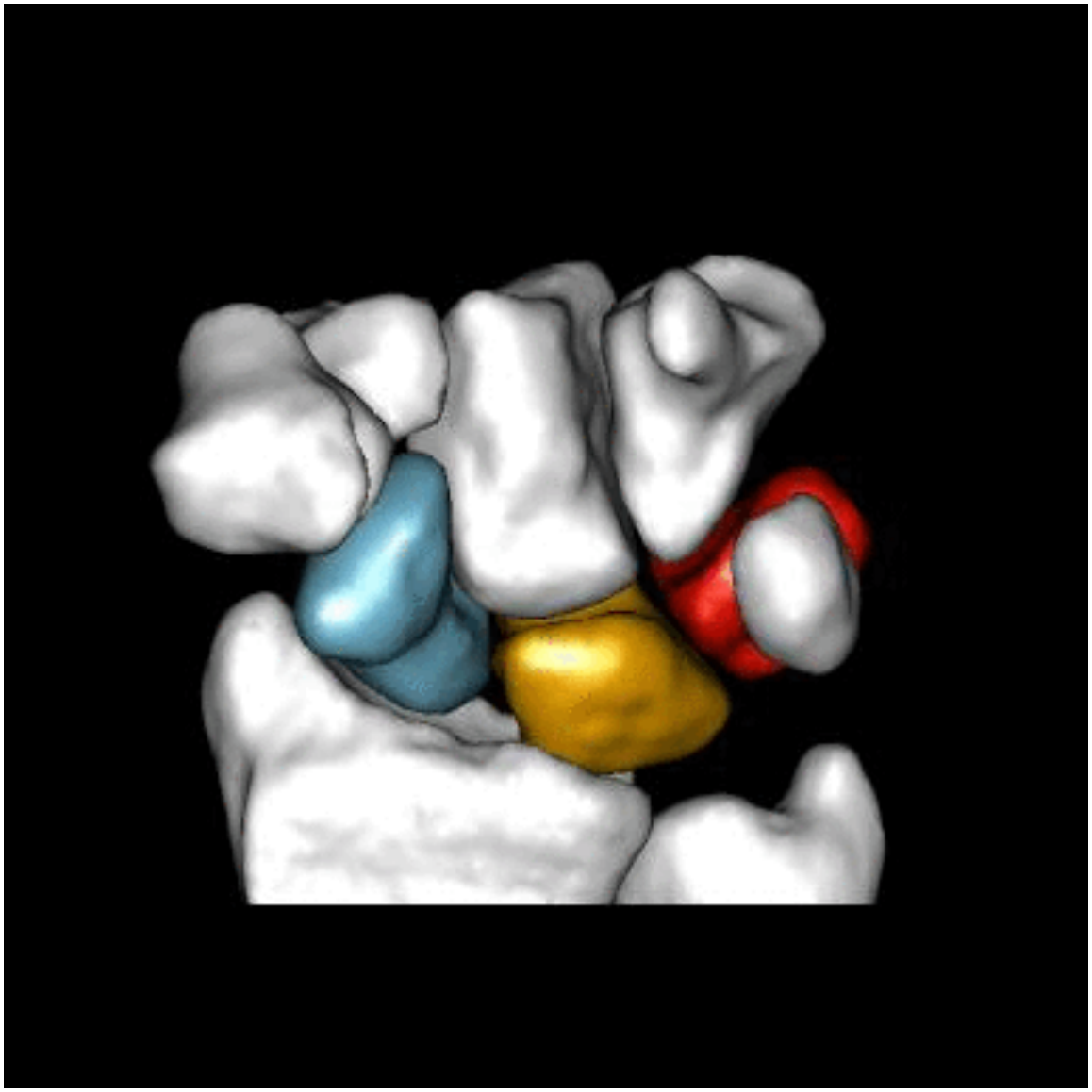
Interkarpale Bänder

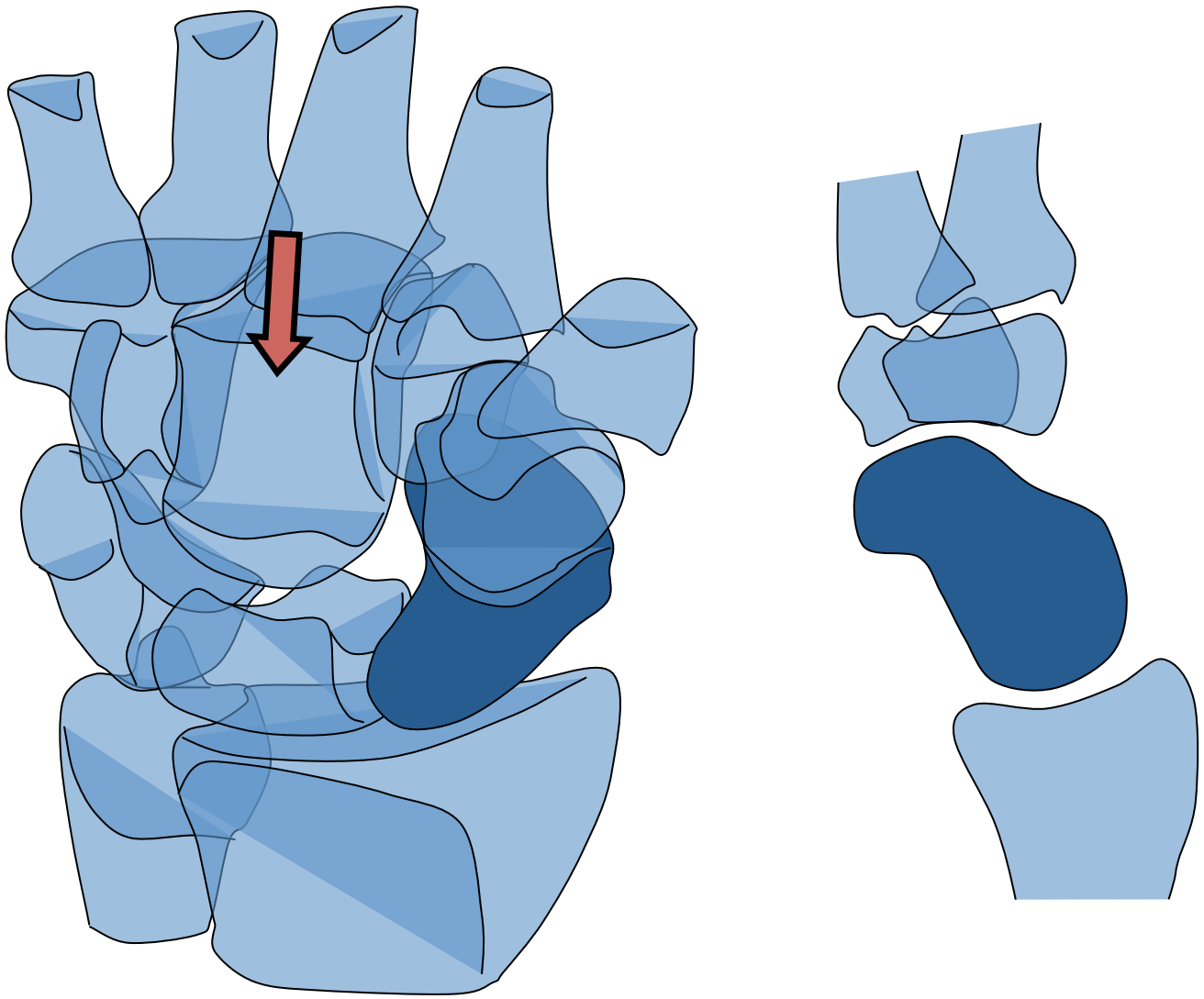


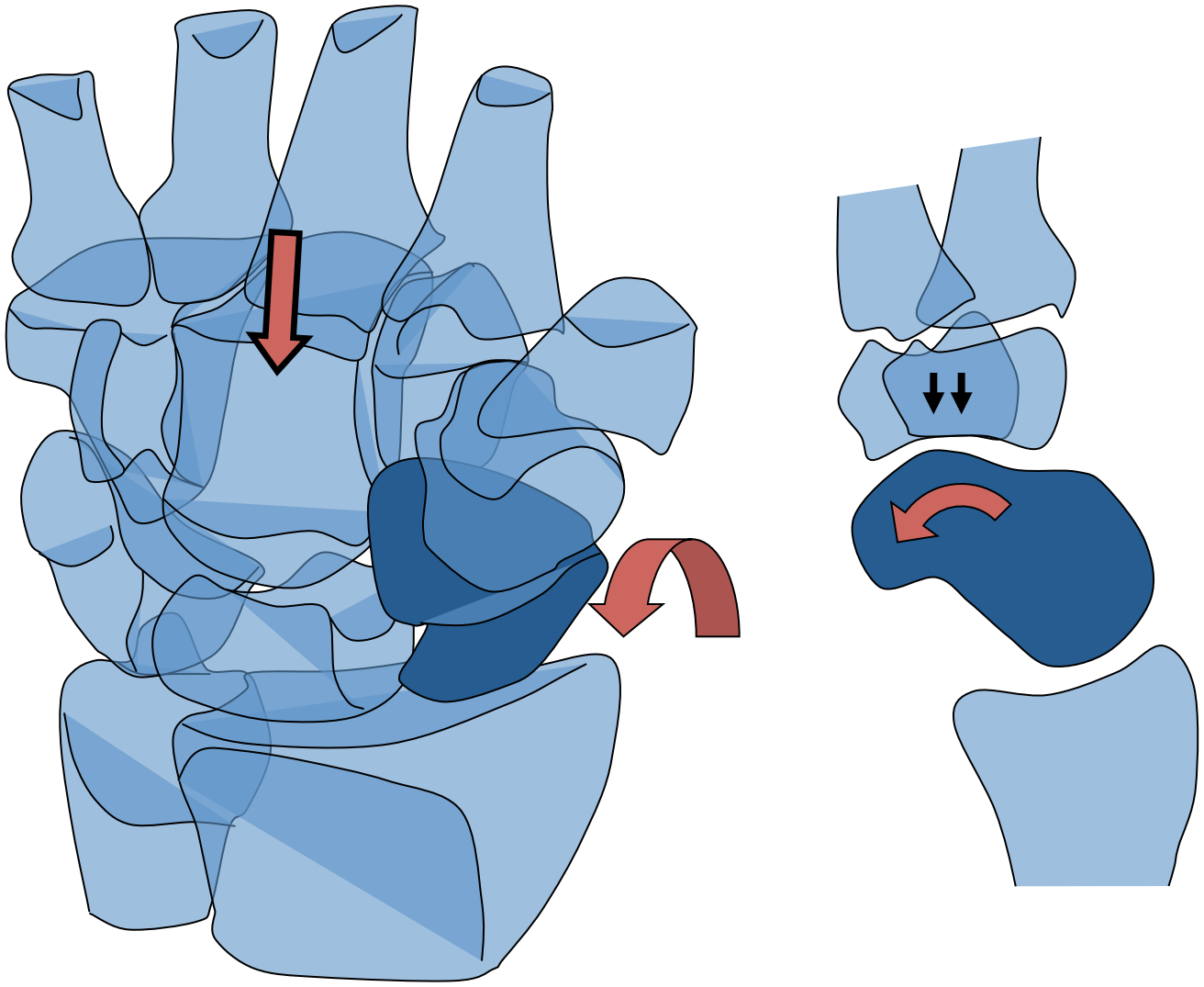


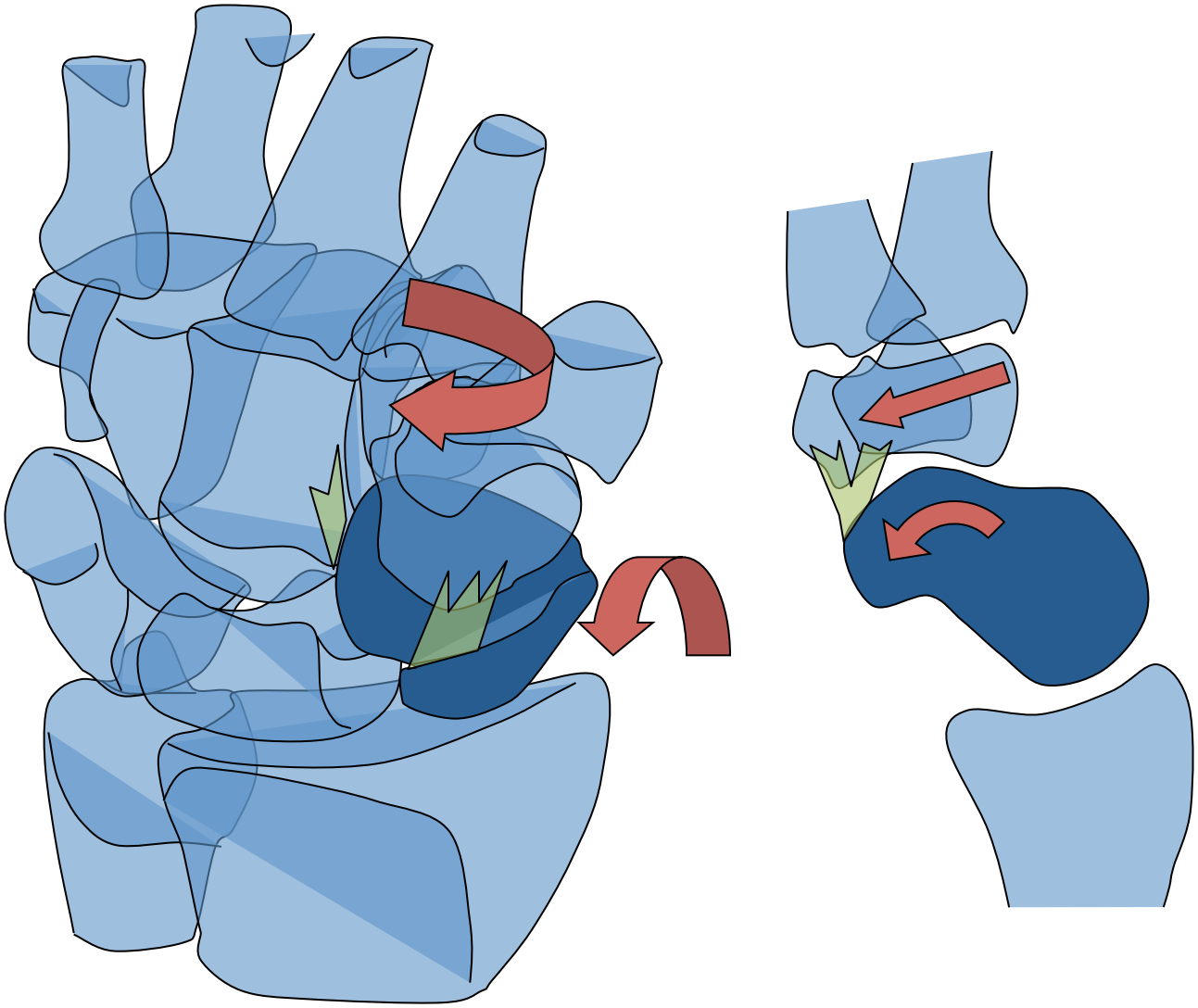


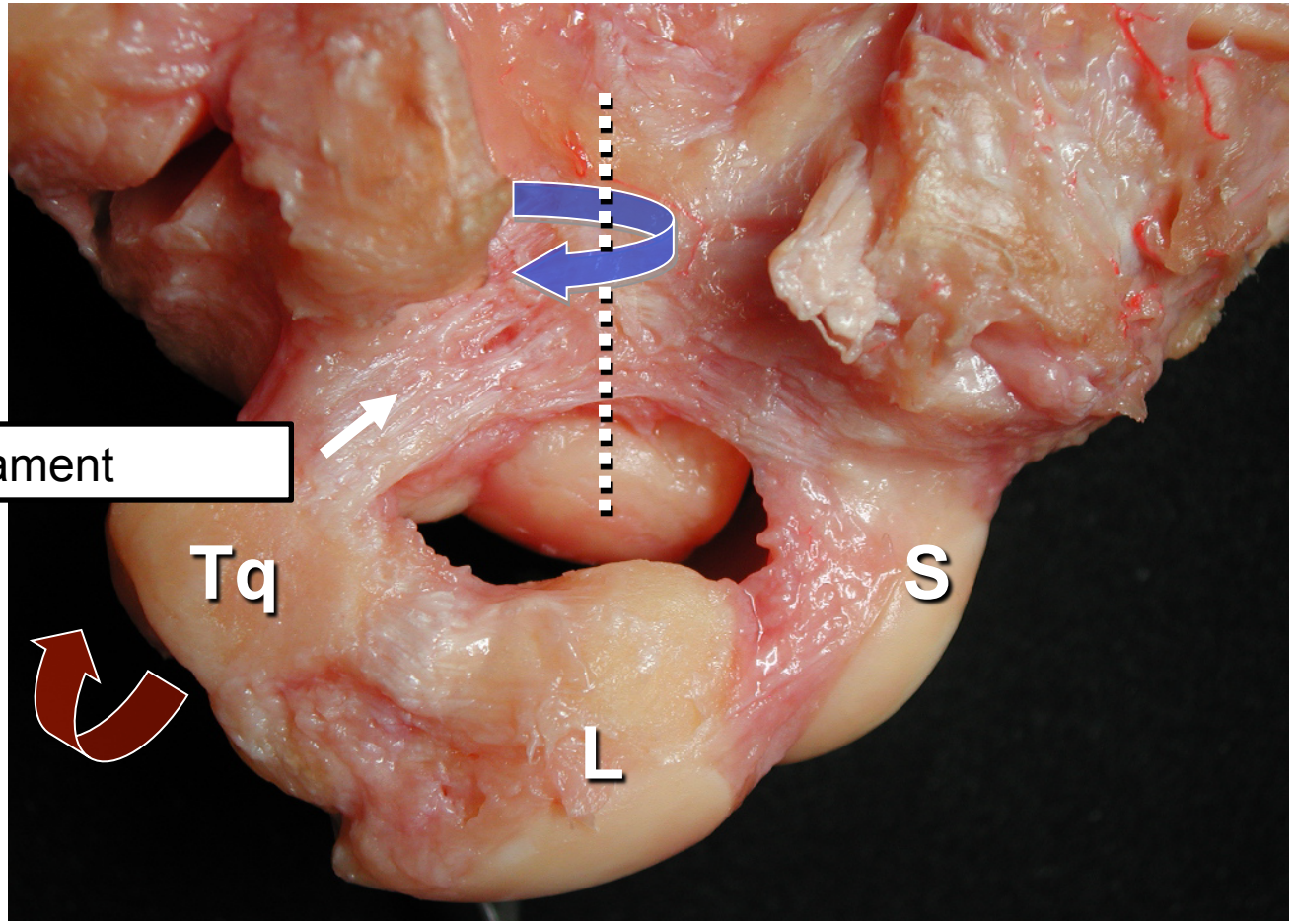

Hamatum
Capitatum
Triquetrum
Skaphoid
Lunatum










“THC”-Ligament
Tq
S
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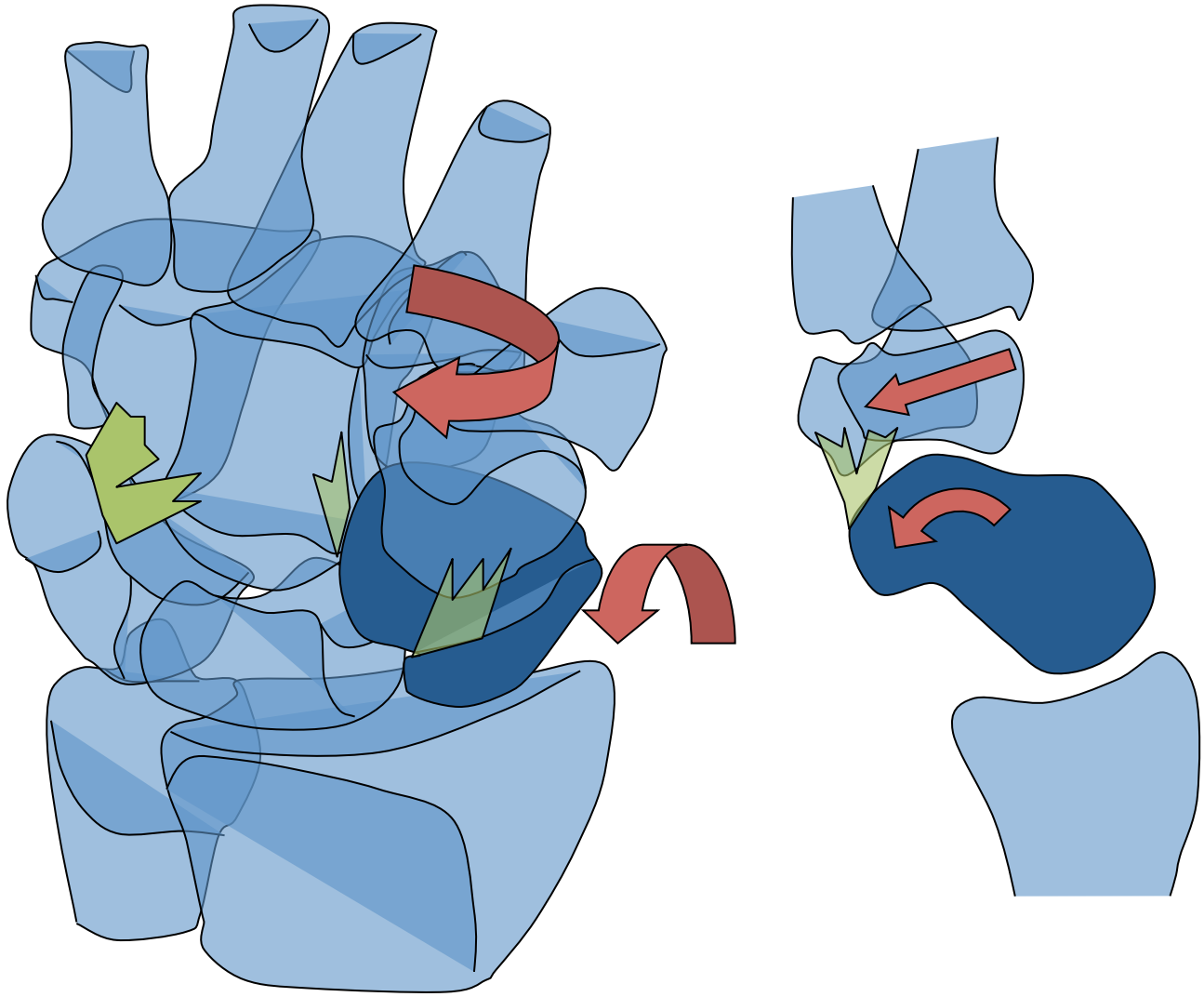
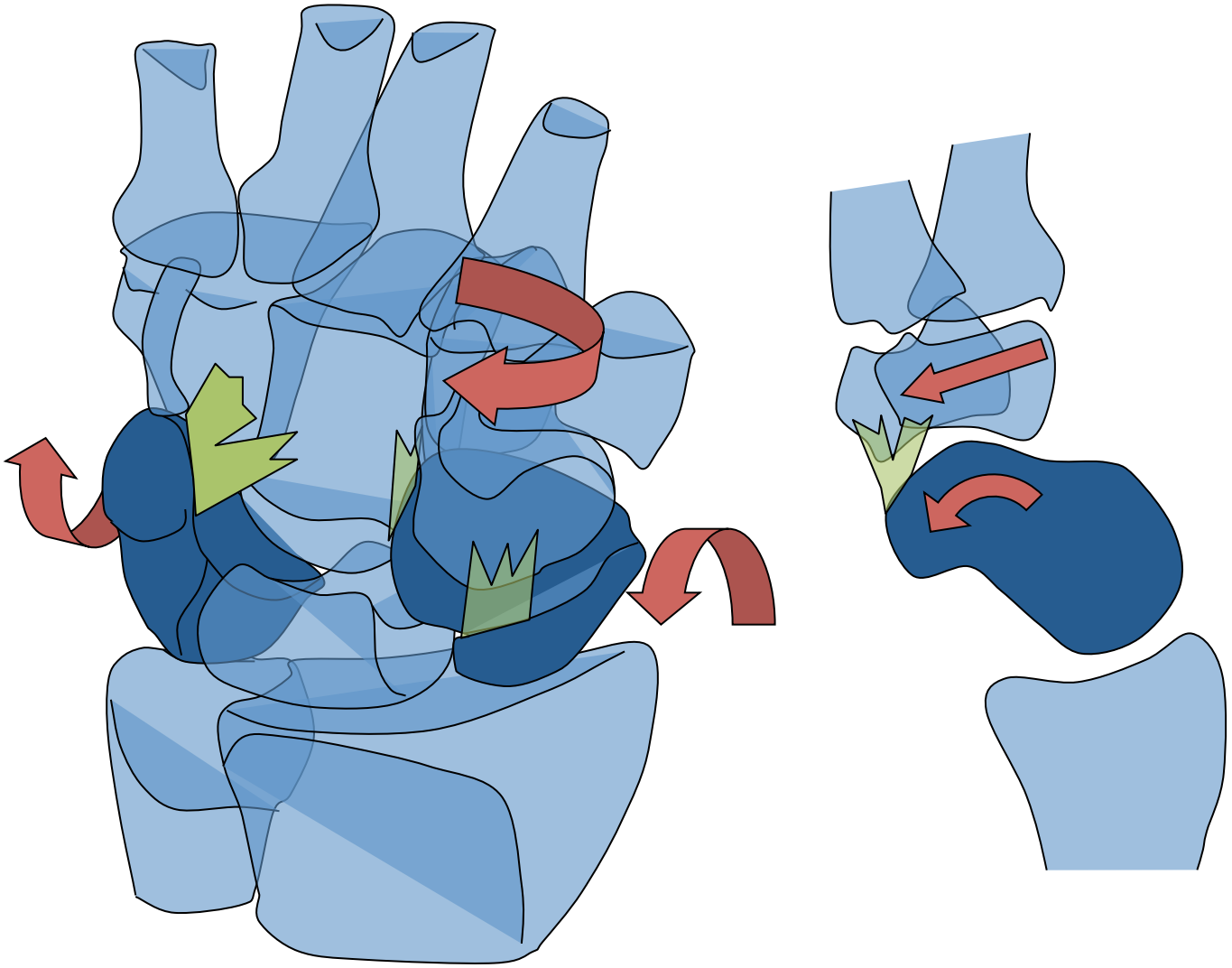
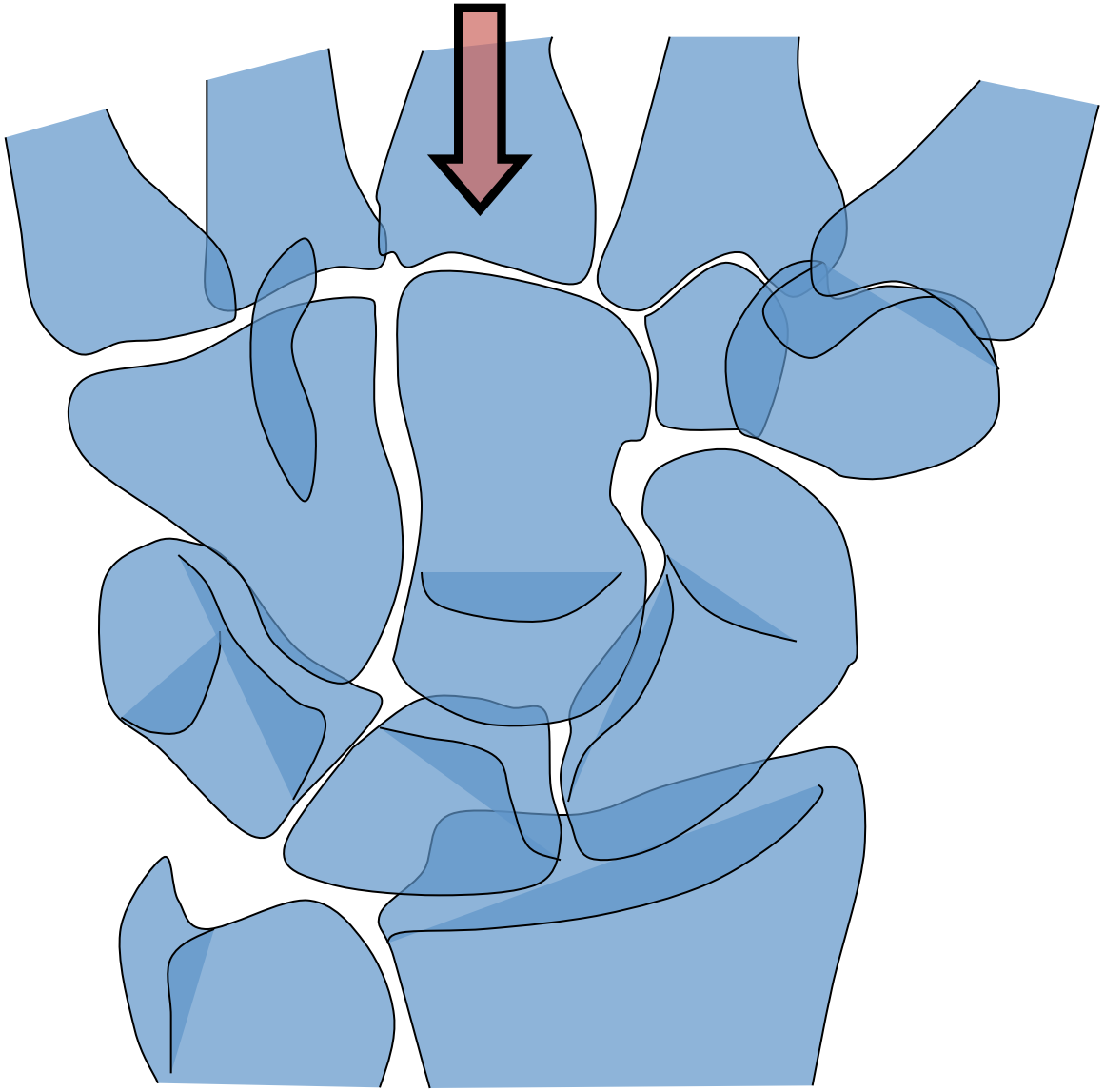
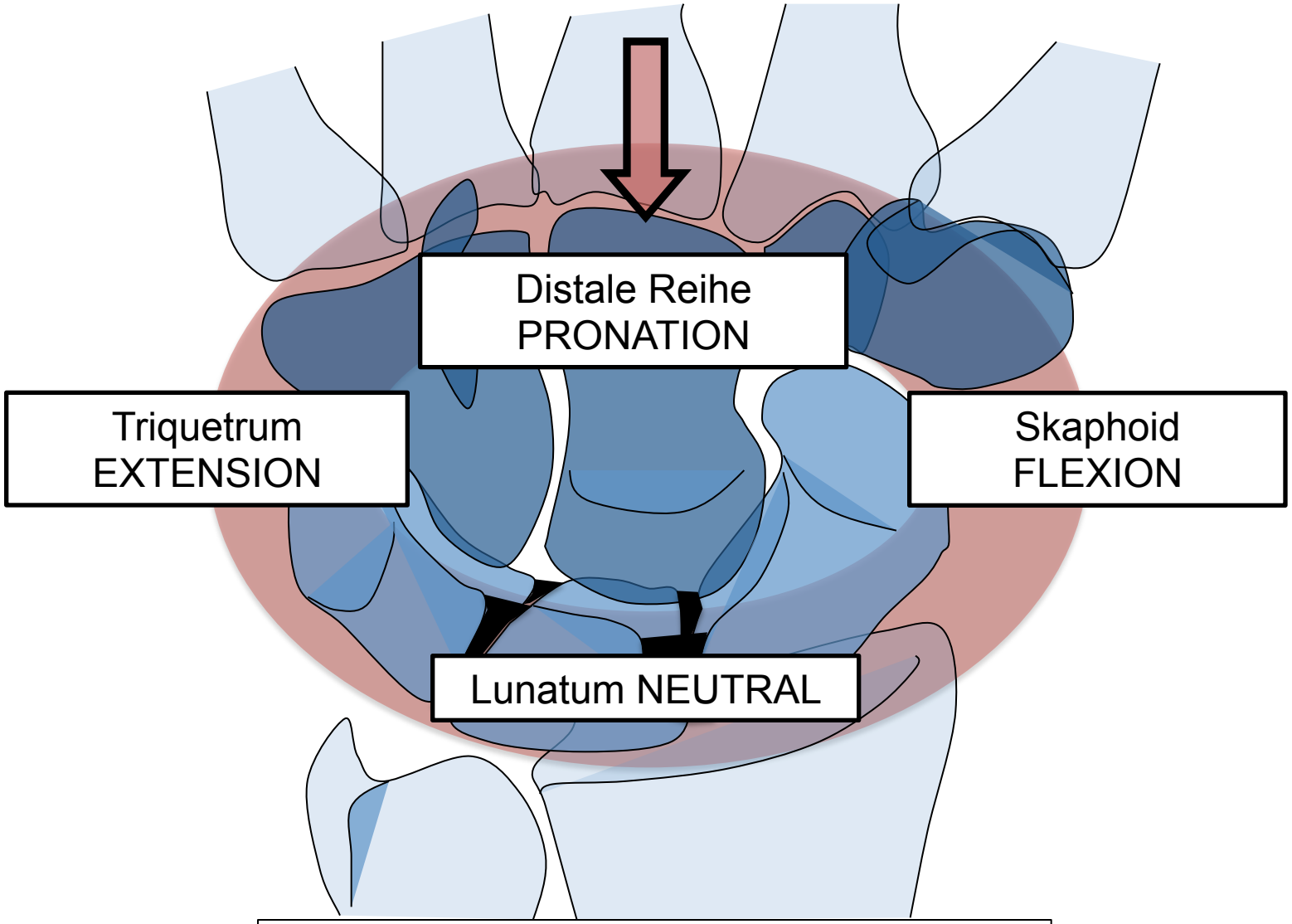
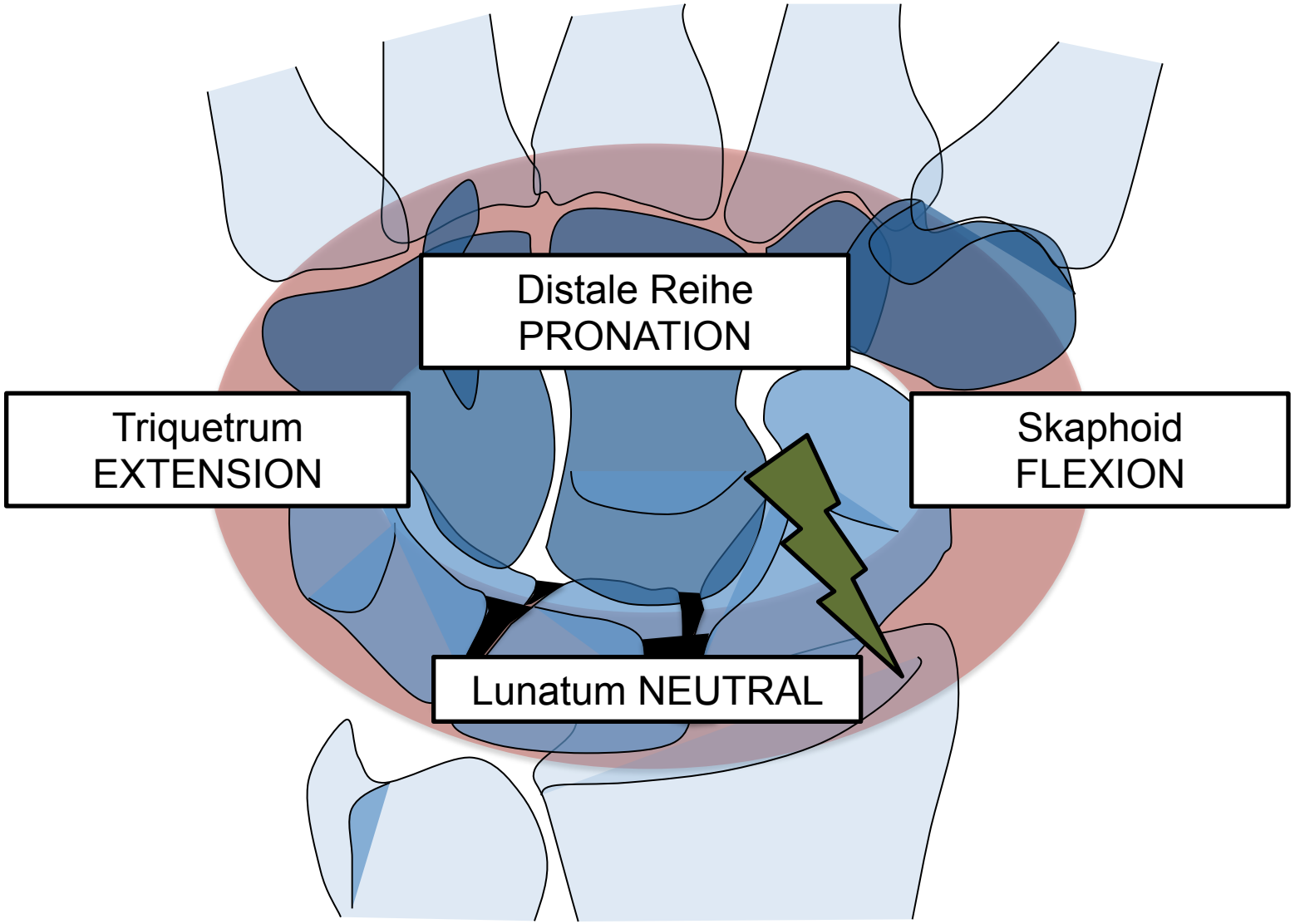


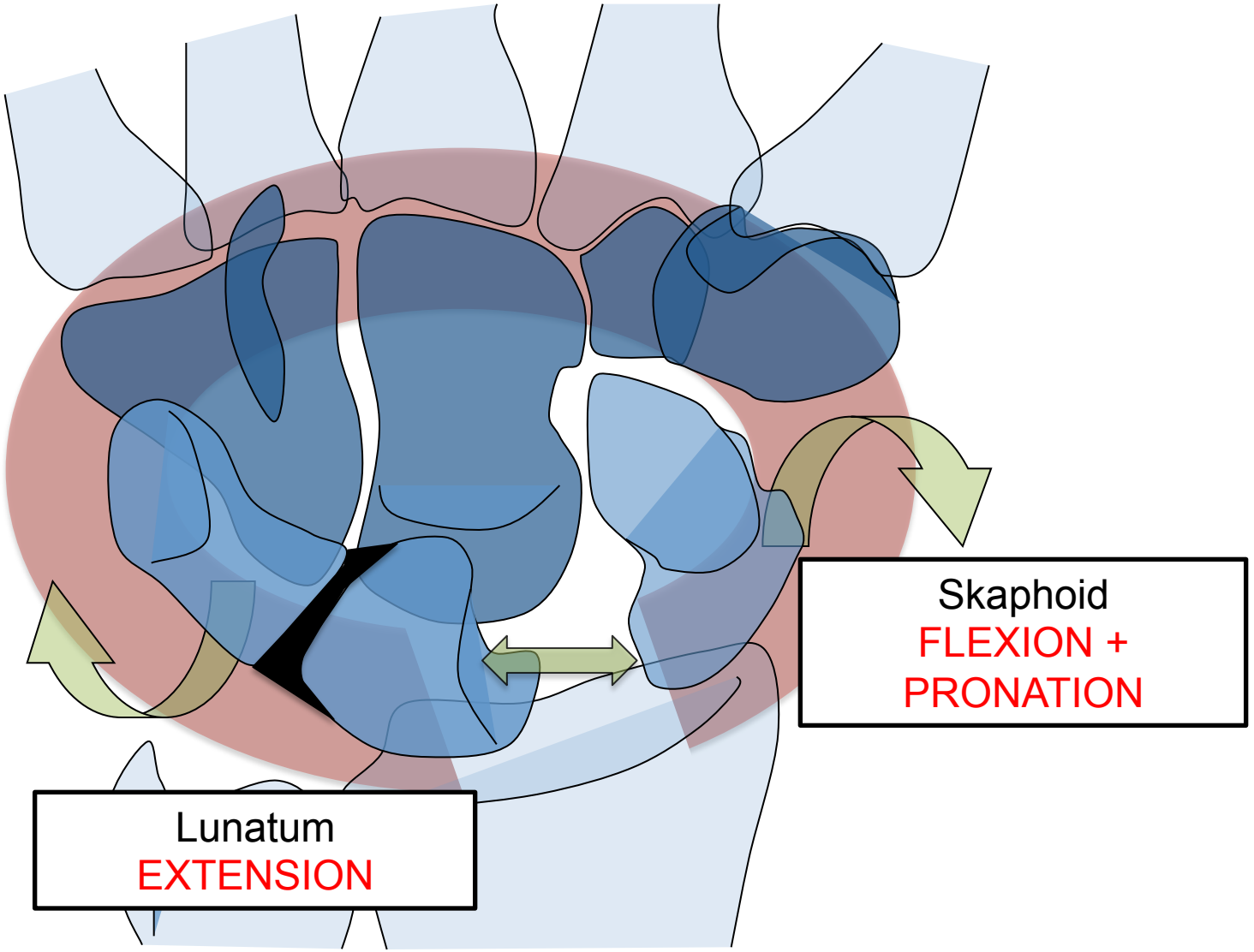






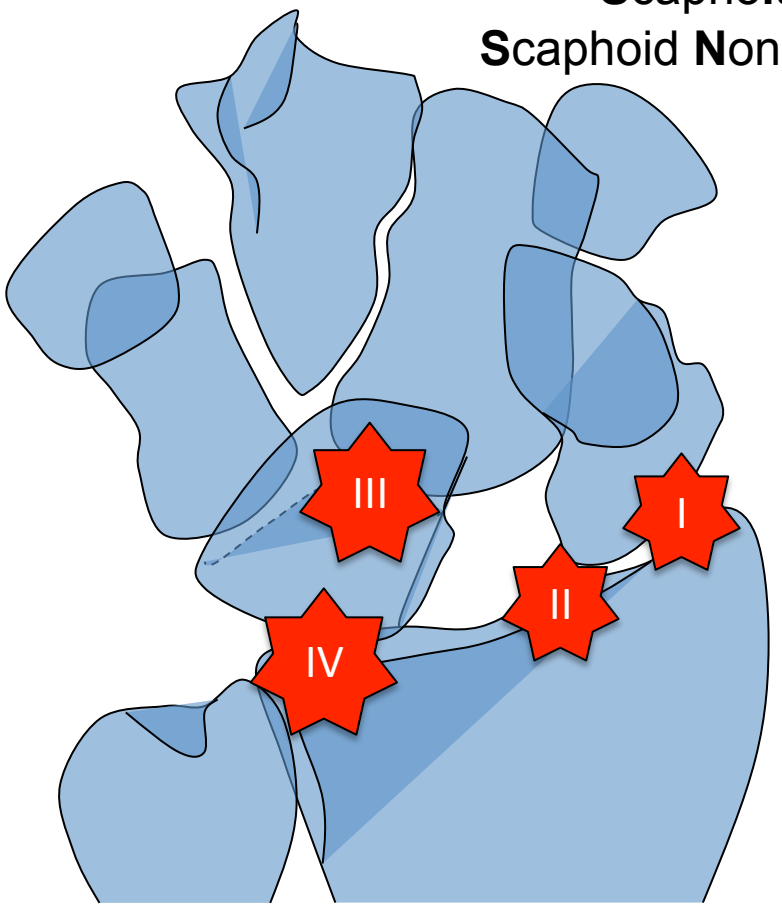
Ring-Konzept (n. Lichtman)

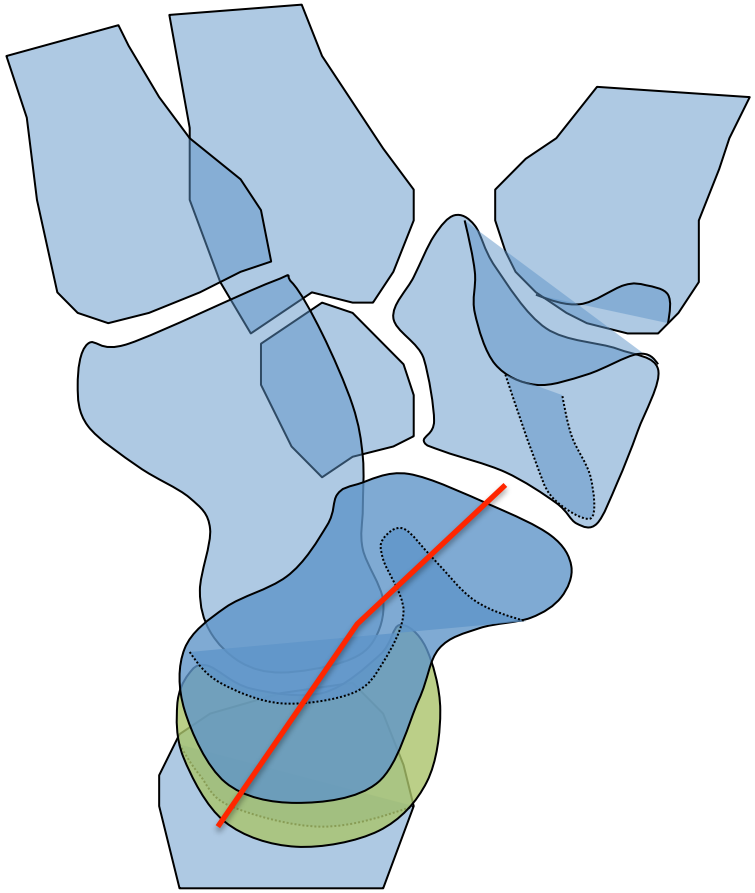

Distale Reihe
PRONATION
Triquetrum
EXTENSION
Skaphoid
FLEXION
Lunatum NEUTRAL

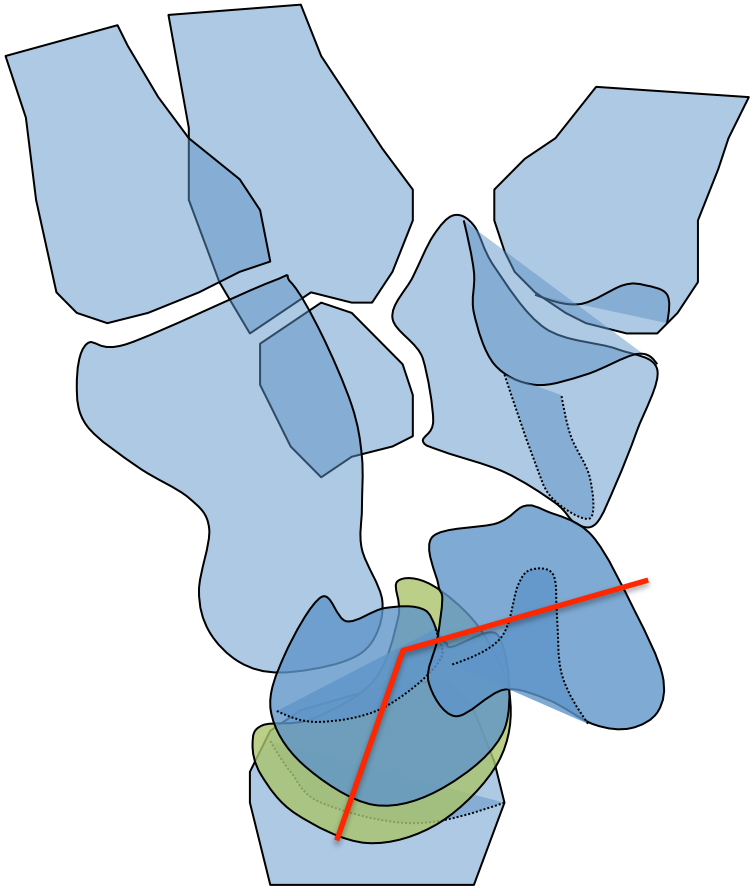

Skaphoid
FLEXION +
PRONATION
Lunatum
EXTENSION

Stadien der posttraumatischen Arthrose (SLAC / SNAC)

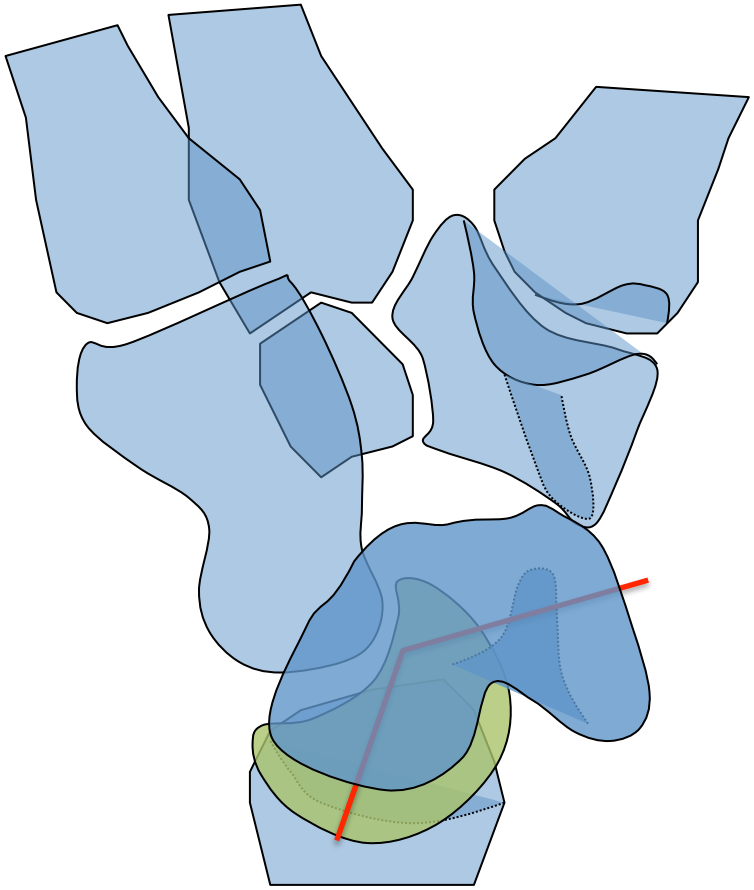
Scapho**l**unate **A**dvanced **C**ollapse
Scaphoid **N**onunion **A**dvanced **C**ollapse







Humpback-Deformität



PROBLEM: SKAPHOLUNÄRE BANDRUPTUR

Therapieentscheidung

Table 1. Staging of Scapholunate Dissociations

	SLD Stage
Is there a partial rupture with a normal dorsal SL ligament?	
If ruptured, can the dorsal SL ligament be repaired?	
Is the scaphoid normally aligned (radioscaphoid angle ≤ 45°)?	
Is the carpal malalignment easily reducible?	
Are the cartilages at both RC and MC joints normal?	

SYMPTOMATISCH?

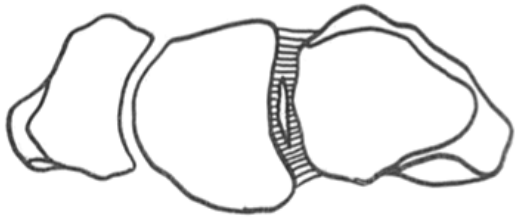
Garcia-Elias et al. J Hand Surg 2006; 31A:125–134

Probleme publizierter Ergebnisse

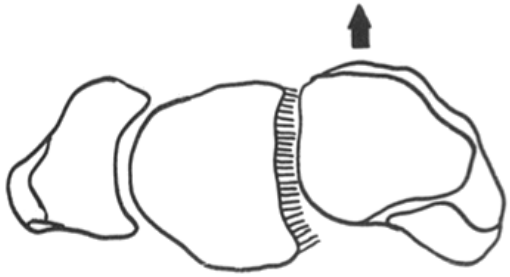
- zu kurze Nachbeobachtung
- wenige Patienten
- heterogenes Patientengut
- handwerklicher Faktor
- Bias

Grade der skapholunären Instabiltität

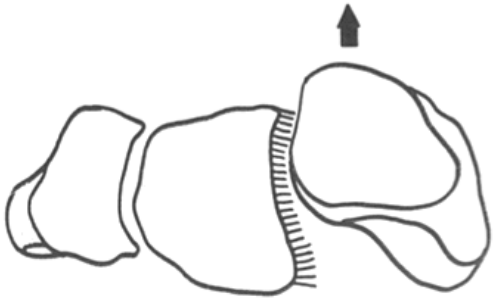
I° (Teil-) Ruptur SL-Band („prädynamische Instabilität“)



II° Rotationsinstabilität Skaphoid (dynamische Instabilität)



III° fixierte Fehlstellung (DISI, statische Instabilität)



Therapieentscheidung

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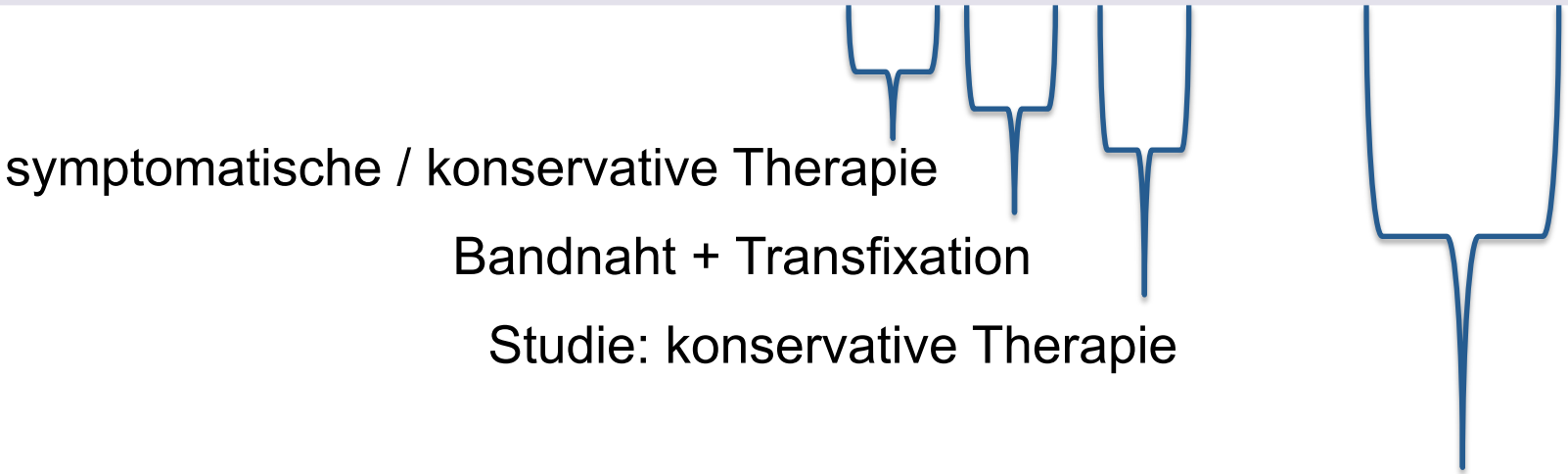


symptomatische / konservative Therapie

Bandnaht + Transfixation

Studie: konservative Therapie

Rettungsoperation (MKTA / PRC)

Natürlicher Verlauf bei dynamischer SLD

THE NATURAL HISTORY OF AN UNTREATED ISOLATED SCAPHOLUNATE INTEROSSEUS LIGAMENT INJURY

C. J. O'MEEGHAN, W. STUART, V. MAMO, J. K. STANLEY and I. A. TRAIL

From the Centre for Hand and Upper Limb Surgery Wrightington Hospital for Joint Disease, Hall Lane, Appley Bridge, Wigan, UK

The natural history of an untreated isolated scapholunate interosseus ligament injury remains unclear, although it is commonly assumed that patients continue to suffer with pain, stiffness and weakness of the wrist and ultimately develop secondary osteoarthritis (SLAC wrist). In this study, we evaluated the clinical condition of 11 patients with an arthroscopically proven interosseus scapholunate ligament injury, but without any radiological signs of either DISI deformity or scapholunate gapping, who had declined further treatment at an average follow-up of 7 years. Whilst there was on going pain and functional limitation in all cases, there was no rapid progression to degenerative change (SLAC wrist).

Journal of Hand Surgery (British and European Volume, 2003) 28B: 4: 307–310

Keywords: scapholunate ligament injury; natural history

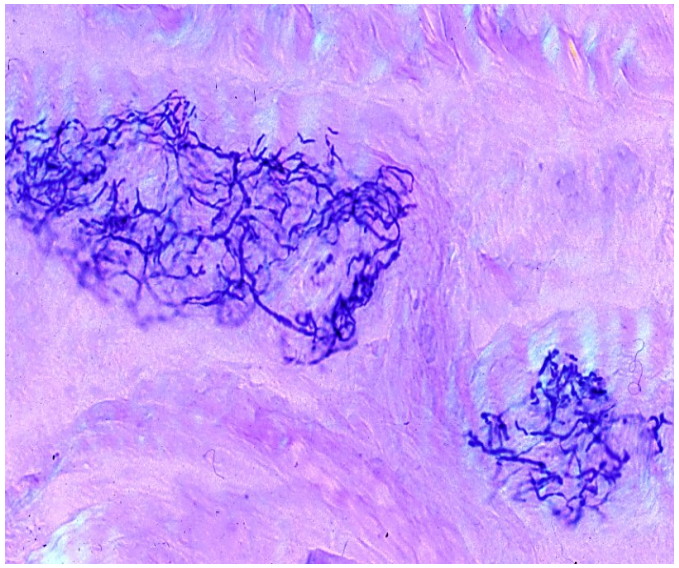
HG - Stabilisierung

Primäre Stabilisatoren

Knochen/Bänder

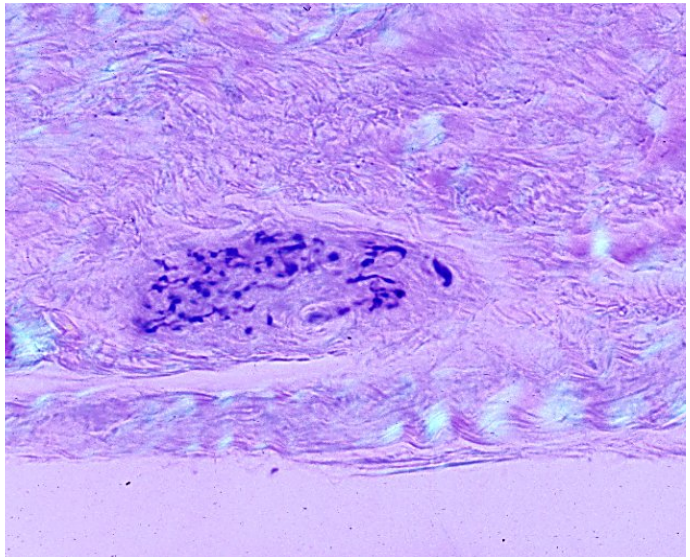
Sekundäre Stabilisatoren

Neuromuskuläre Kontrolle

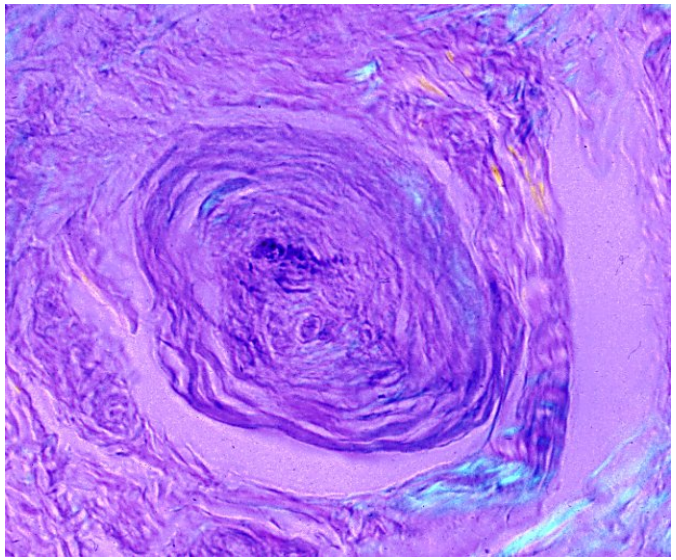


Golgi

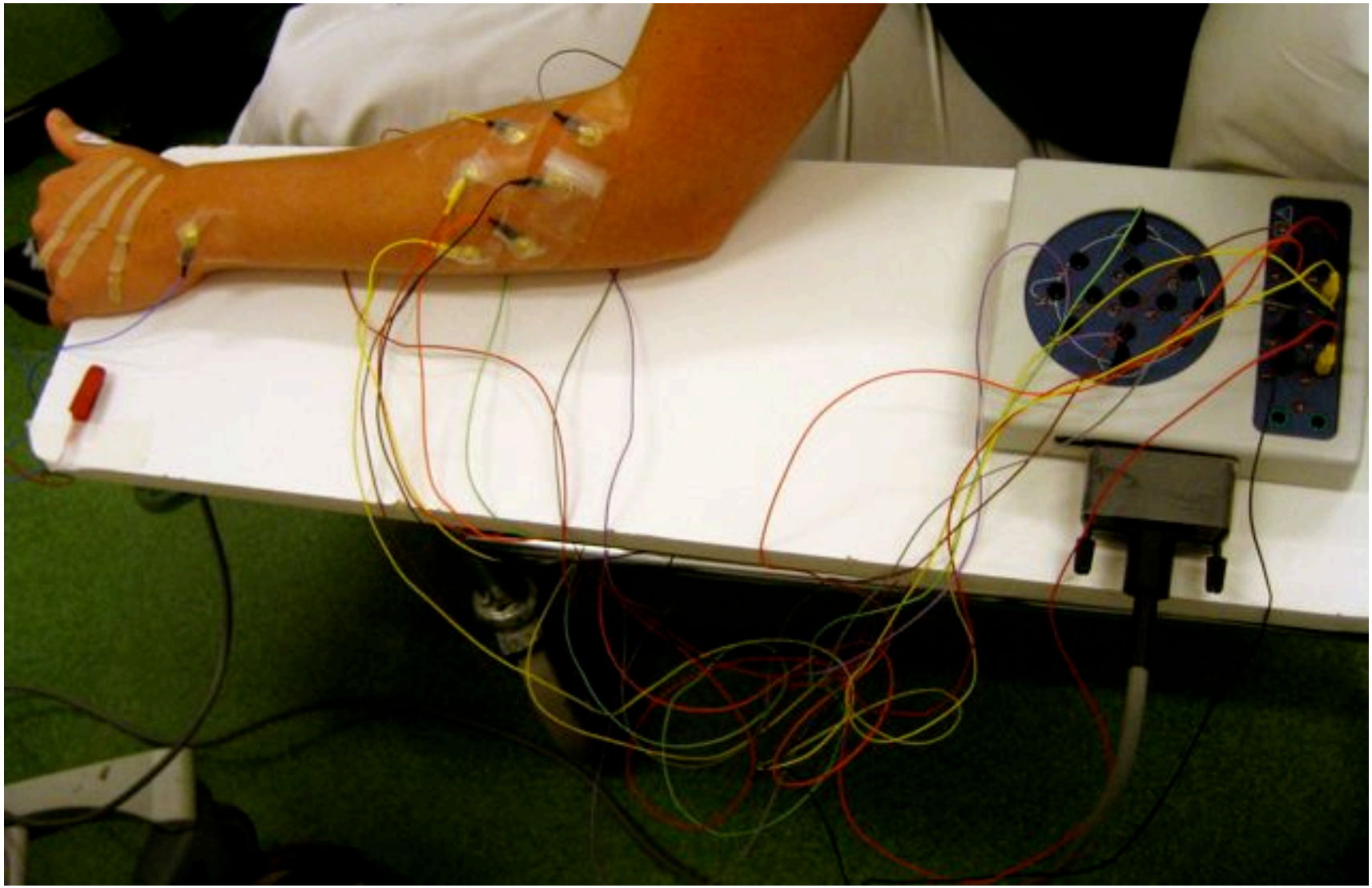
Bänder sind nicht einfache “Kabel”, sondern komplexe Stabilisatoren, die Mechanozreptoren enthalten



Ruffini

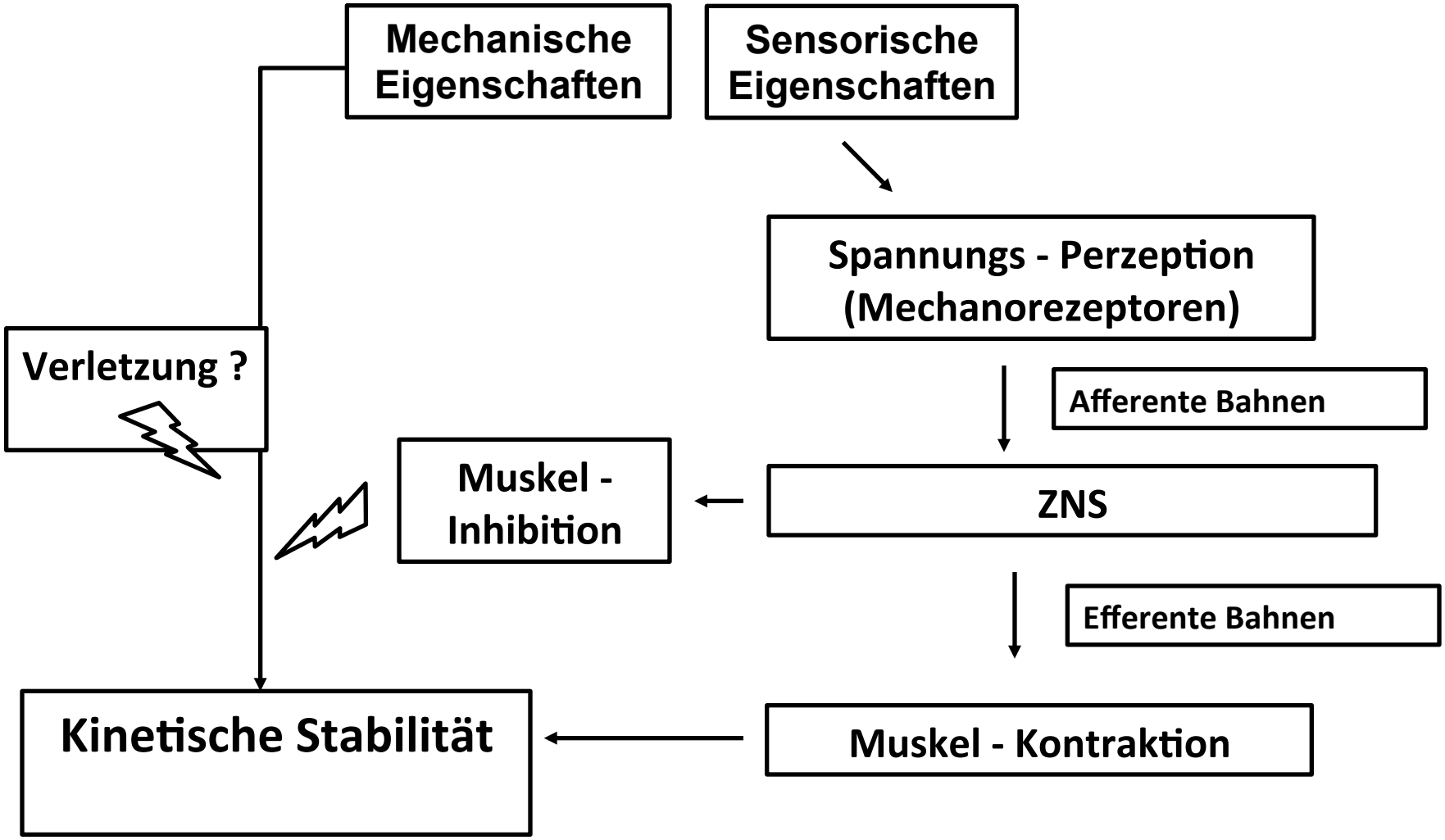


Pacini



Hagert et al. J Hand Surg 34A:642-651, 2009

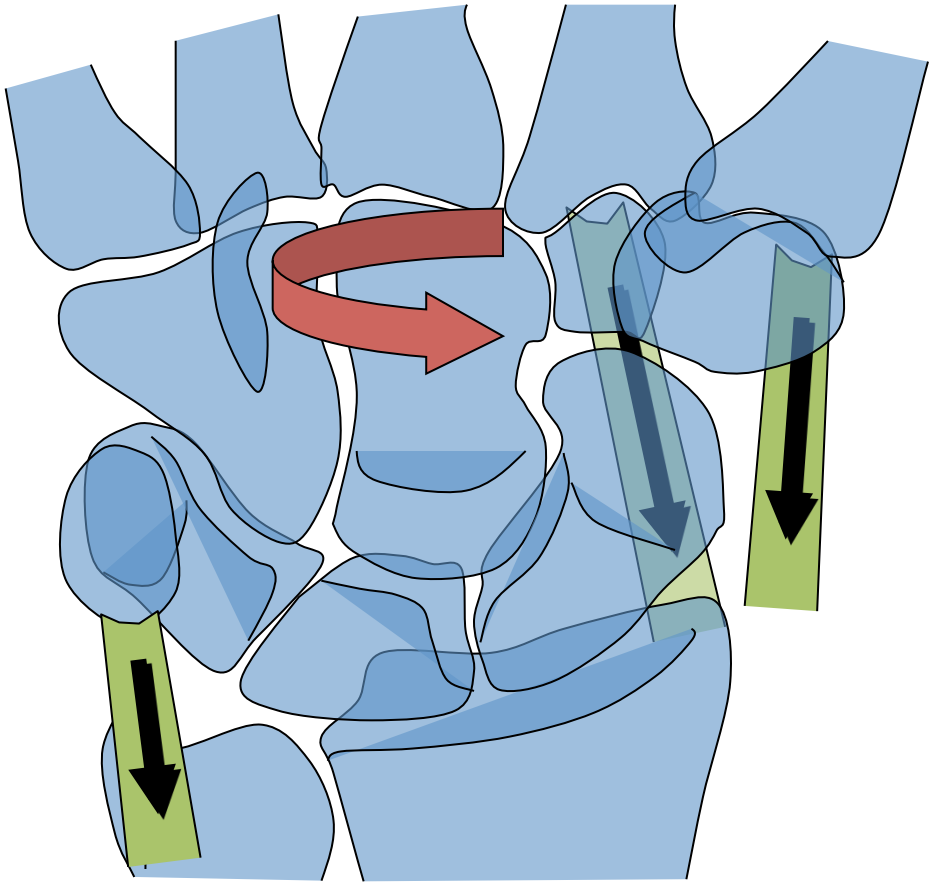
HG-Bänder


Mechanische Eigenschaften
Sensorische Eigenschaften
Spannungs - Perzeption (Mechanorezeptoren)
Afferente Bahnen
ZNS
Muskel - Inhibition
Verletzung ?
Efferente Bahnen
Muskel - Kontraktion
Kinetische Stabilität

Welche Muskeln stabilisieren Handwurzel?

(kein Muskel setzt direkt am Karpus an!)

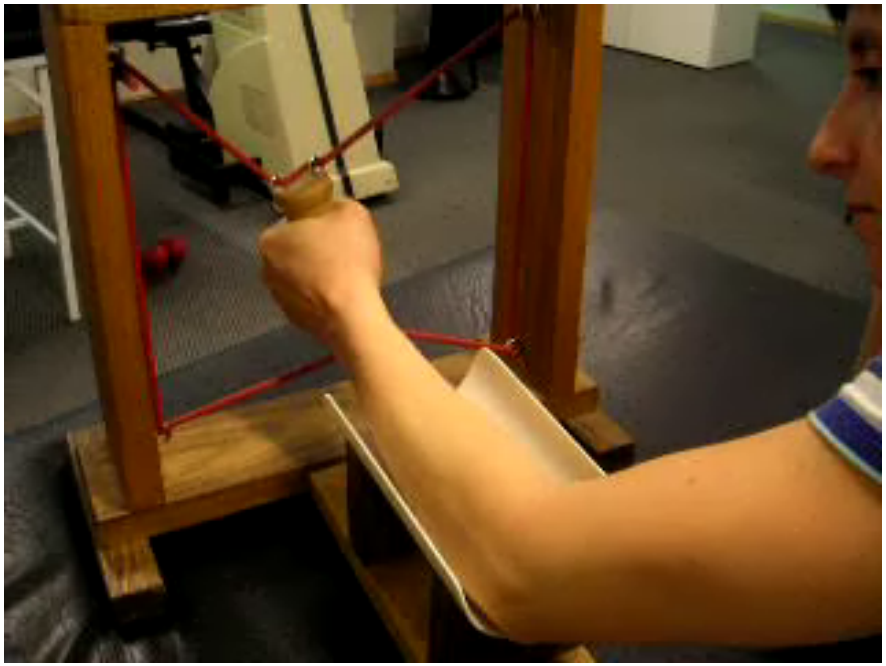
Marc Garcia-Elias



SL-freundliche Muskeln

- ✓ **Abductor Pollicis Longus**
- ✓ **Extensor Carpi Radialis Longus**
- ✓ **Flexor Carpi Ulnaris**

Bei dynamischen SL-Bandinstabilitäten sollten in der Handtherapie gezielt Muskeln gestärkt werden, die das Skaphoid supinieren (ECRL, APL, FCU)



Studie DAHTH-Gruppe München

Handtherapeutisches Trainingsprogramm bei

Handgelenksinstabilitäten nach SL-Bandläsion

(Für Patienten)

Allgemeine Hinweise für Patienten:

- **alle Behandlungsinterventionen werden im schmerzfreien Bereich durchgeführt**
- **der Patient sollte ein Übungstagebuch führen**
- **die Schulter bei den Übungen locker lassen**
- **das Atmen nicht vergessen**
- **die Übungen langsam durchführen**

Schmerzphase/Akutphase

2 x pro Woche Therapie , Übungstagebuch führen

1.Dicker Stift

Handtuch unterlegen, Unterarm ist in Supinationsstellung (Auswärtsdrehung), dicken Stift auf den Fingeransatz legen, Finger umschließen den Stift und machen dabei eine Kralle, mit geringen Kraftaufwand halten, (Kralle statisch durchführen).

Übung 3x 10 Wiederholungen

2.Grippy/Schaumstoffquader

Handtuch unterlegen, Unterarm in 0-Stellung oder in Supinationsstellung (Auswärtsdrehung), Grippy/Schaumstoffquader auf den Fingeransatz legen, Finger in die Kralle (kleine Faust) und den Schaumstoff leicht zudrücken, anspannen und wieder öffnen

Übung 3x 10 Wiederholungen

3.Daumen abspreizen

Hand flach auf dem Tisch ablegen und den Daumen gegen leichten Widerstand abspreizen, Reibung des Tisches reicht aus.

Übung 3x10 Wiederholungen

Phase 2:

2x pro Woche Therapie , Übungstagebuch führen

1.Theraband gelb/Haushaltsgummi

Handtuch unterlegen, Unterarm ist in Supinationsstellung (Auswärtsdrehung), Handgelenk in 0-Stellung und die Fingergelenke sind in einer Kralle (kleine Faust). Nun leichte isometrische Anspannung in die Palmarflexion (Hand nach oben oder zum Körper gegen das Theraband anspannen), an der Tischkante ausführen.

Übung 3x10 Wiederholungen

gleiche Übung, nun mit Ausgangsstellung Unterarm liegt kleinfingerseitig auf der Unterlage.

Übung 3x10 Wiederholungen

Unterarm ist in Pronationstellung (Einwärtsdrehung), Daumen abspreizen und gegen den Widerstand eines breiten Haushaltsgummis anspannen.

Übung 3x10 Wiederholungen

Handgelenk ist in 0°-Stellung, Fingergelenke sind in der Kralle (kleine Faust), die Mittelgelenke sollen gegen den Widerstand des Therabandes drücken. Das Theraband mit der anderen Hand fixieren.

Übung 3x10 Wiederholungen

2..Schwammübung/Schwamm gegen die Wand drücken

Unterarm ist in Supinationsstellung (Auswärtsdrehung), Unterarm und Handgelenk sind in 0°-Stellung, die Finger sind in der Krallenstellung (kleine Faust) und nun werden der ausgestreckte Arm und die gebeugten Mittelgelenke in den Schwamm gegen die Wand gedrückt. Diese Stellung wird mit leichter Spannung gehalten.

Übung 3x10 Wiederholungen

B. Dopfer, B. Grafl-Drost, M. Gilg, C. Hahn, B. Jung, S. Klöckner-Reckels

Therapieentscheidung

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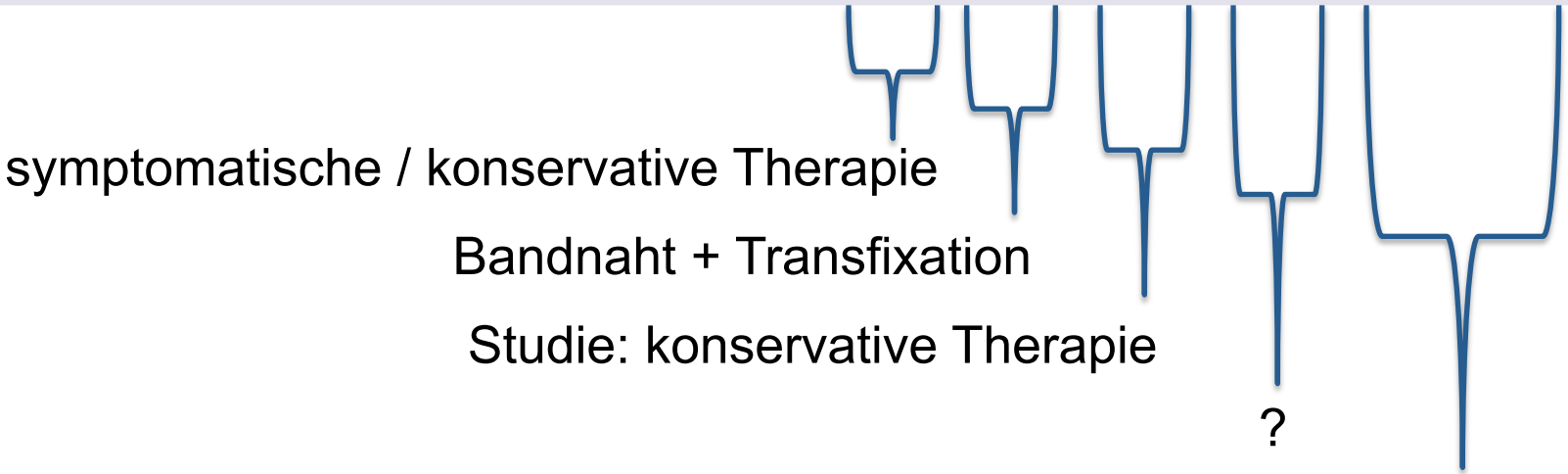


symptomatische / konservative Therapie

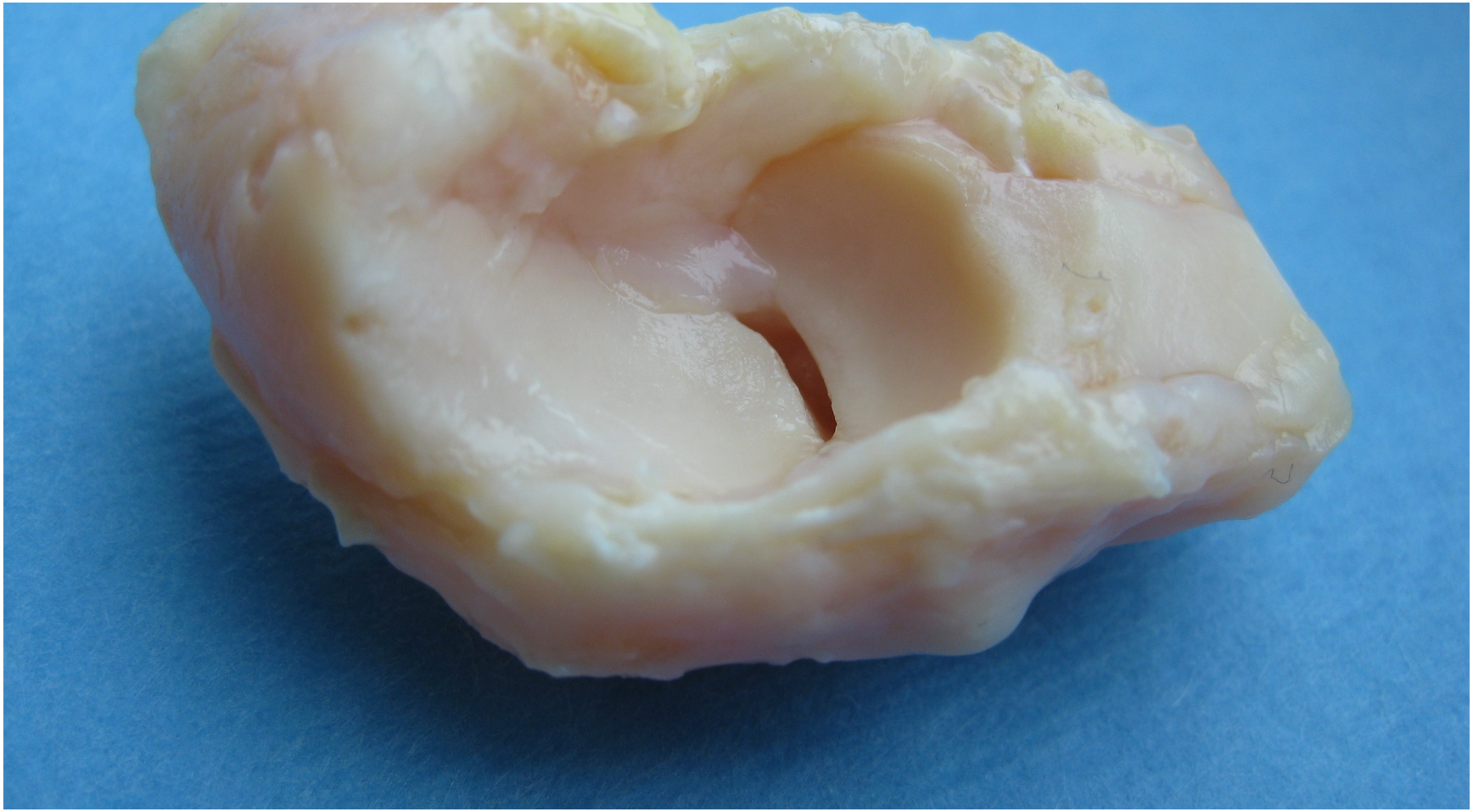
Bandnaht + Transfixation

Studie: konservative Therapie

?

Rettungsoperation (MKTA / PRC)

Zielvorgabe



Problem: Multidirektionale Instabilität!

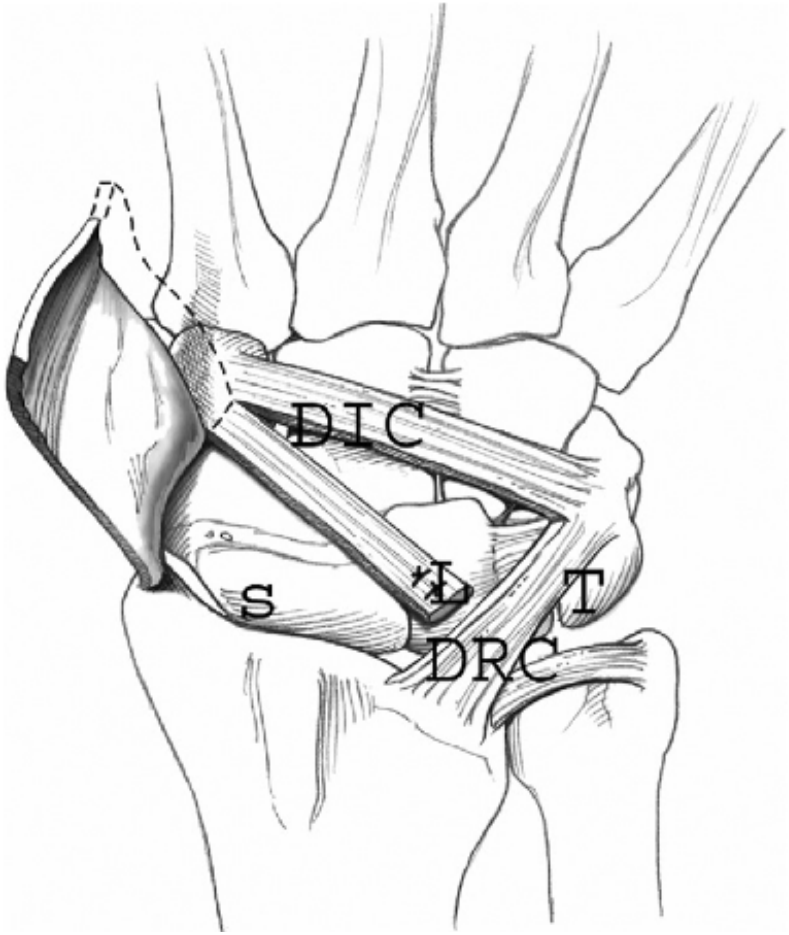
The effect of rotatory subluxation of the scaphoid on radio-scaphoid contact

The effect of progressive rotatory subluxation of the scaphoid on radio-scaphoid contact area was examined in a cadaveric model. Five degrees of subluxation reduced the contact area of the proximal pole by 44%, with a shift to the dorsal lip of the radius. At 20° of subluxation the contact area was reduced by 77%, with a shift radially to the dorsal lip of the radial styloid. These findings explain the progression of radio-scaphoid arthritis from the radial styloid to the remainder of the fossa and reemphasize the importance of operative reduction of a scapho-lunate disassociation in the prevention of degenerative arthritis. (J HAND SURG 1987;12A[2 Pt 1]:771-4.)

Ronald C. Burgess, M.D., *Lexington, Ky.*

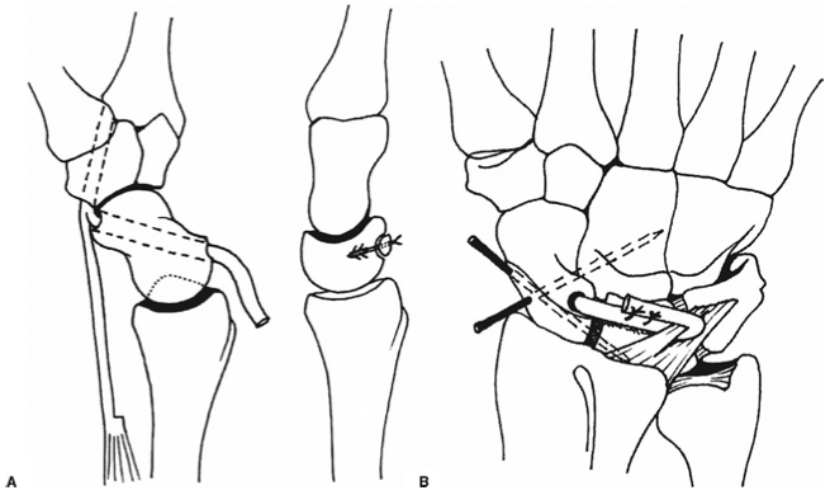
Dorsale Kapsulodese (DILC)

- E/F 51/0/37
  VAS 4.8
  Grobkraft 78% Ggs.
  DASH 28



“Mod. Brunelli”-Tenodese (3-LT)

- E/F 53/0/35
  VAS 2.8
  Grobkraft 80% Ggs.
  DASH 25



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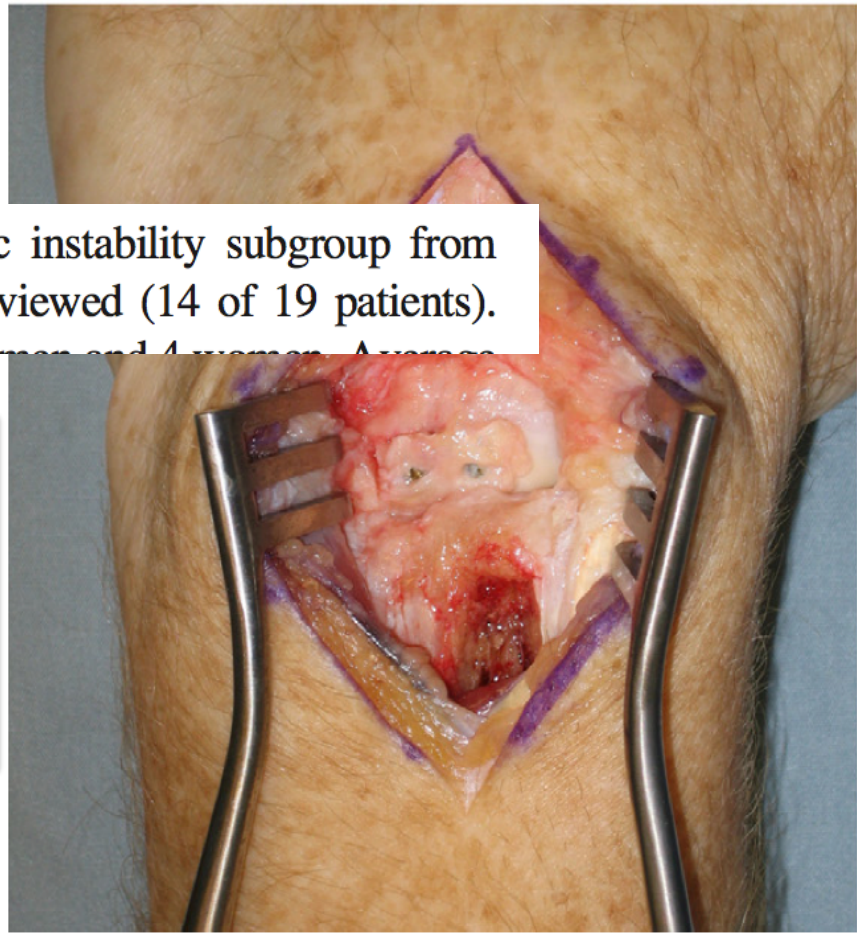
Bone-Ligament-Bone-Transplantat

TABLE 2. Summary of Early and Long-Term Results

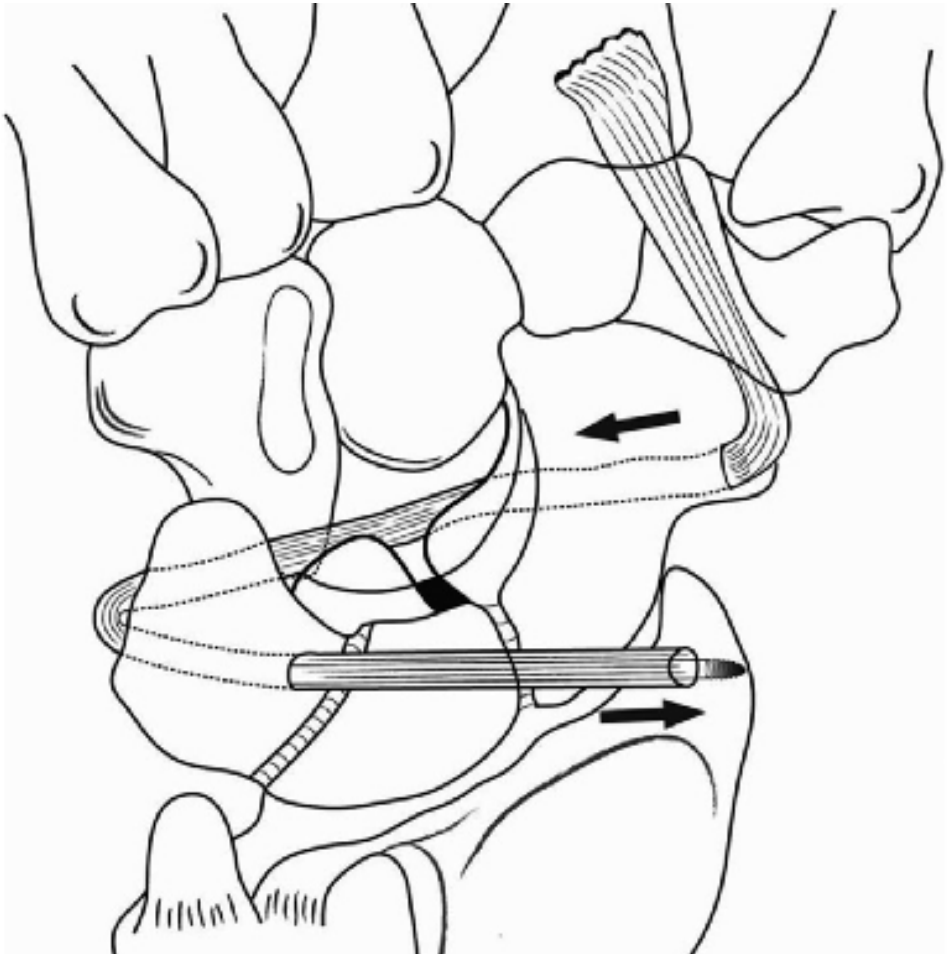
	Pre (14	Early Results[6]	Long-Term
Follow-up (y)			
Failures	—	0	3
Scapholunate angle (°)	< 60	50	65
Scapholunate gap (mm)	2	< 3	3.5
Arthritis (grade)	0	0	1
Wrist extension (°)	69	52	44
Wrist flexion (°)	72	67	53
Grip strength, kg (lb)	27 (59)	39 (86)	38 (79)
Mayo score	65	87	83

Records of the dynamic instability subgroup from the original series were reviewed (14 of 19 patients). These patients included 10 men and 4 women. Average



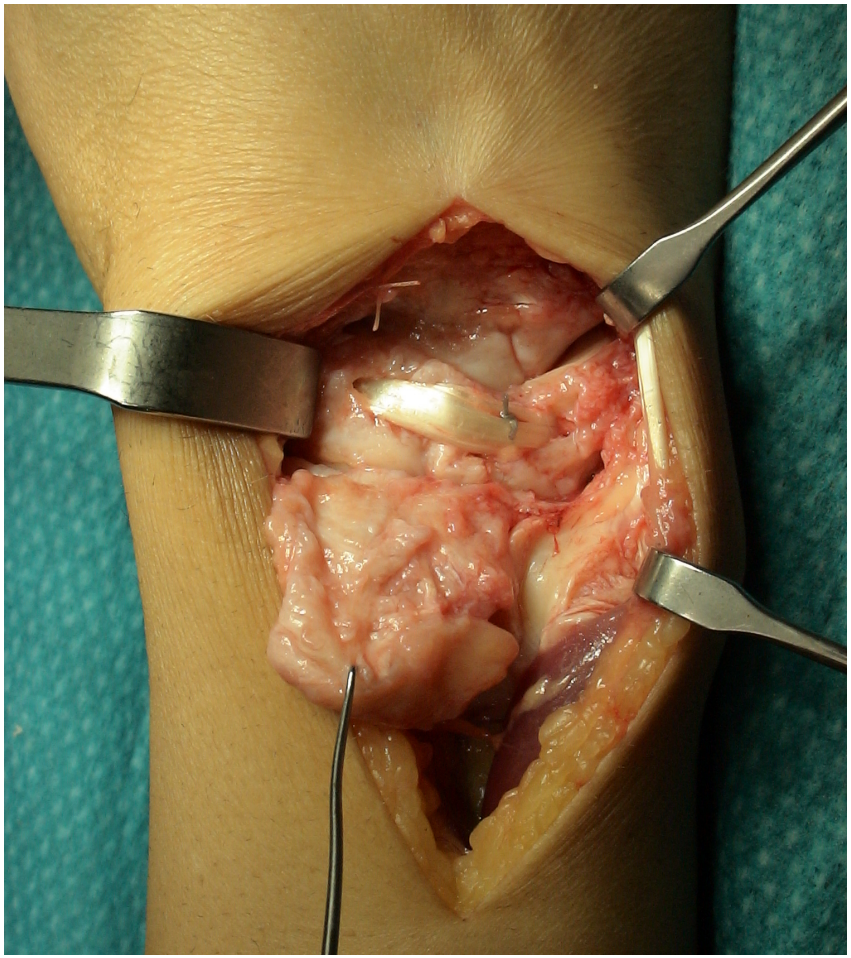
Soong M, Merrell GA, Ortmann F 4th, Weiss AP. J Hand Surg Am. 2013 Mar;38(3):504-8.

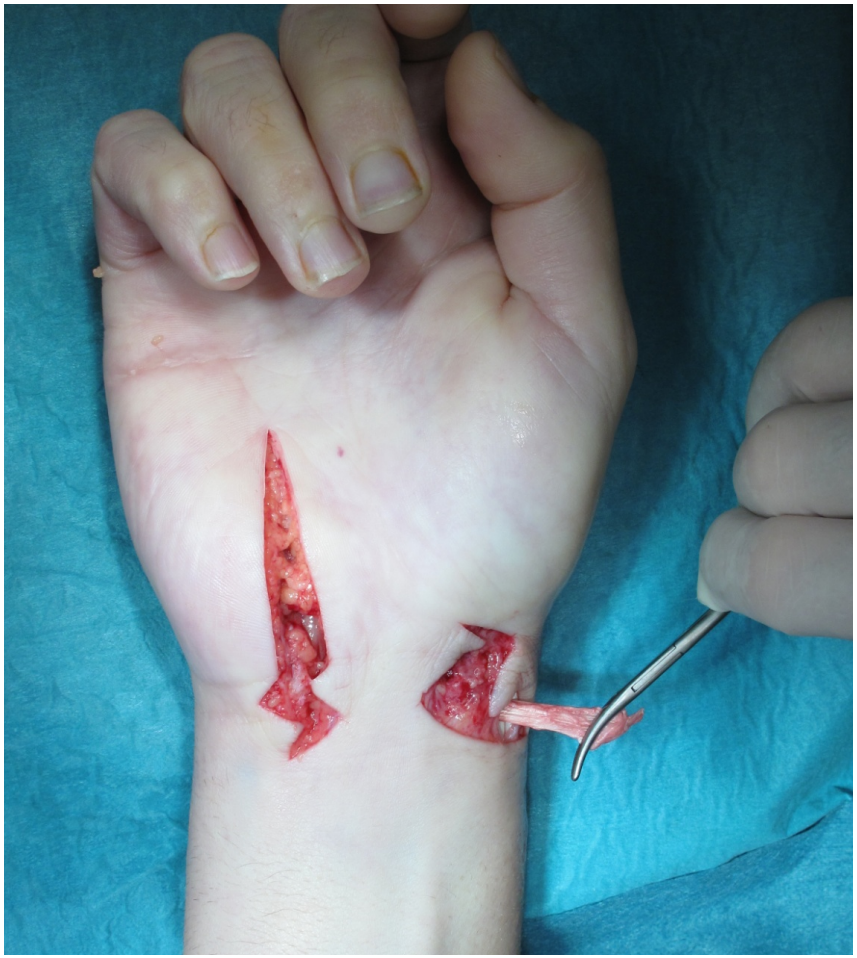
Spiral-Tenodese



Chee KG, Chin AY, Chew EM, Garcia-Elias M. J Hand Surg Am. 2012 Dec;37(12):2611-8.

Spiral-Tenodese





SLAM

Mediokarpale Teilarthrodese

E/F 63/0/62
VAS 3.3
Grobkraft 85% Ggs.
DASH 20

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Welche Option?

- E/F 51/0/37
  VAS 4.8
  Grobkraft 78% Ggs.
  DASH 28

- E/F 53/0/35
  VAS 2.8
  Grobkraft 80% Ggs.
  DASH 25

- E/F 63/0/62
  VAS 3.3
  Grobkraft 85% Ggs.
  DASH 20

Fazit

- Dynamische Instabilitäten können möglicherweise konservativ behandelt werden
- Es gibt derzeit keine langfristige Lösung für die statische Instabilität
- Viele Verfahren haben ähnliche Ergebnisse
- Rettungsoperation sind nicht schlechter

Die Therapie der skapholunären Bandverletzung muss an

- morphologisch-/anatomischen
- klinischen
- und funktionellen

Aspekten orientiert werden

VIELEN DANK