



UANL

UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN

HOSPITAL UNIVERSITARIO
FACULTAD DE MEDICINA



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Profesor

Servicio de Cirugía Plástica, Reconstructiva y Estética

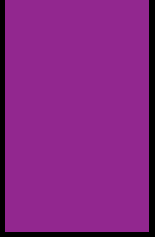
Curso de Alta Especialidad en Cirugía de Mano y Microcirugía

Hospital Universitario José Eleuterio González



Aldo G. Beltrán P., MD, MSc



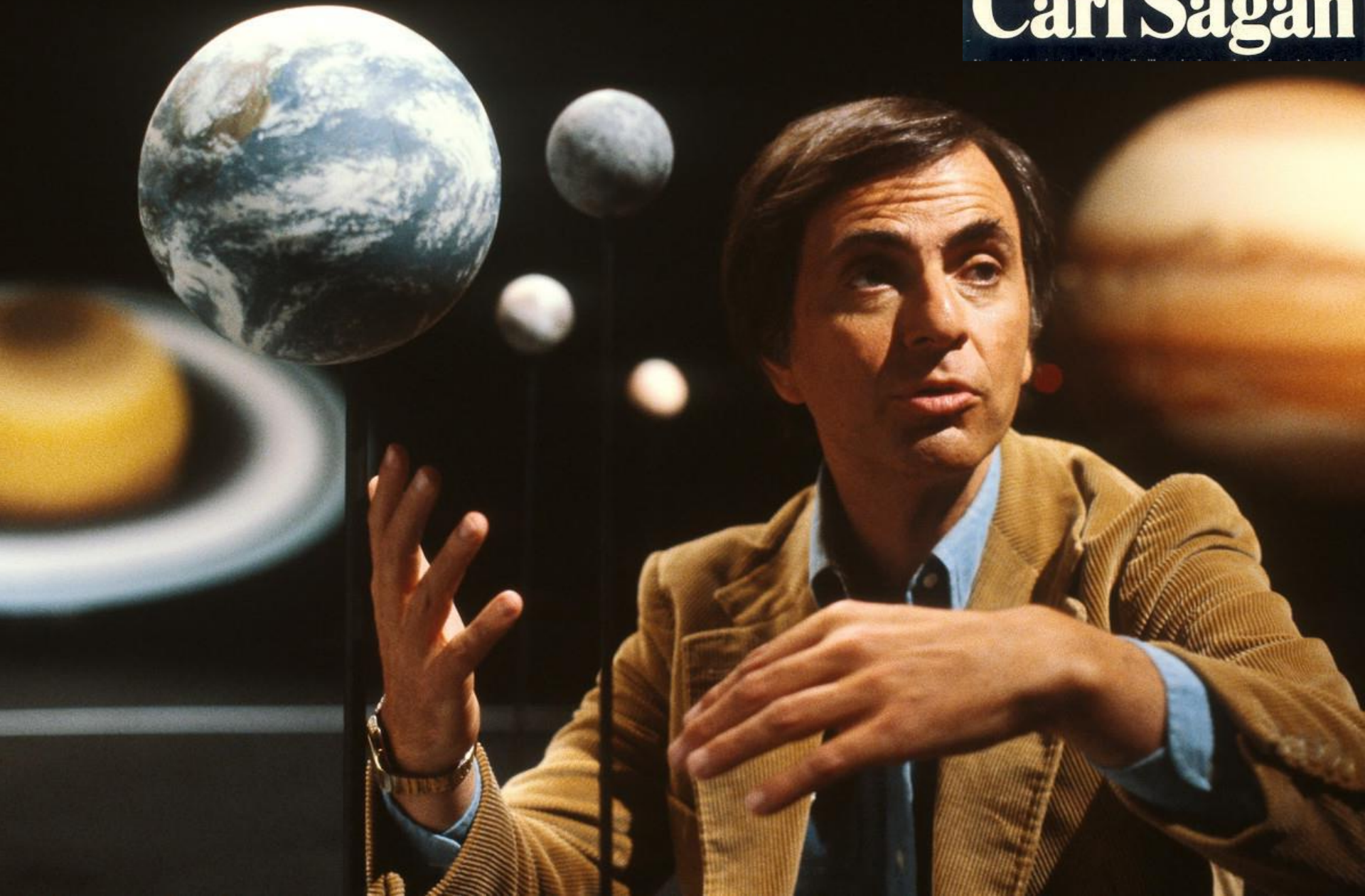


Morfología del miembro superior y la mano humana

Y SUS IMPLICACIONES EN EL DESARROLLO DE LA
CIRUGÍA RECONSTRUCTIVA

COSMOS

Carl Sagan



COSMOS Carl Sagan



BRAZO

RADIO

CÚBITO / CARPO

MANO

Human

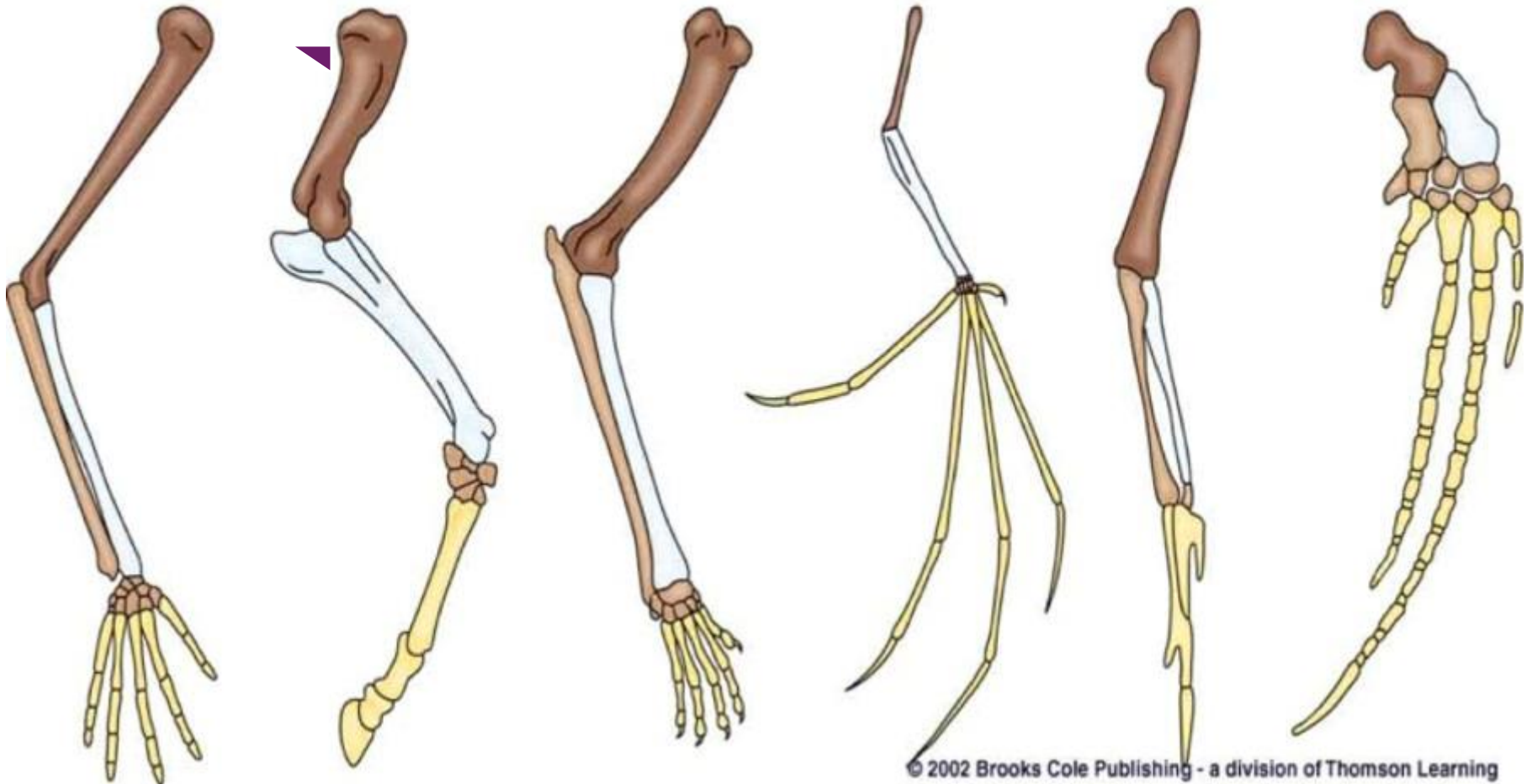
Horse

Cat

Bat

Bird

Whale



BRAZO

RADIO

CÚBITO / CARPO

MANO

Human

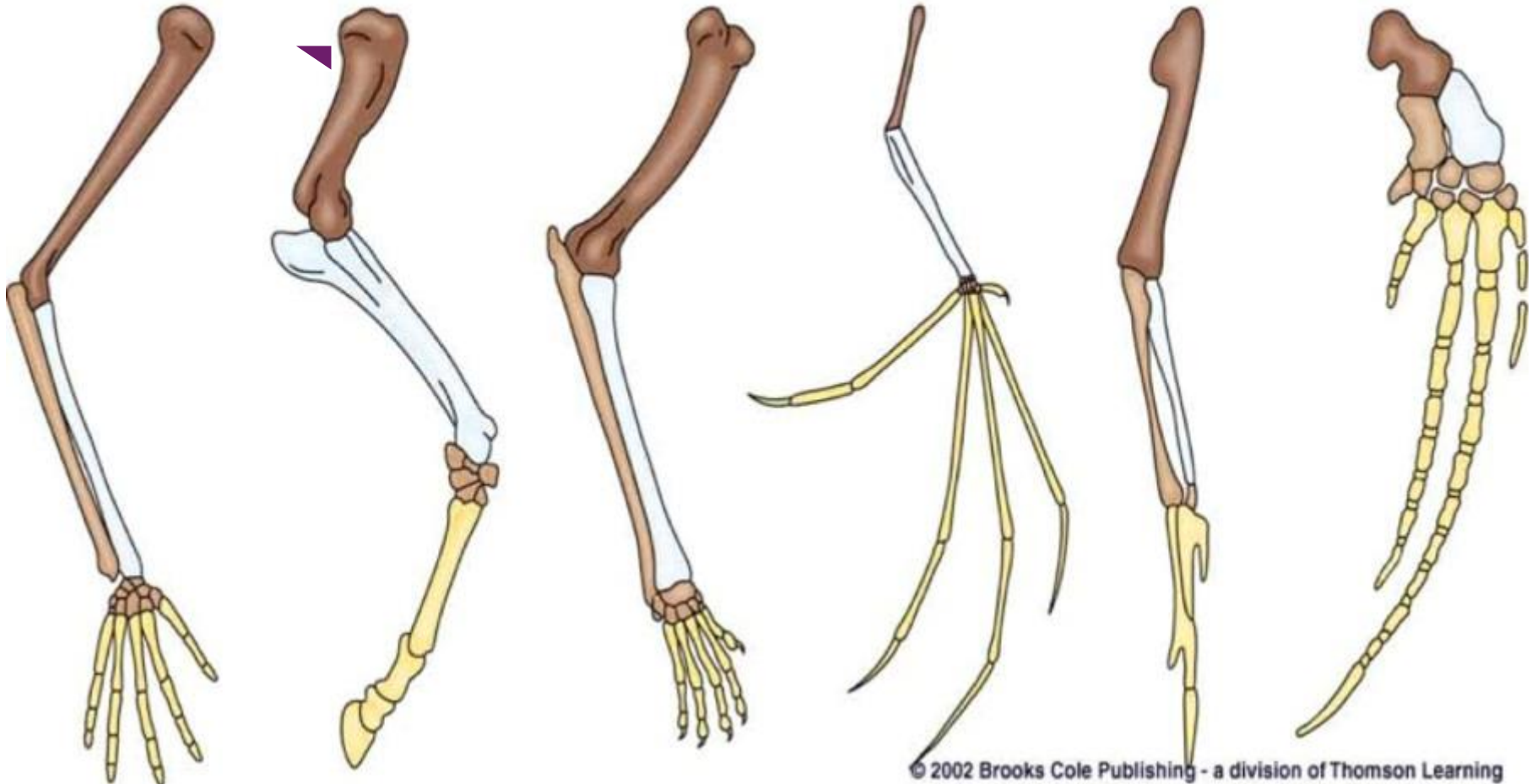
Horse

Cat

Bat

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Whale



BRAZO

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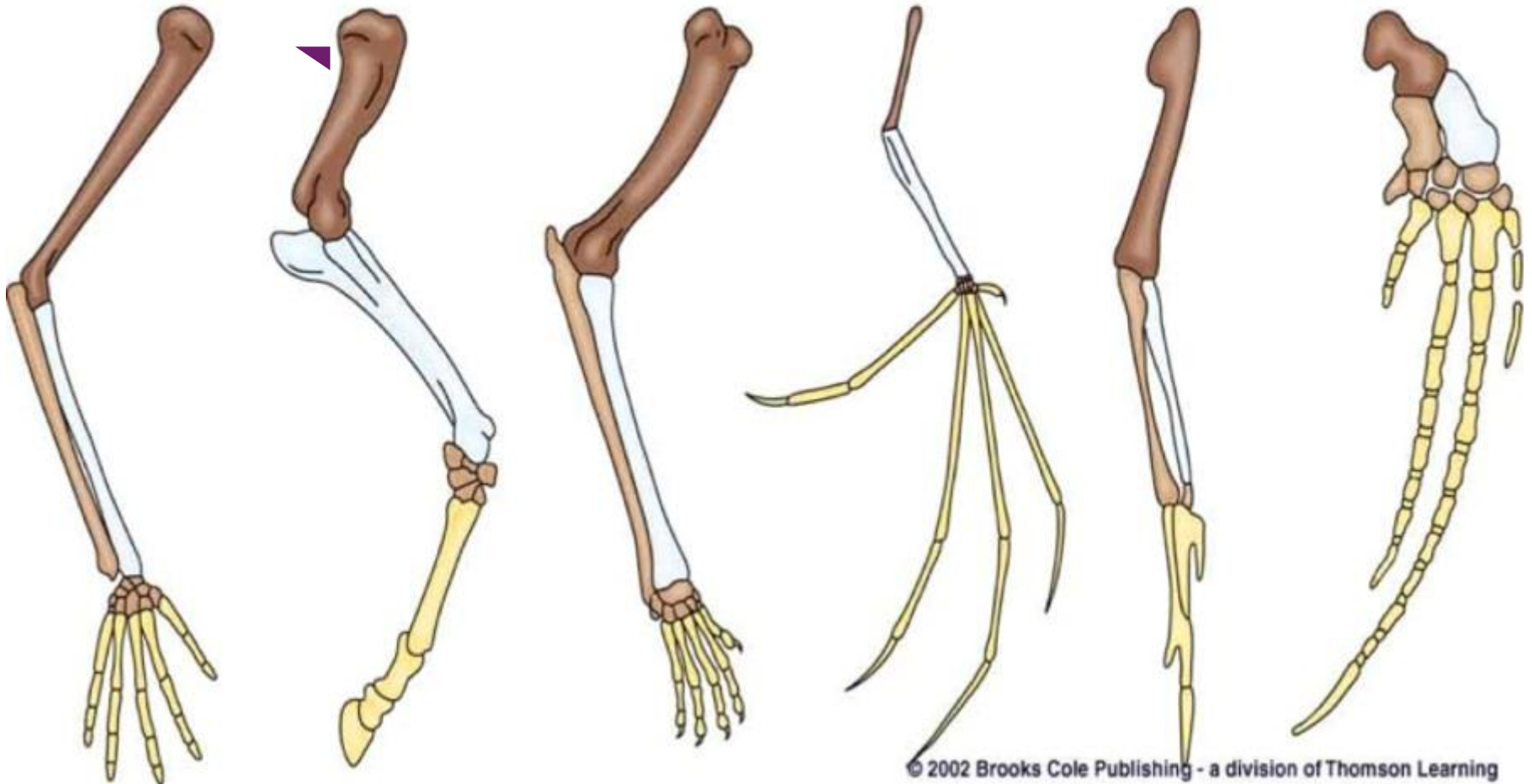
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BRAZO

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Human

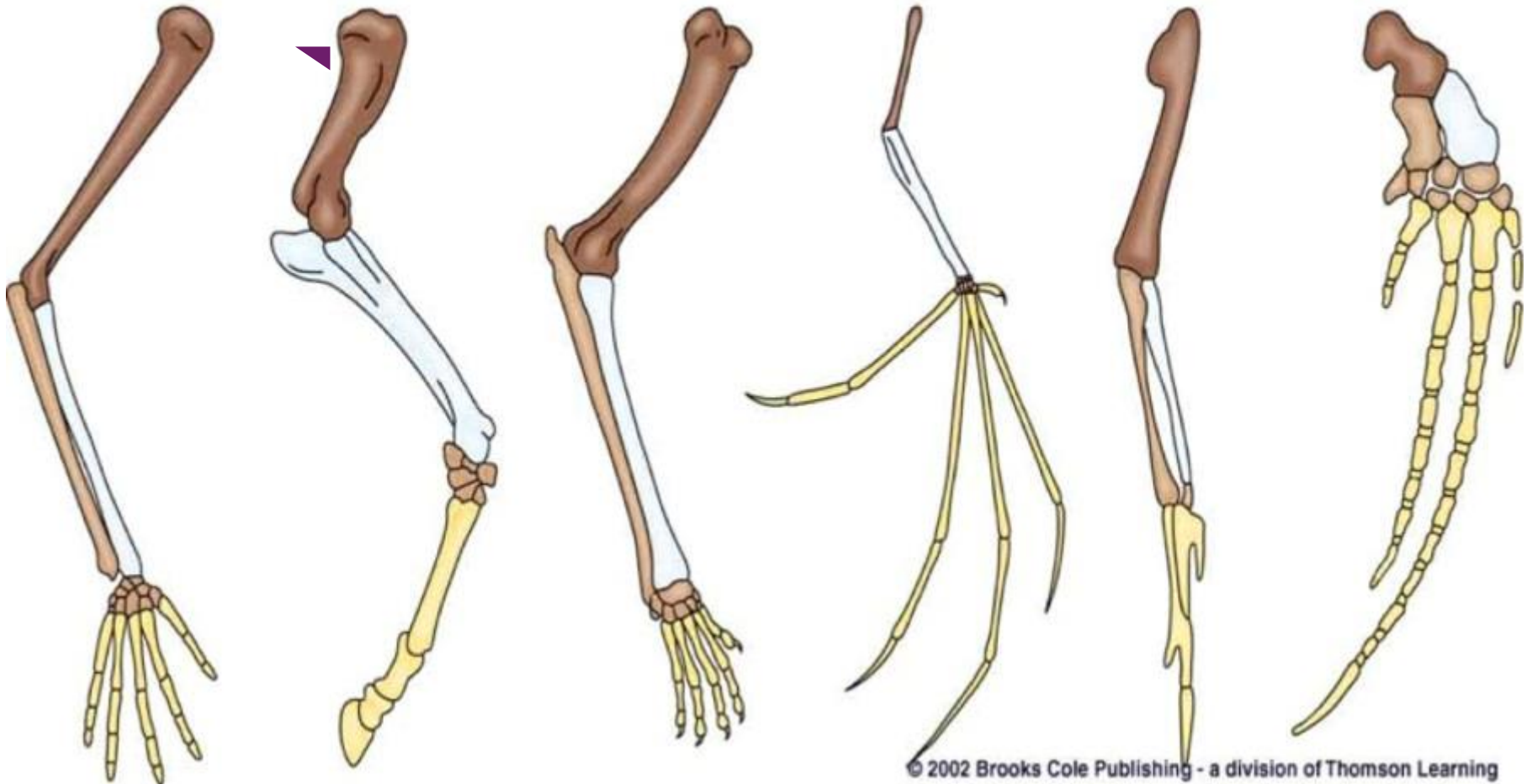
Horse

Cat

Bat

Bird

Whale



BRAZO

RADIO

CÚBITO / CARPO

MANO

Human

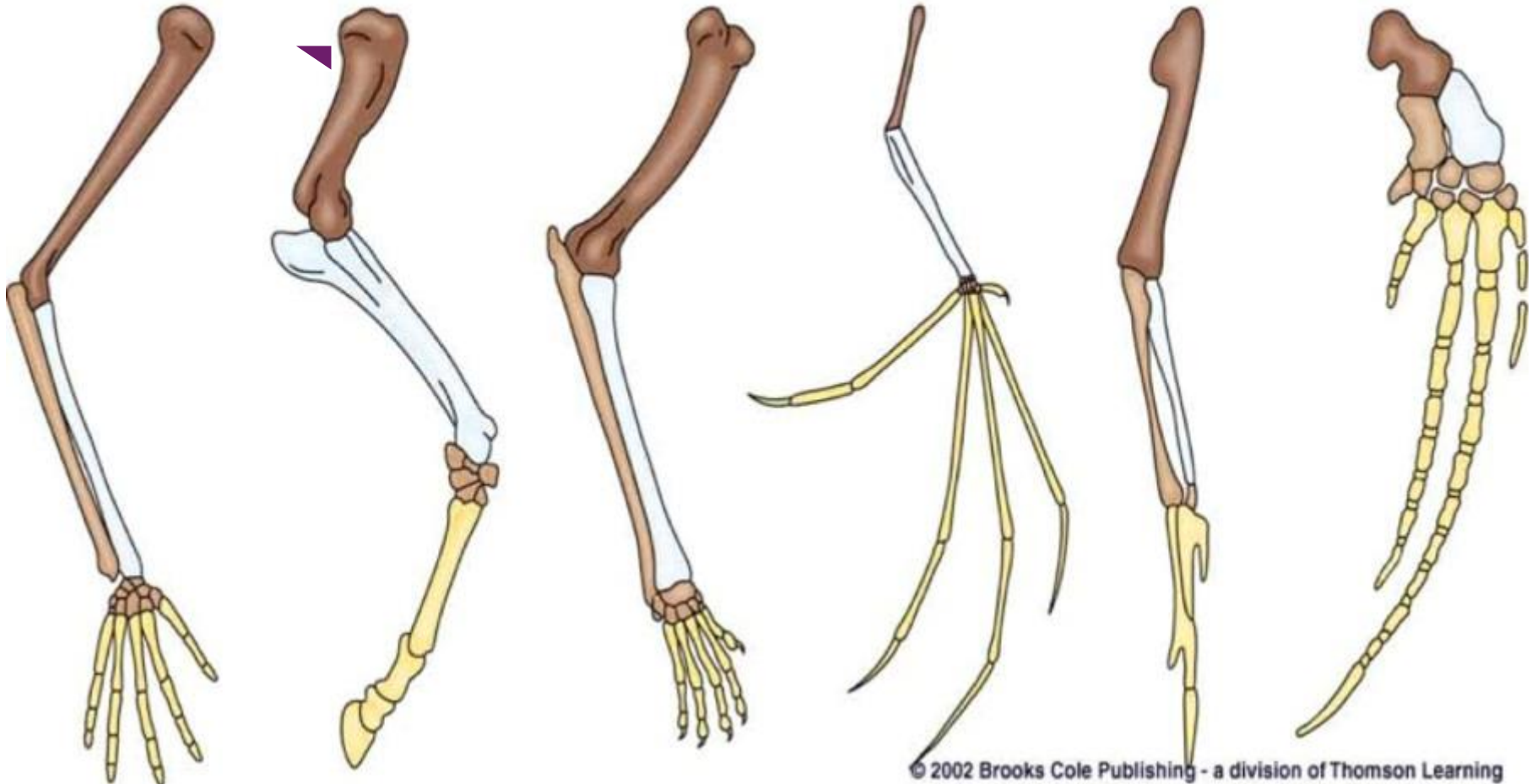
Horse

Cat

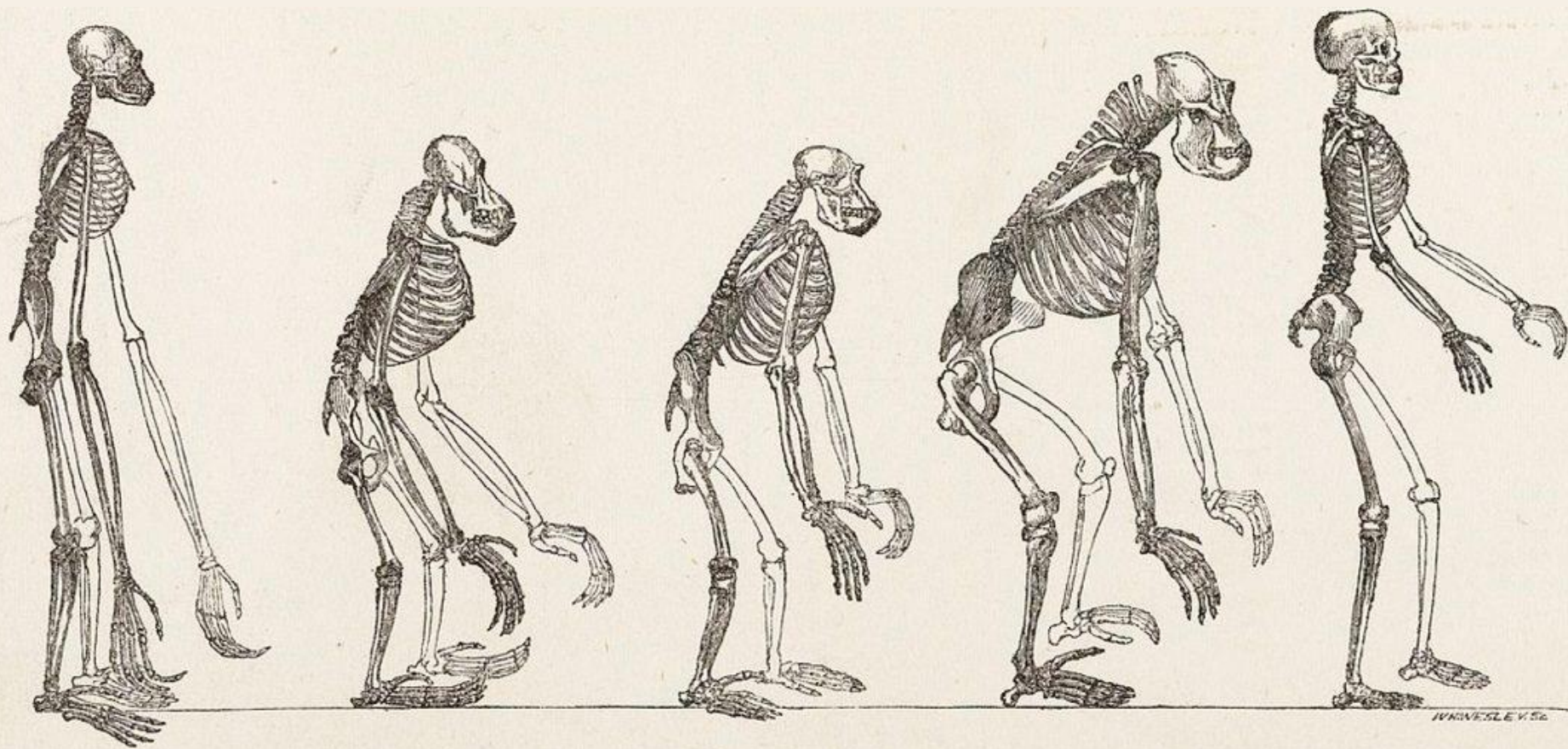
Bat

Bird

Whale







GIBBON.

ORANG.

Skeletons of the
CHIMPANZEE.

GORILLA.

MAN.

AUSTRALOPITHECUS AFAERENSIS



*88 HUESOS
HALLADOS
EN 1974
EN ETIOPIA
ELLA FUE LA PRIMERA
EN ANDAR EN 2 PATAS*

LUCY

*VIVO HACE 3.8 MILLONES DE AÑOS
MURIO A LOS 28 AÑOS
AL CAER DE UN ARBOL
ESTA EN EL MUSEO NACIONAL DE ETIOPIA
EN ADIS ABEBA*



SCARLETT JOHANSSON

MORGAN FREEMAN

**UNA PERSONA
PROMEDIO
USA EL 10%
DE SU
CAPACIDAD CEREBRAL.
HOY ELLA
ALCANZARÁ EL 100%**

LUCY

**LA NUEVA PELÍCULA DIRIGIDA
POR LUC BESSON
CREADOR DE BÚSQUEDA IMPLACABLE,
EL PERFECTO ASESINO Y
EL QUINTO ELEMENTO**

WWW.LUCY-LAPELICULA.COM



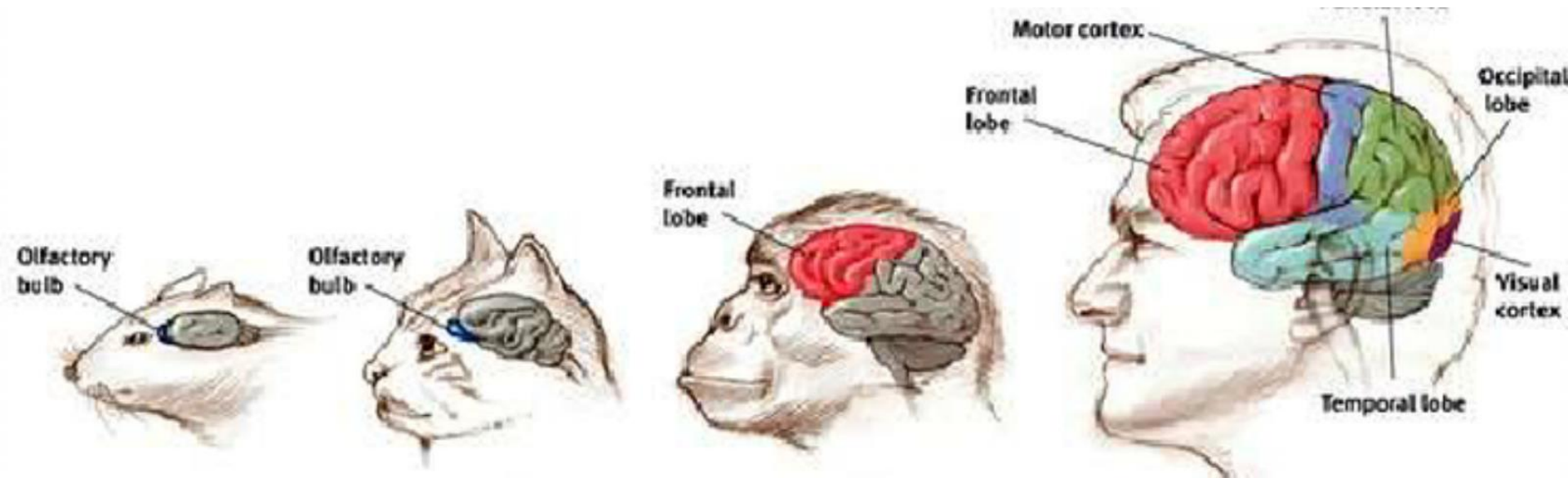




JOSÉ MARÍA ROTELLA (1951 – 2020)

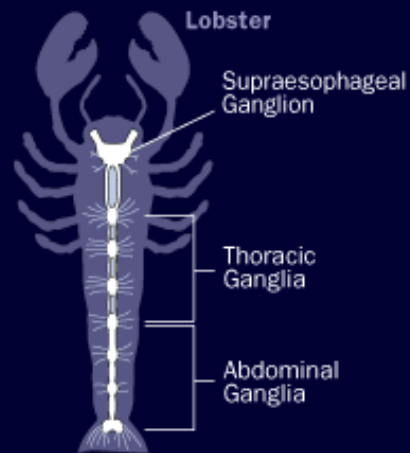
El Éxodo del Tacto:
Del hocico a la mano





Brain Comparison

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- Cerebellum
- Optic Lobe
- Cerebrum
- Cerebral Hemisphere
- Medulla
- Pituitary
- Olfactory Bulb





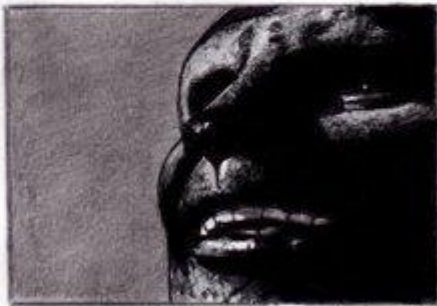






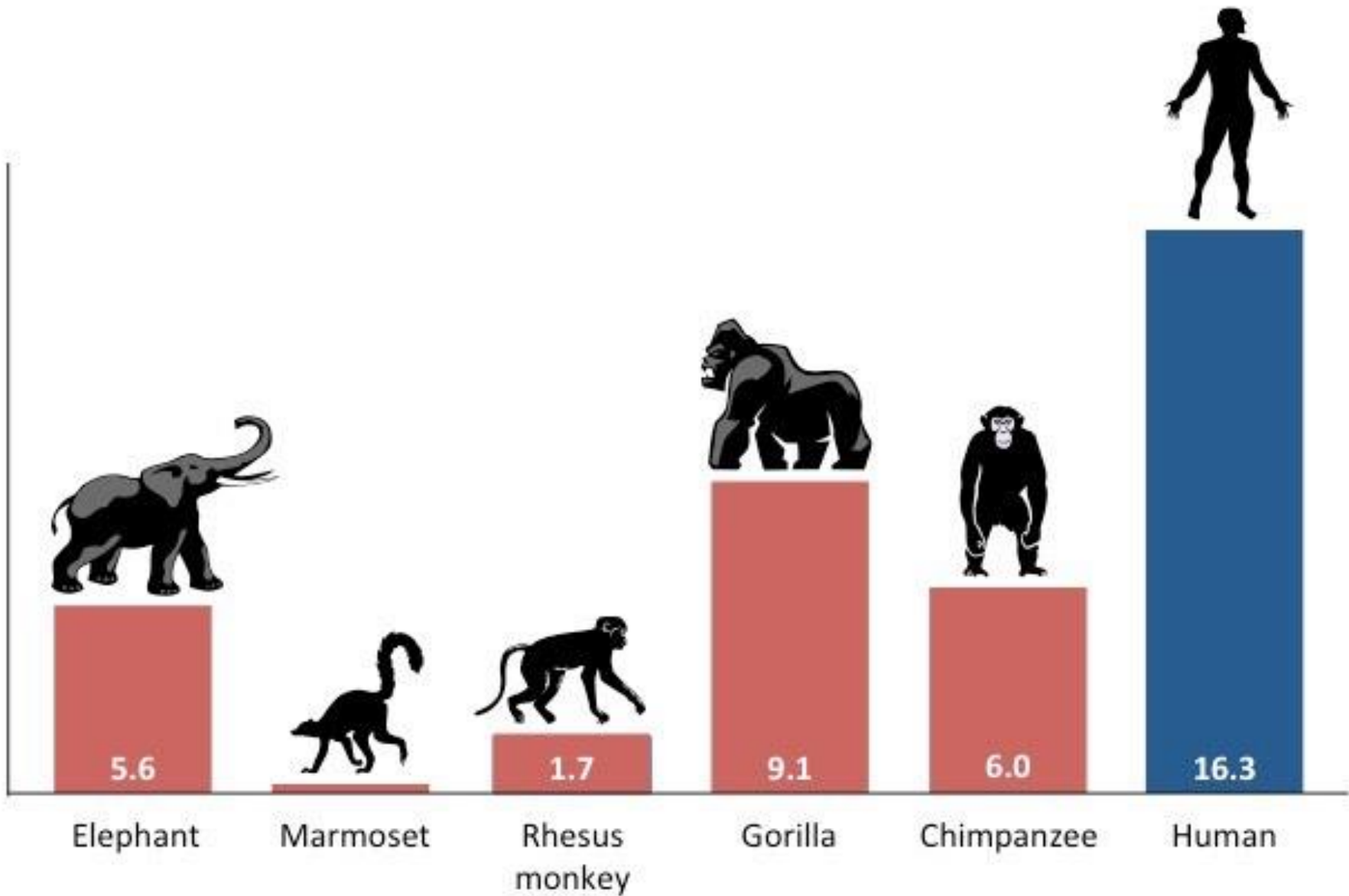
MANIMAL

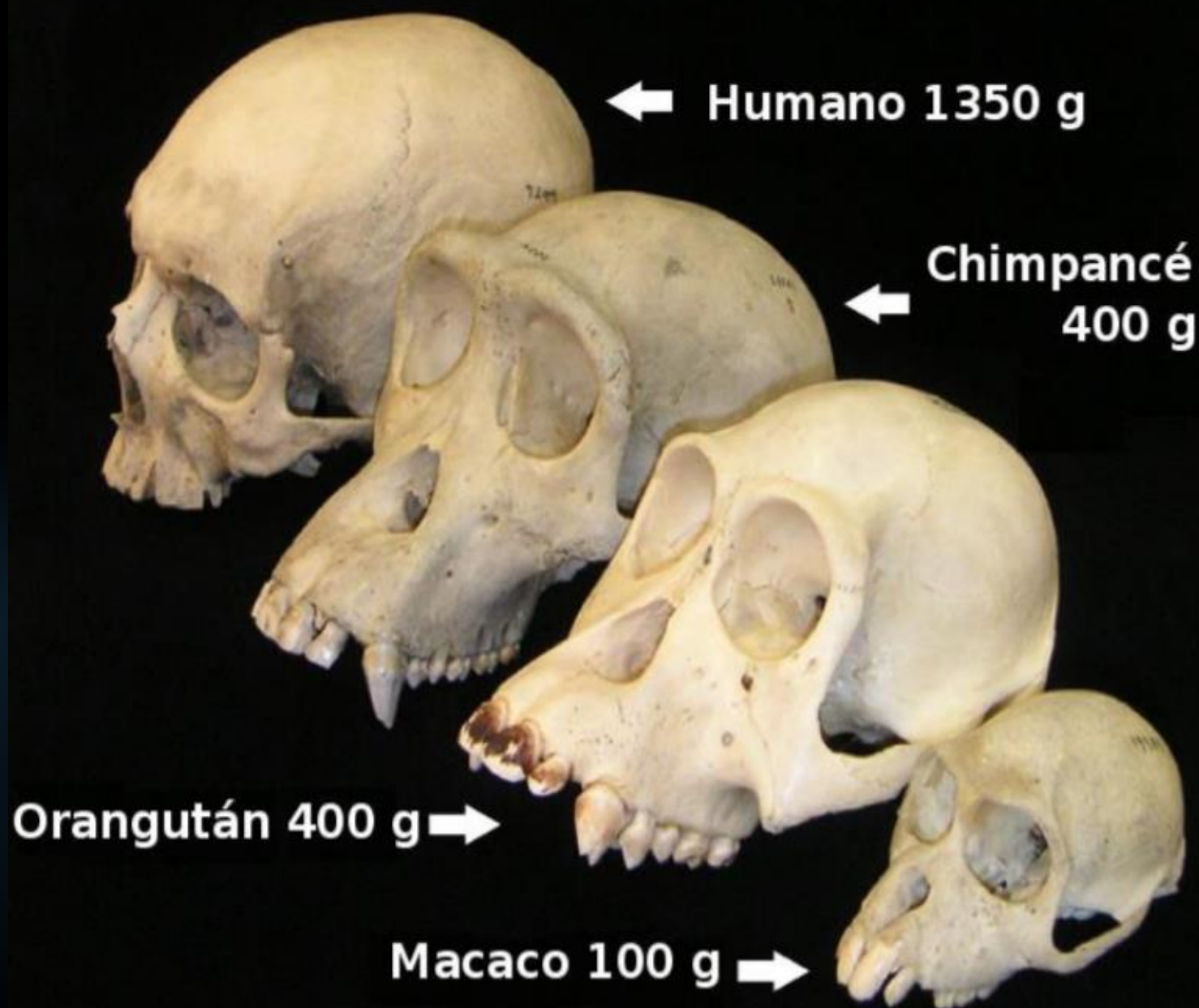






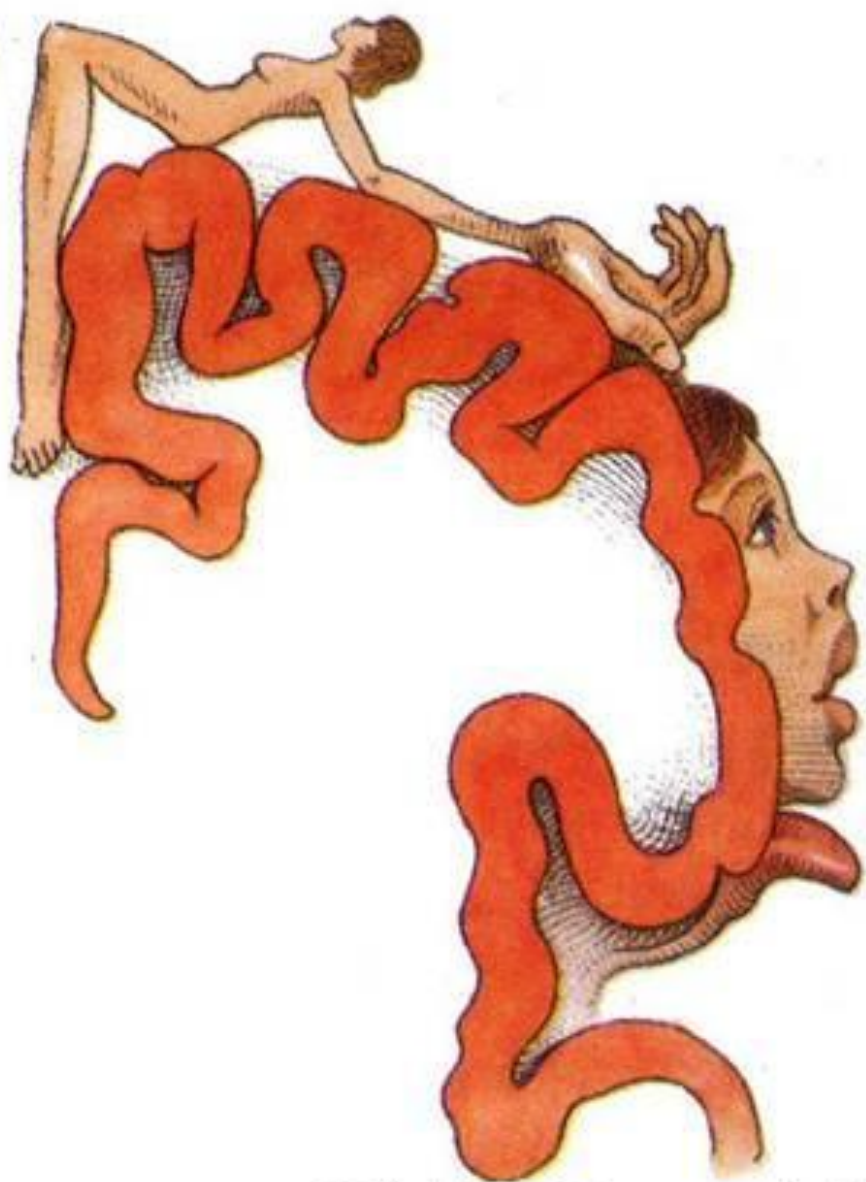
Cerebral Cortex Neurons (billions)







Córtex Motor



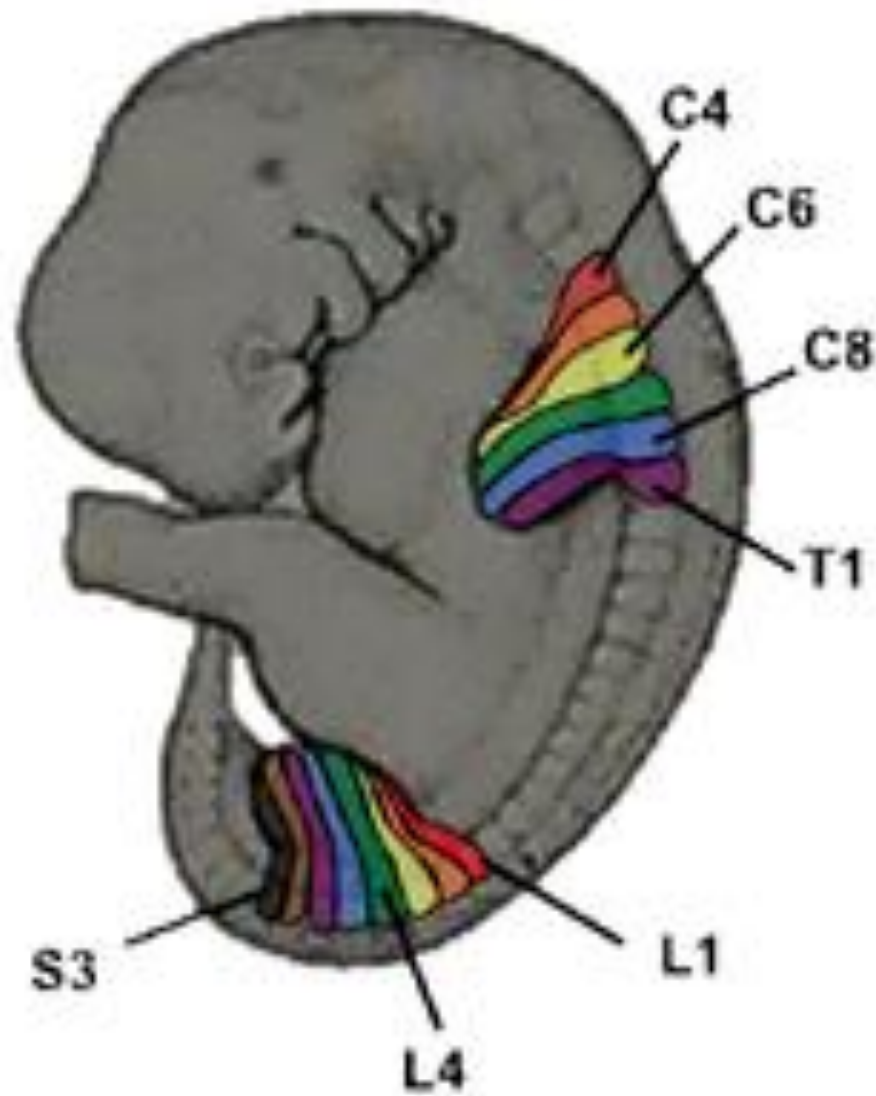
Córtex Sensorial

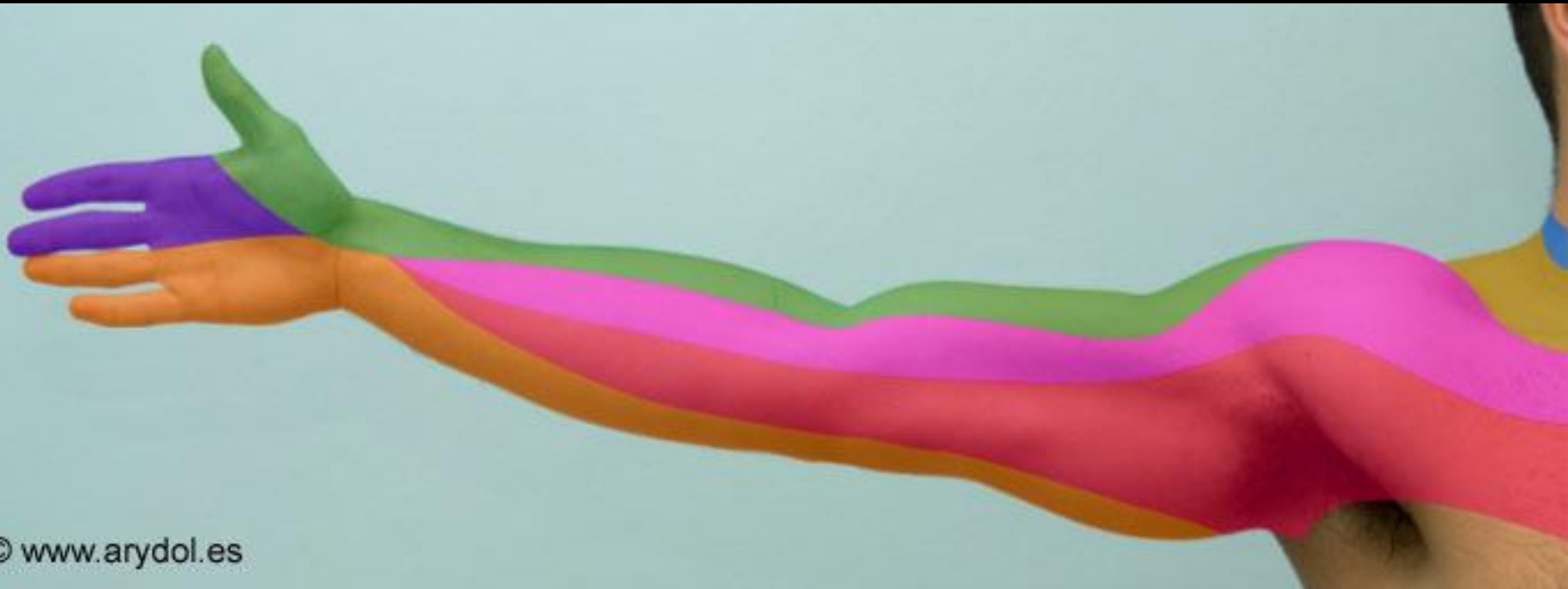


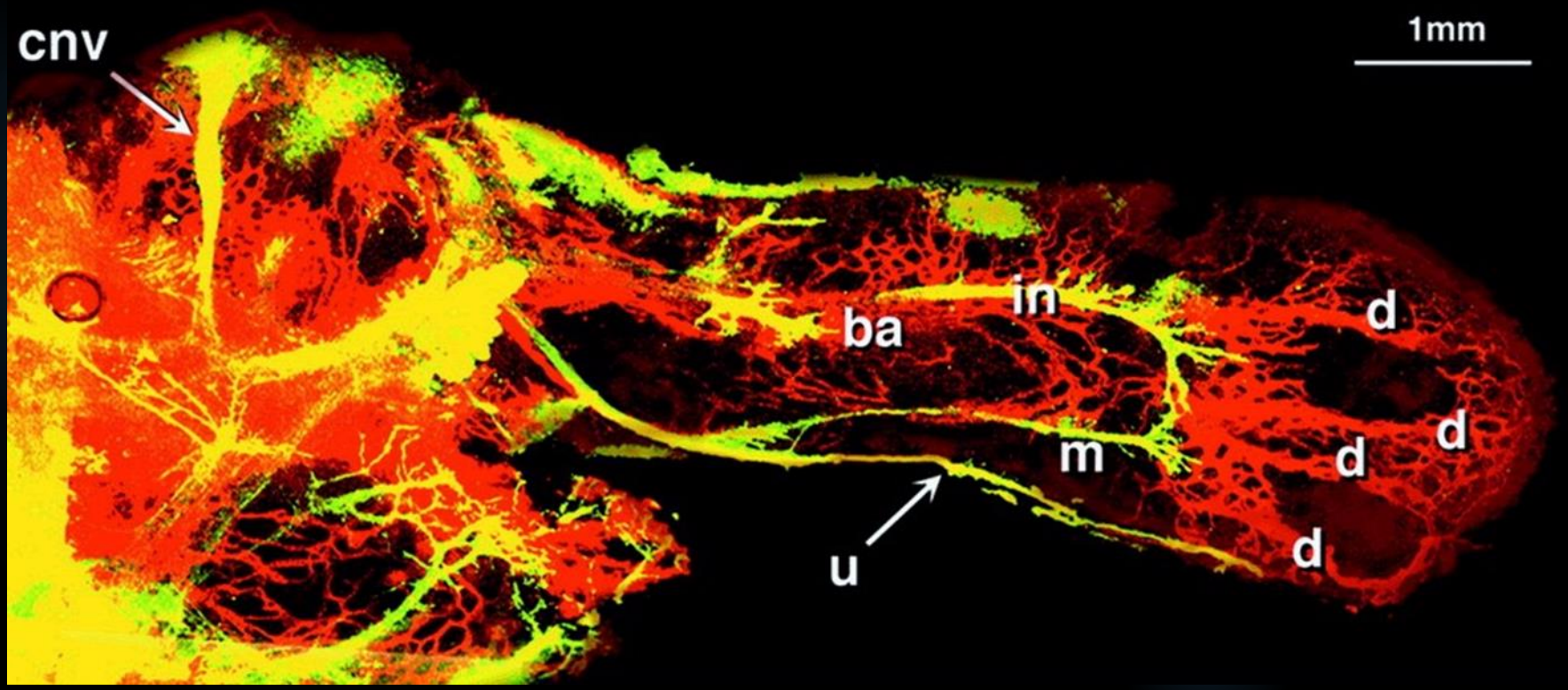
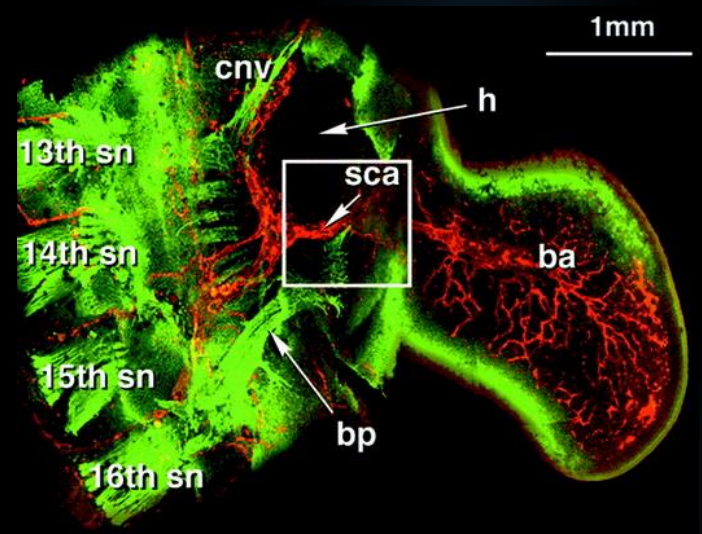
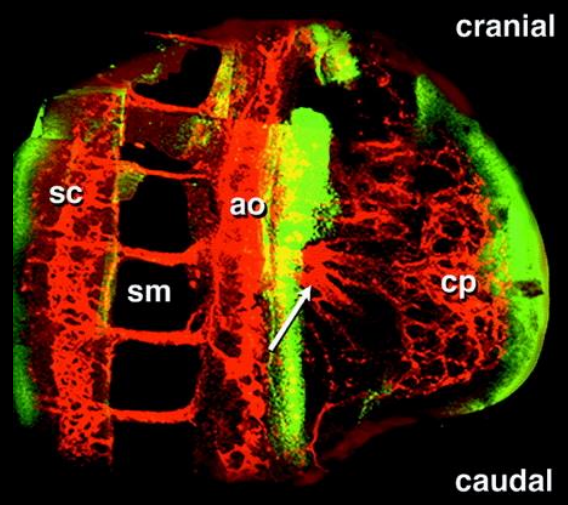
SENSORIAL



MOTOR

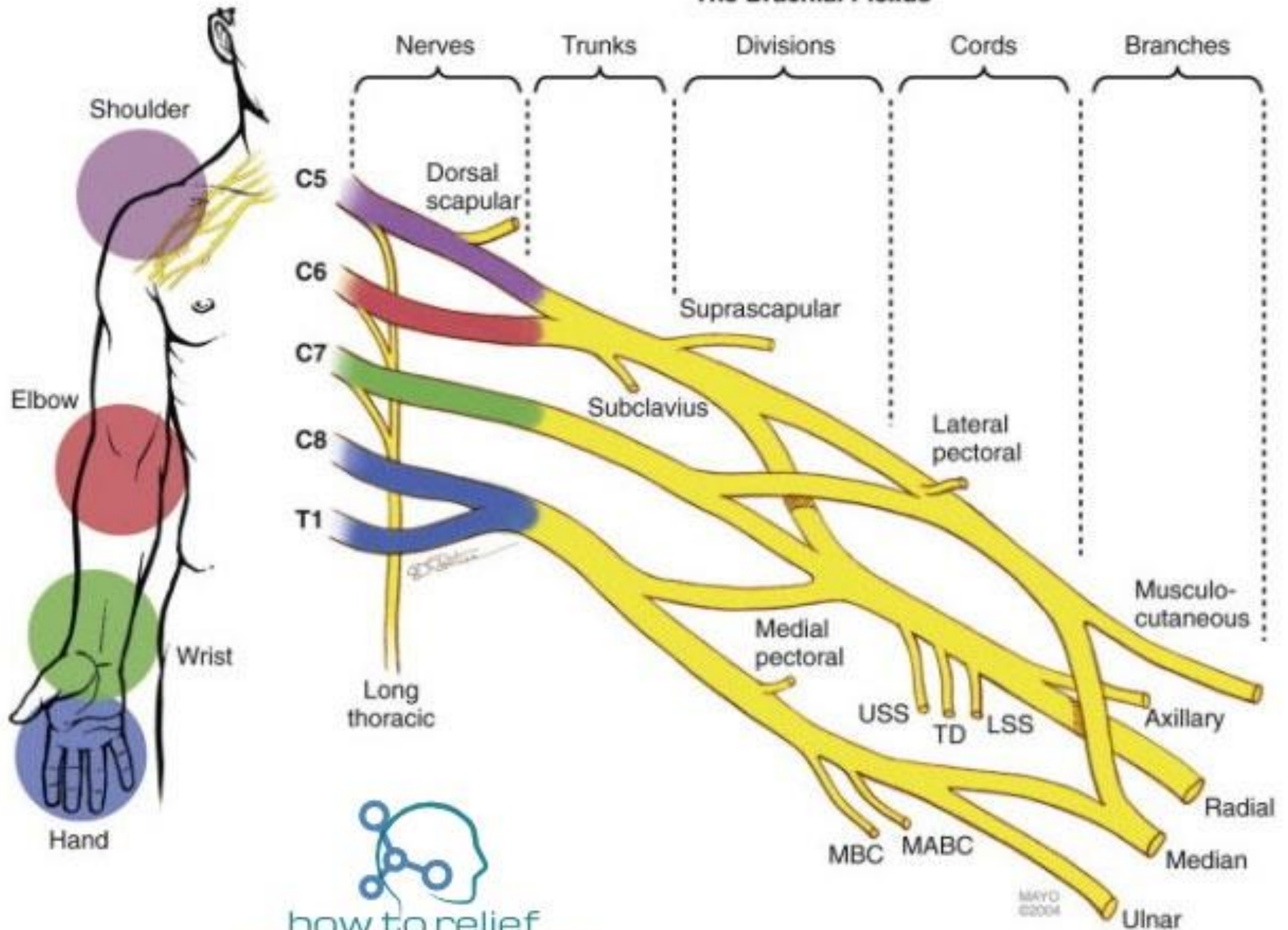








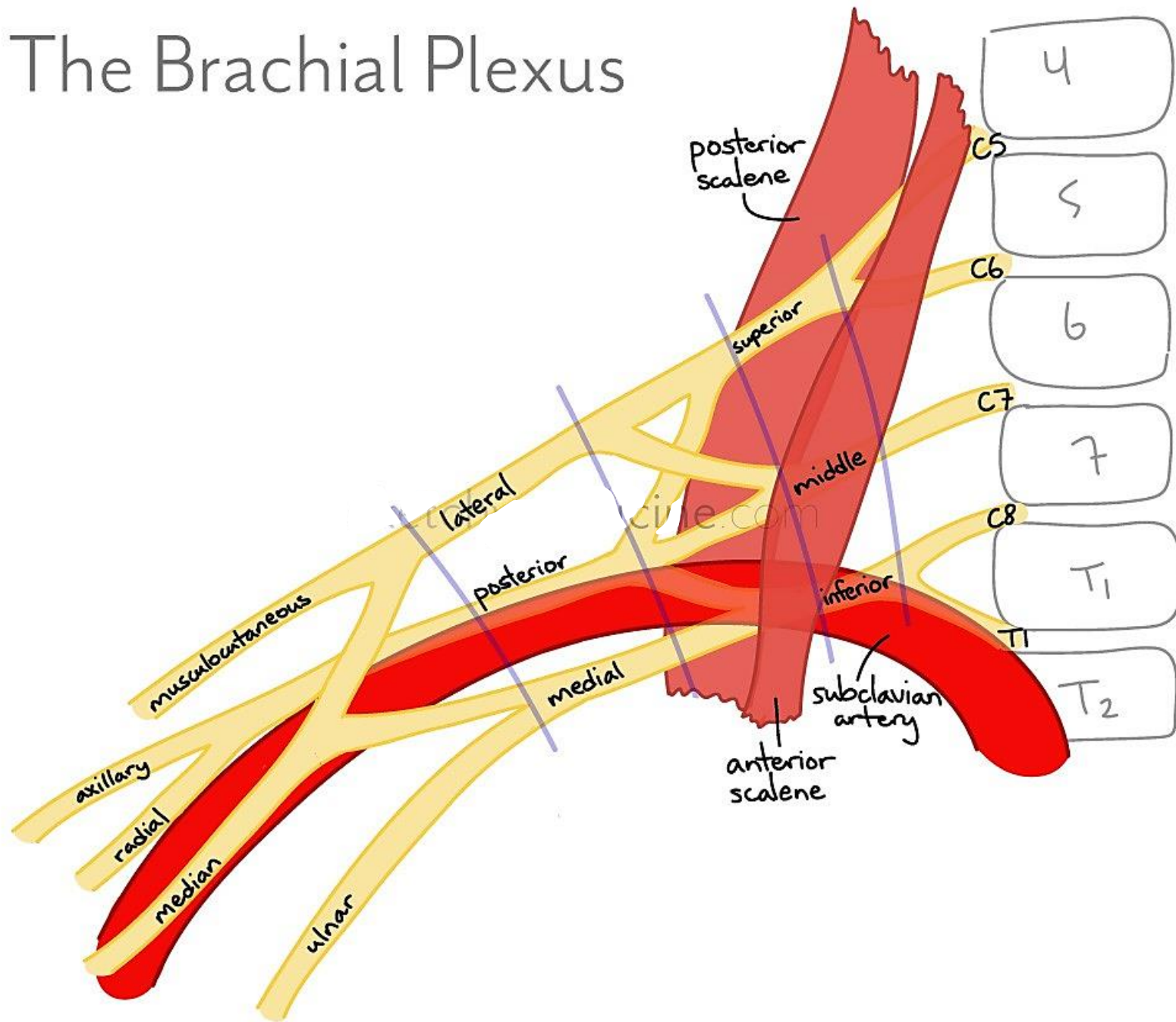
The Brachial Plexus

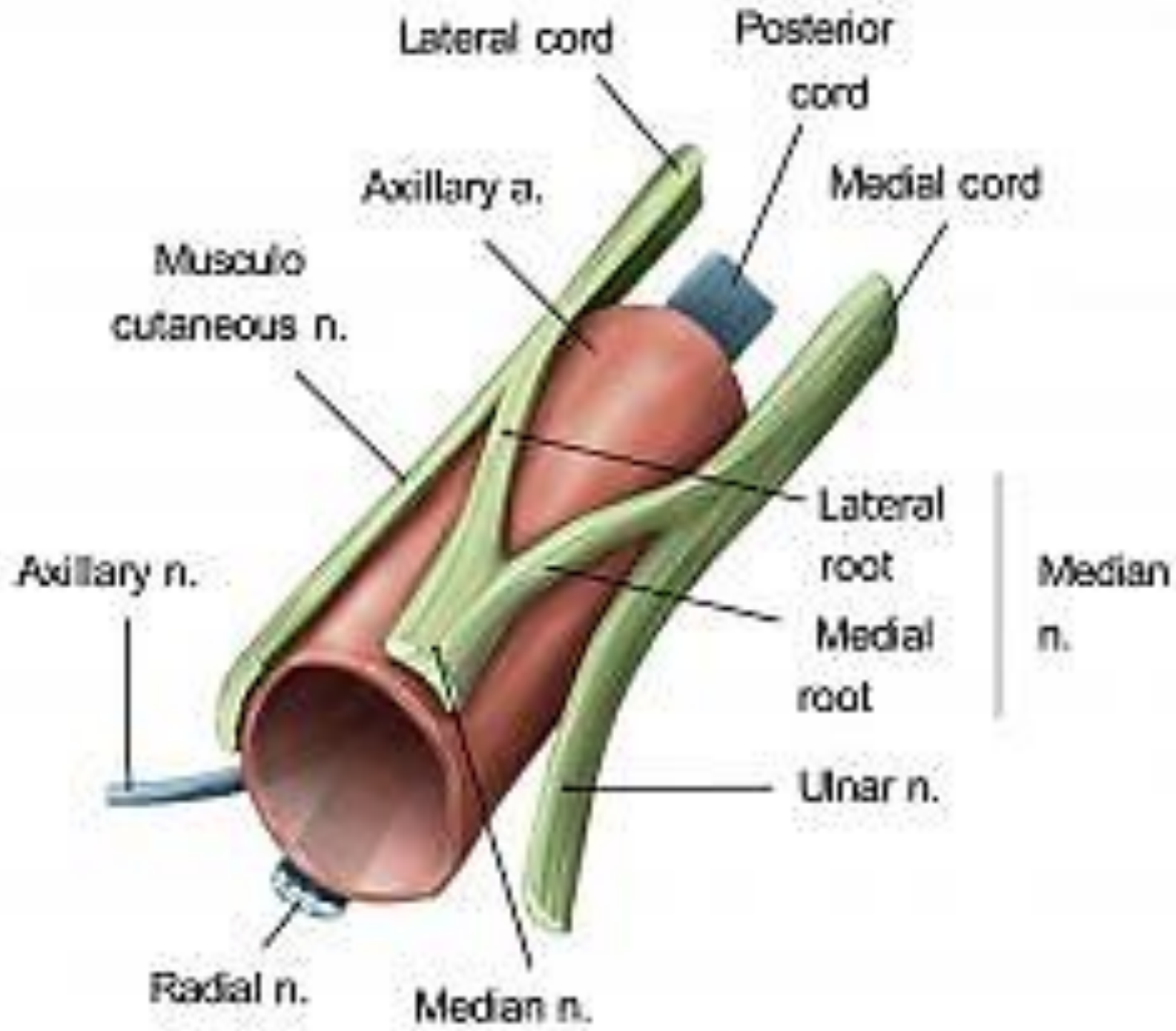


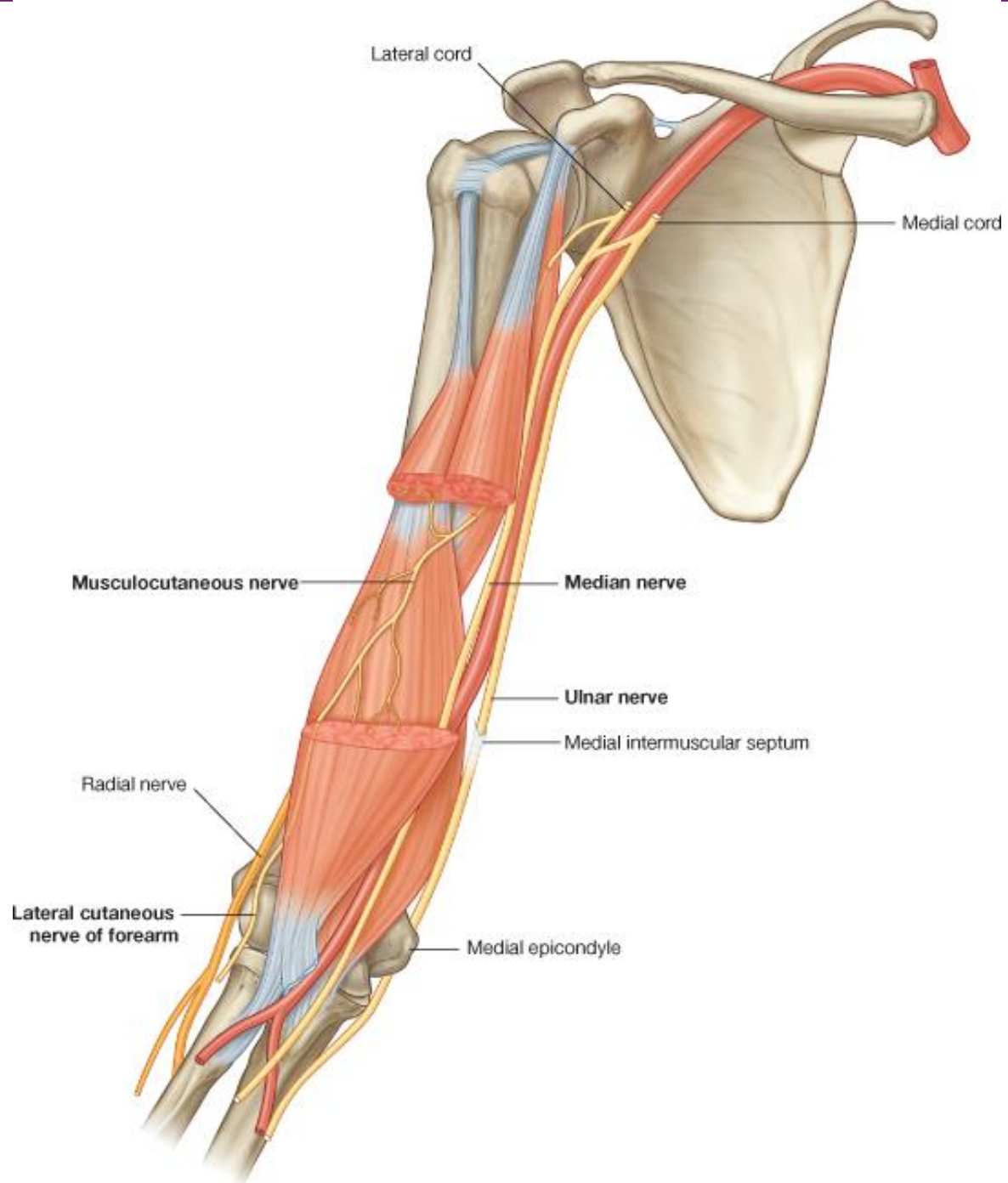
how to relief

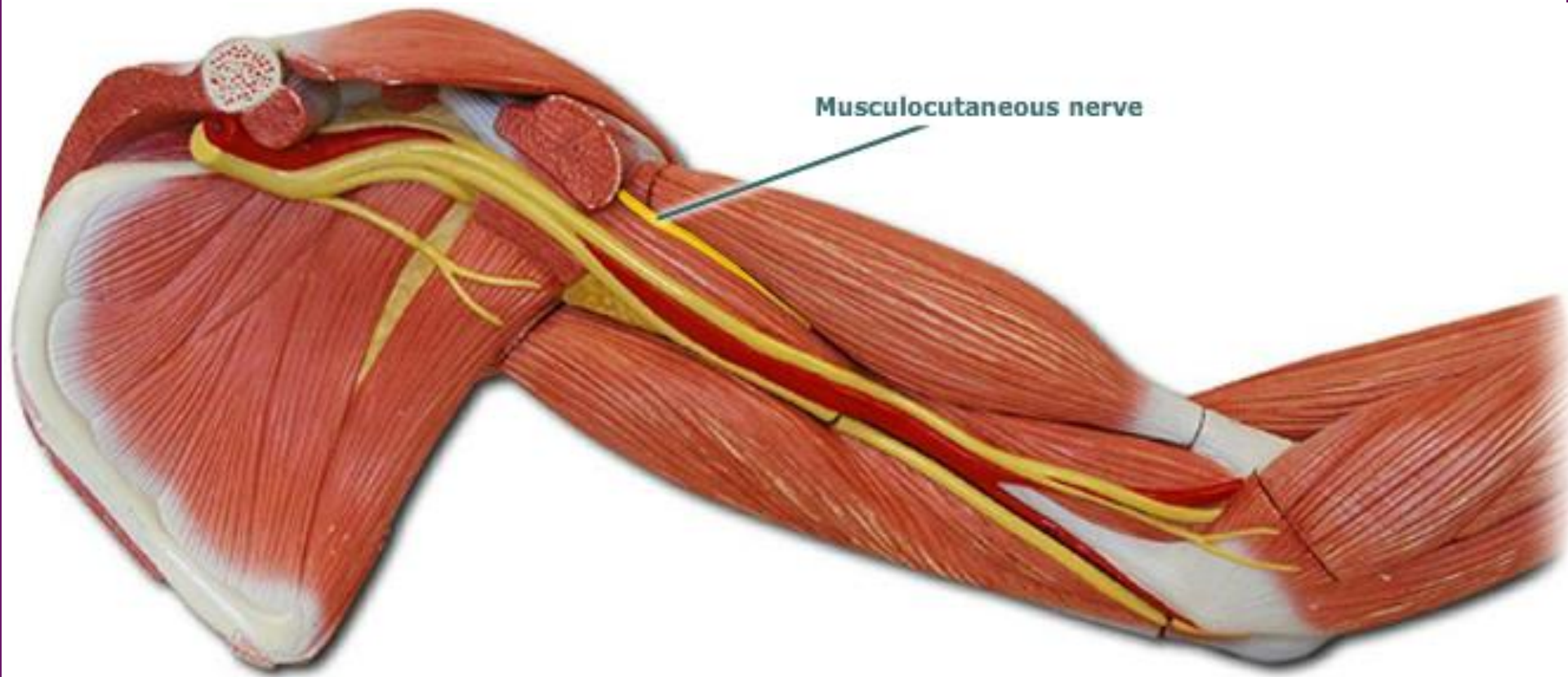
MAYO ©2004

The Brachial Plexus

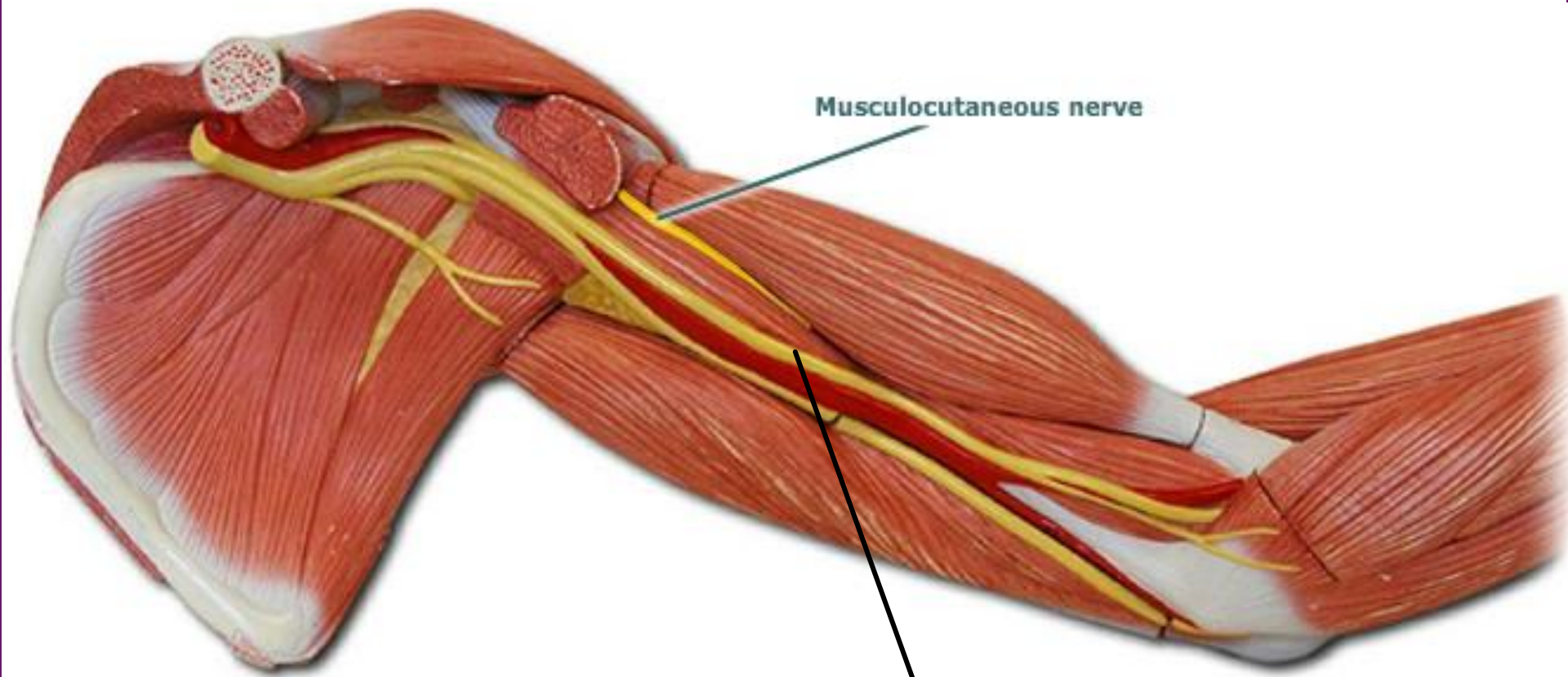






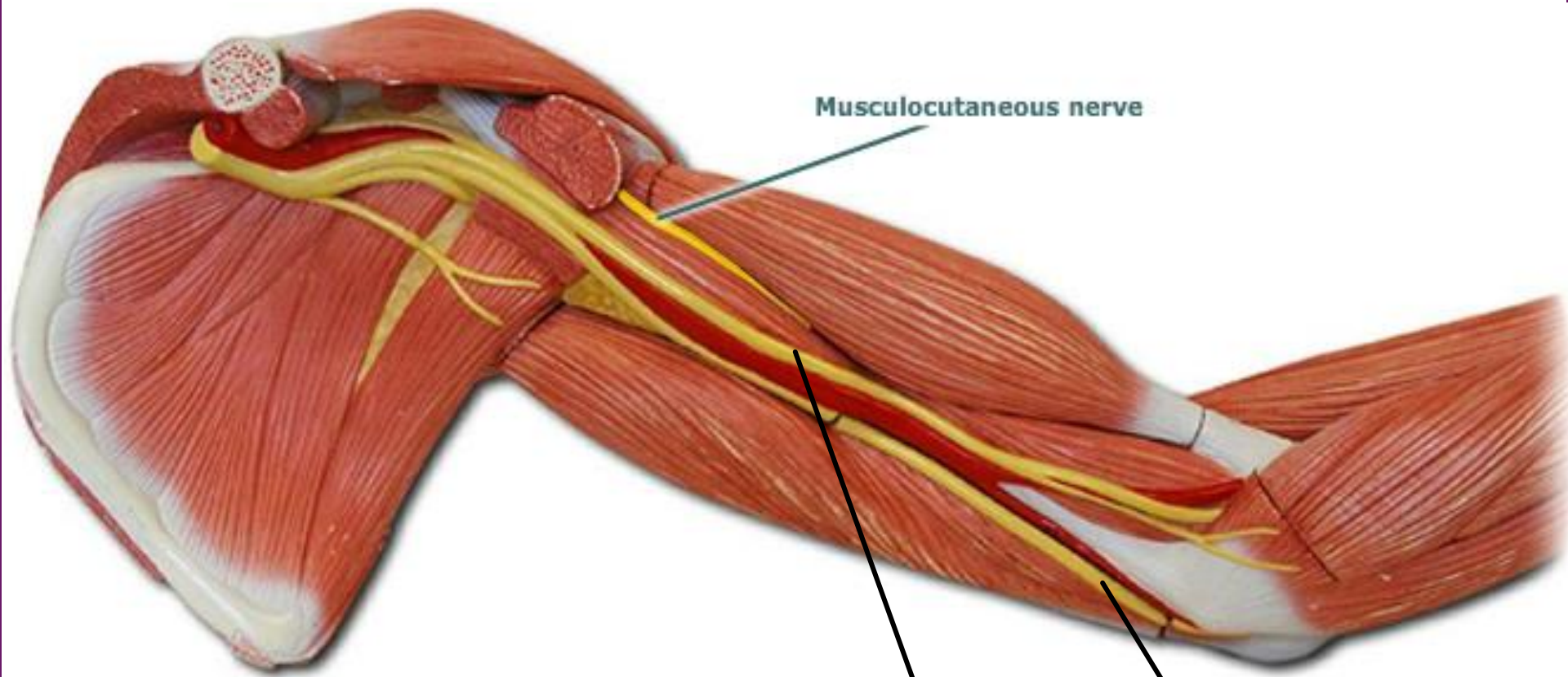


Musculocutaneous nerve



Musculocutaneous nerve

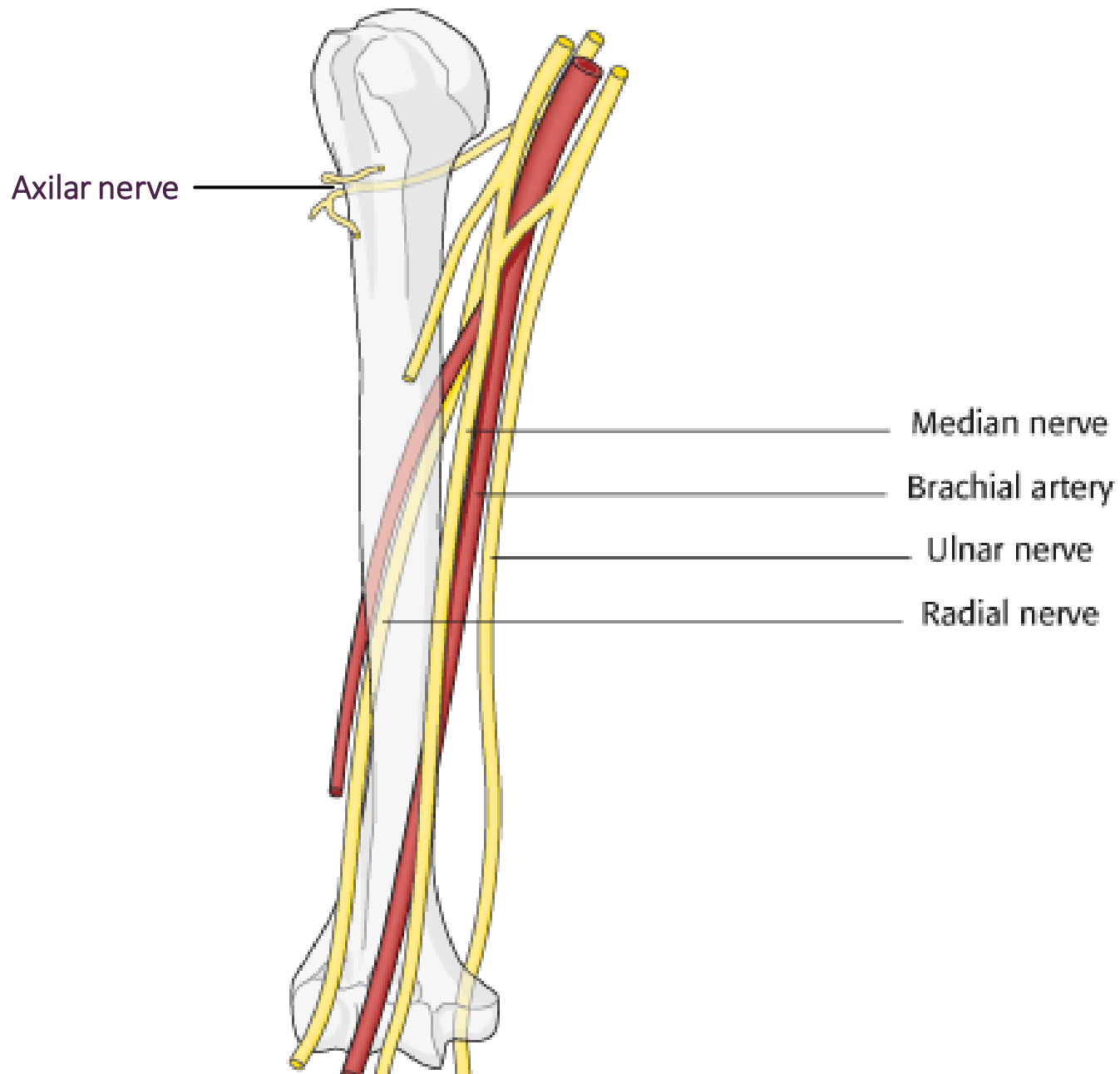
Median nerve

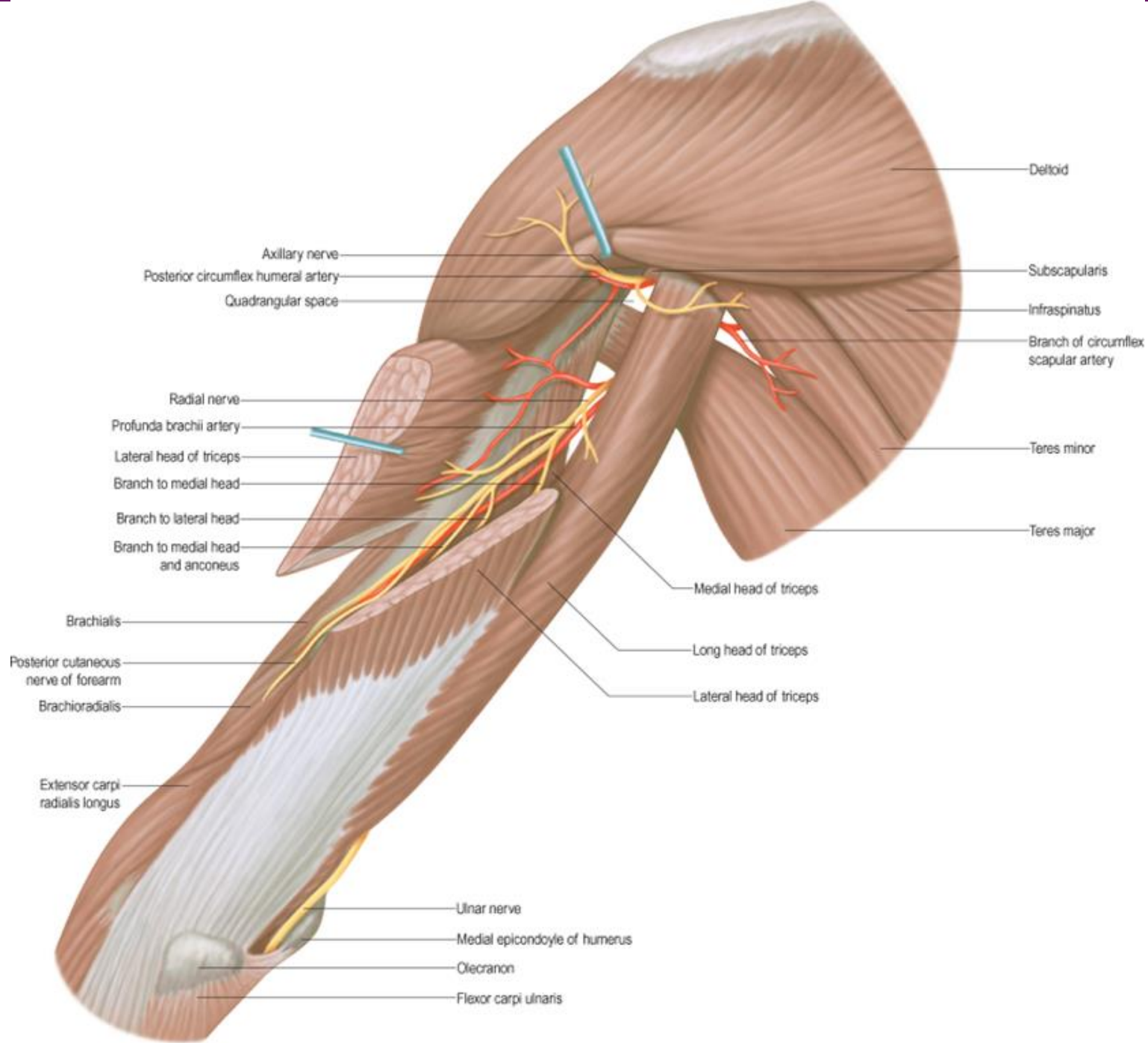


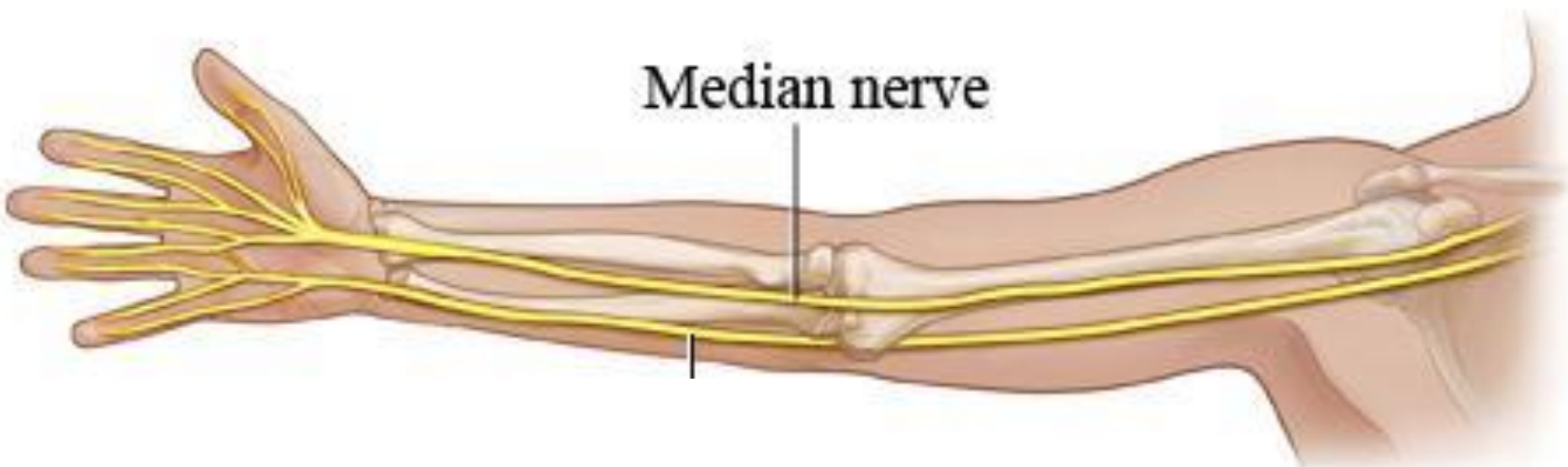
Musculocutaneous nerve

Median nerve

Ulnar nerve







Nervio MEDIANO

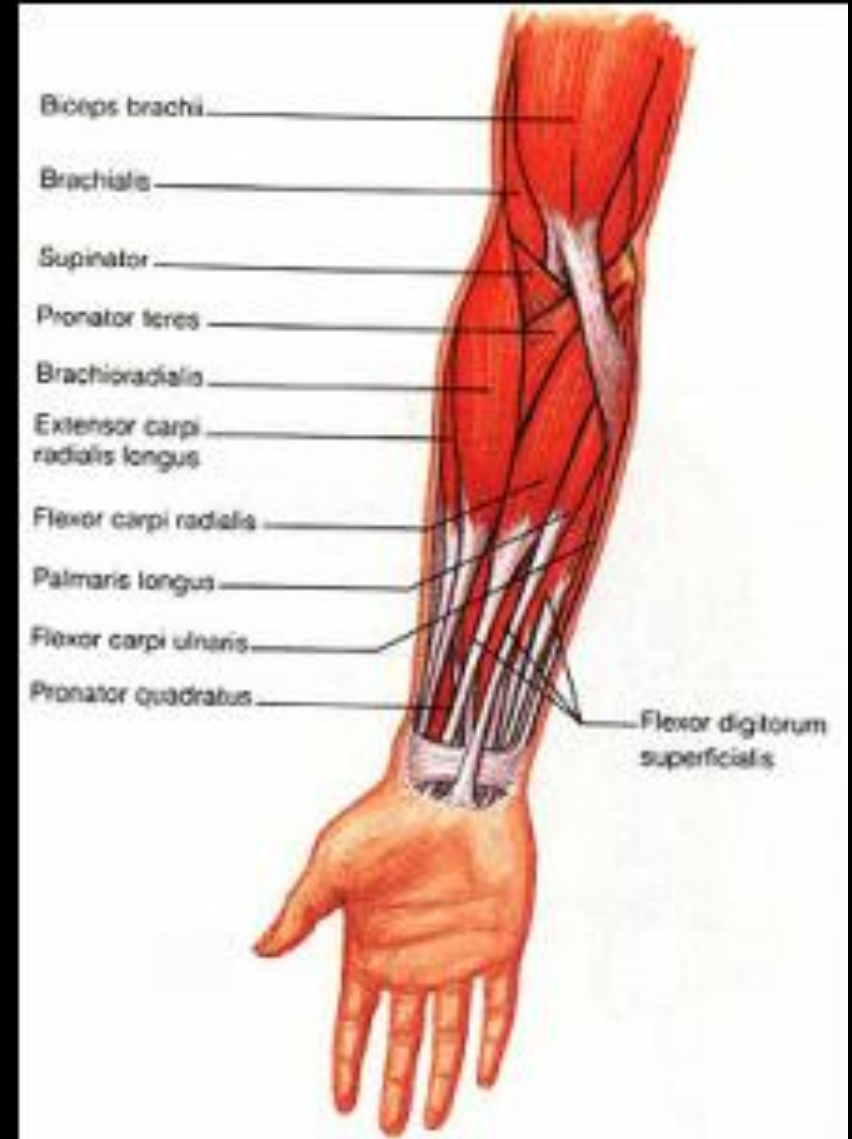
- ▶ Anterior
- ▶ Medial – Línea Media
- ▶ Palmar

▶ FLEXION

▶ PRONACION

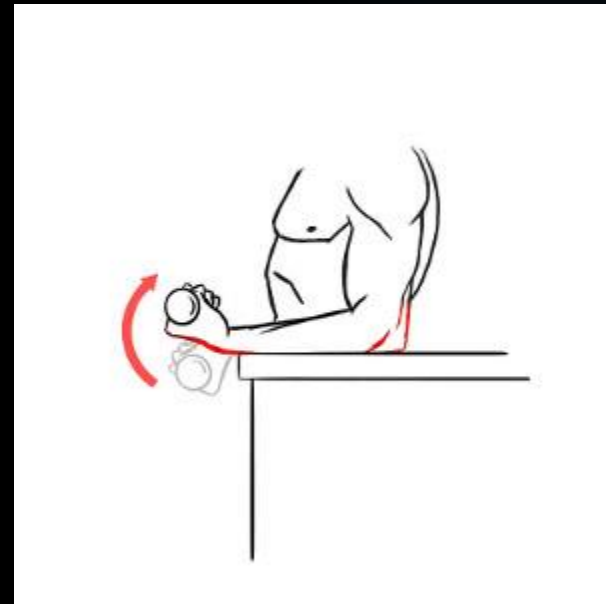
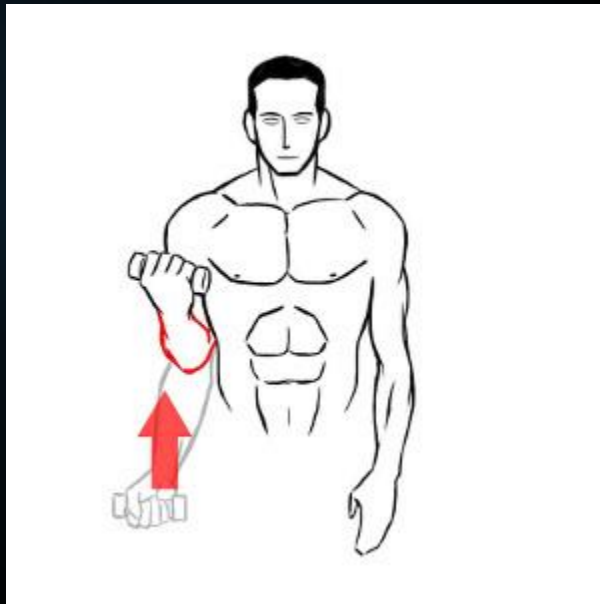
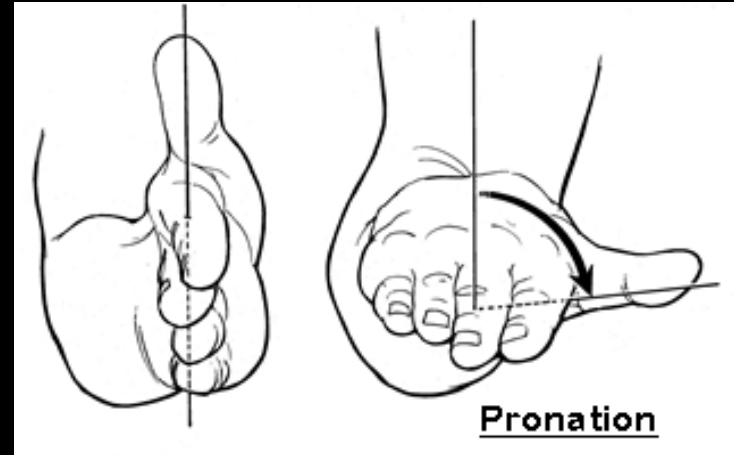
ANTERIOR - PALMAR

- ▶ FLEXION
- ▶ PRONACION



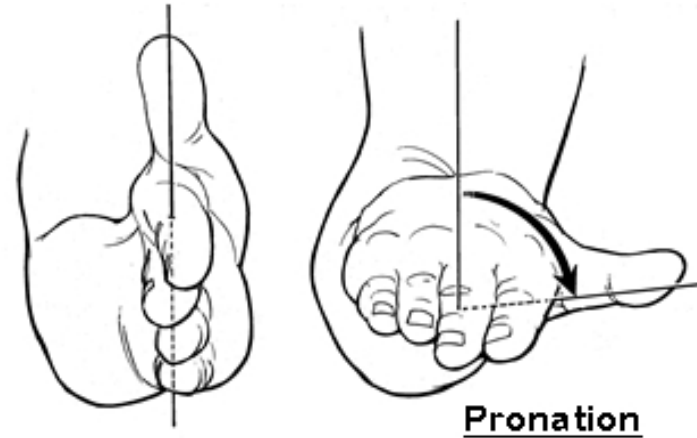
ANTERIOR - PALMAR

- ▶ FLEXION
- ▶ PRONACION



ANTERIOR - PALMAR

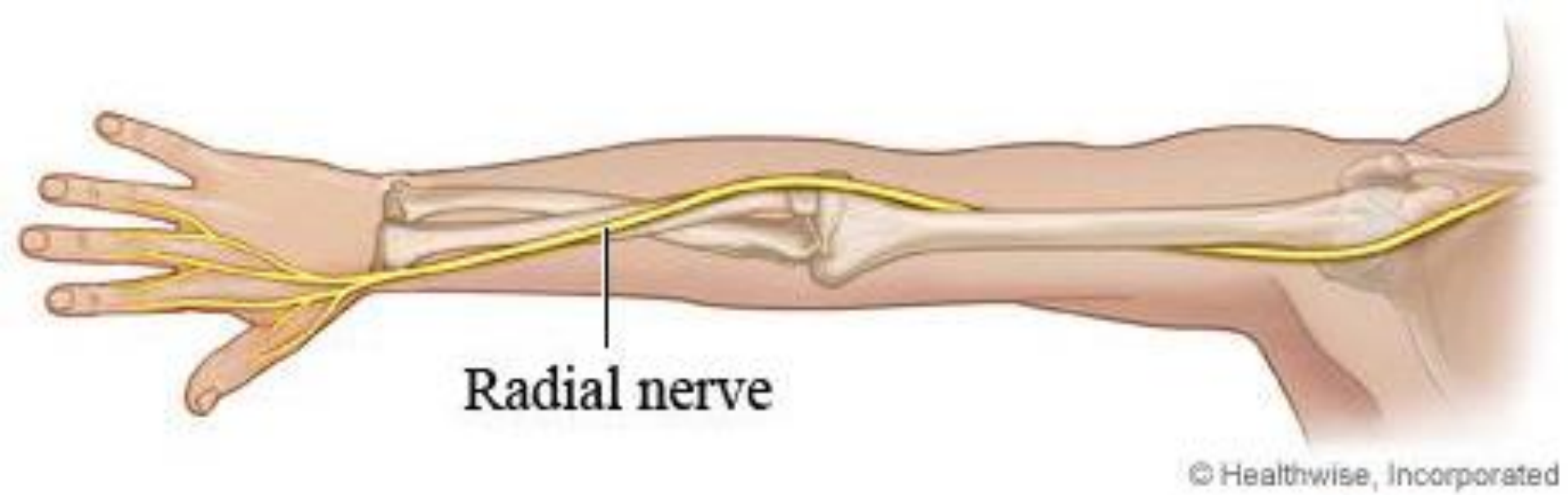
- ▶ **AGARRAR**
- ▶ **FUERZA**











Nervio RADIAL

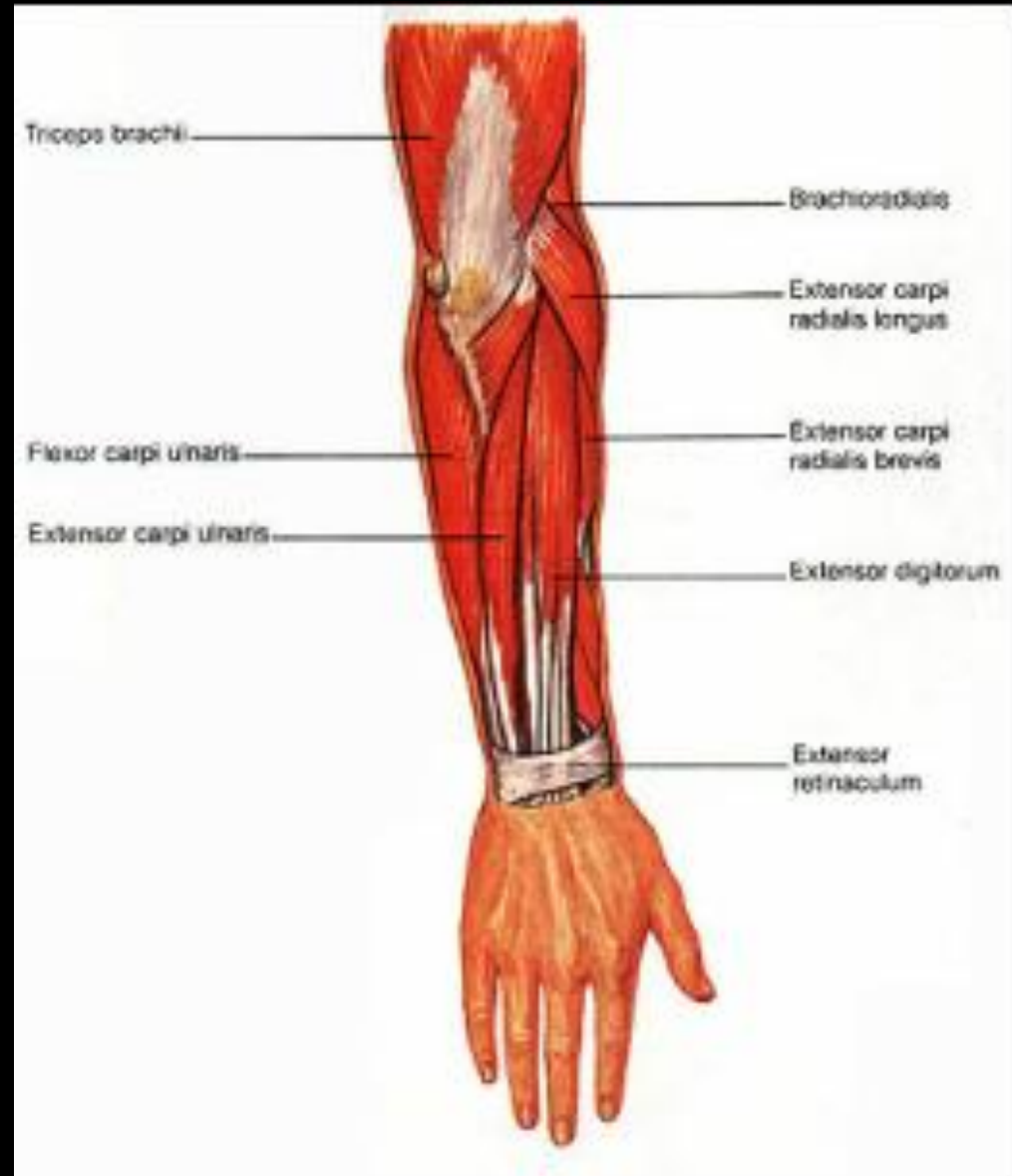
- ▶ Posterior
- ▶ Lateral (Radial)
- ▶ Dorsal

▶ EXTENSION

▶ SUPINACION

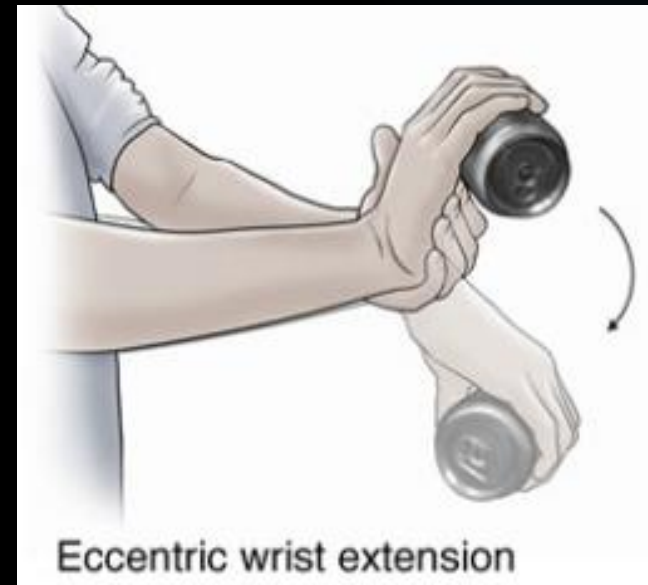
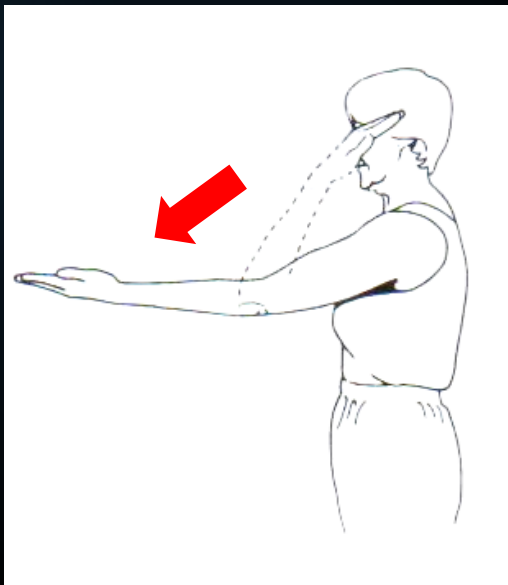
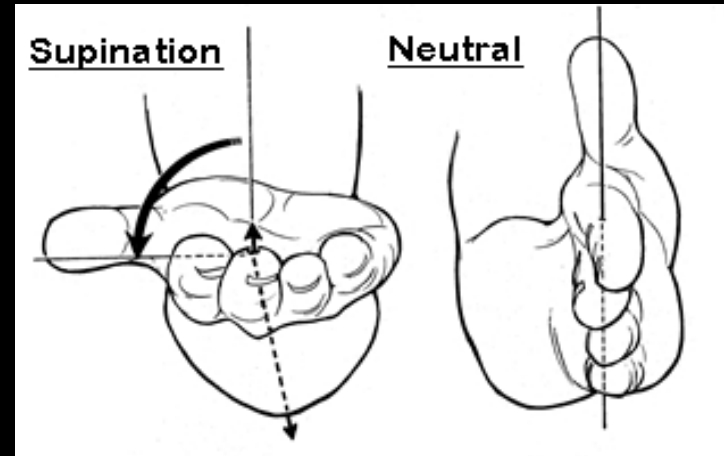
POSTERIOR - DORSAL

- ▶ EXTENSION
- ▶ SUPINACION



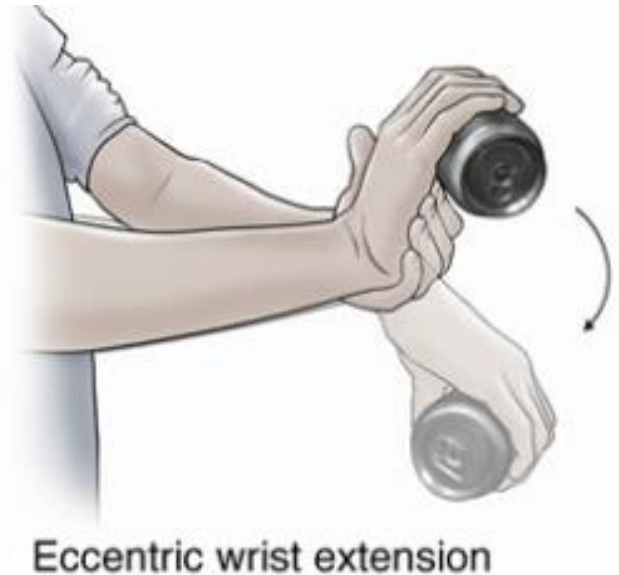
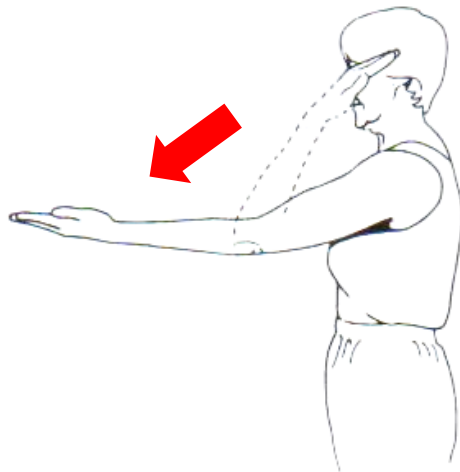
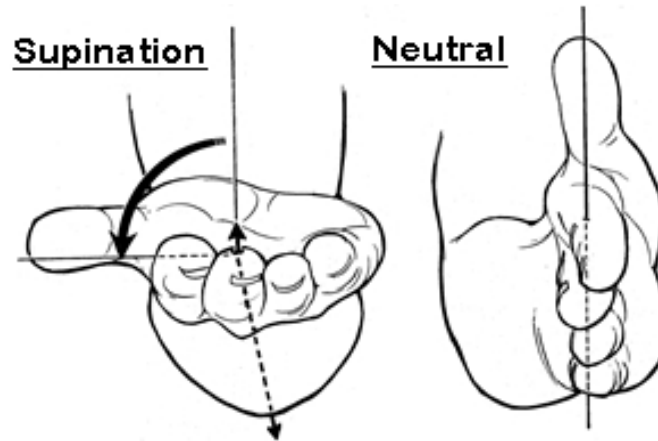
POSTERIOR - DORSAL

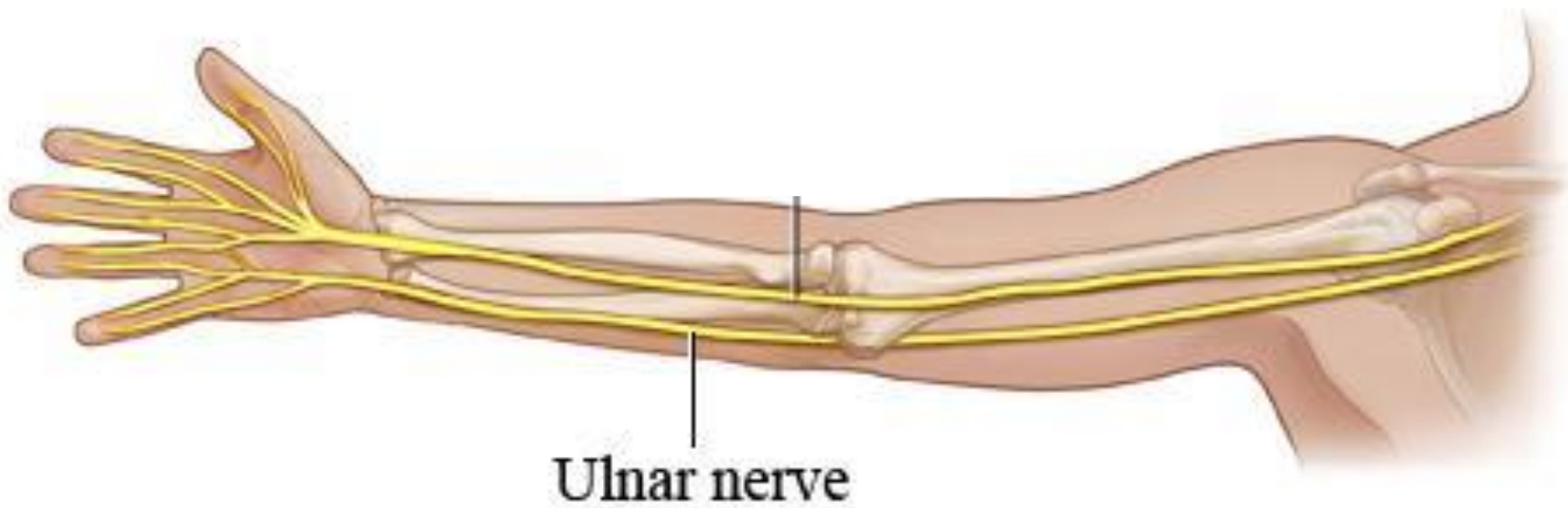
- ▶ EXTENSION
- ▶ SUPINACION



POSTERIOR - DORSAL

- ▶ SOLTAR
- ▶ POSICIONAMIENTO

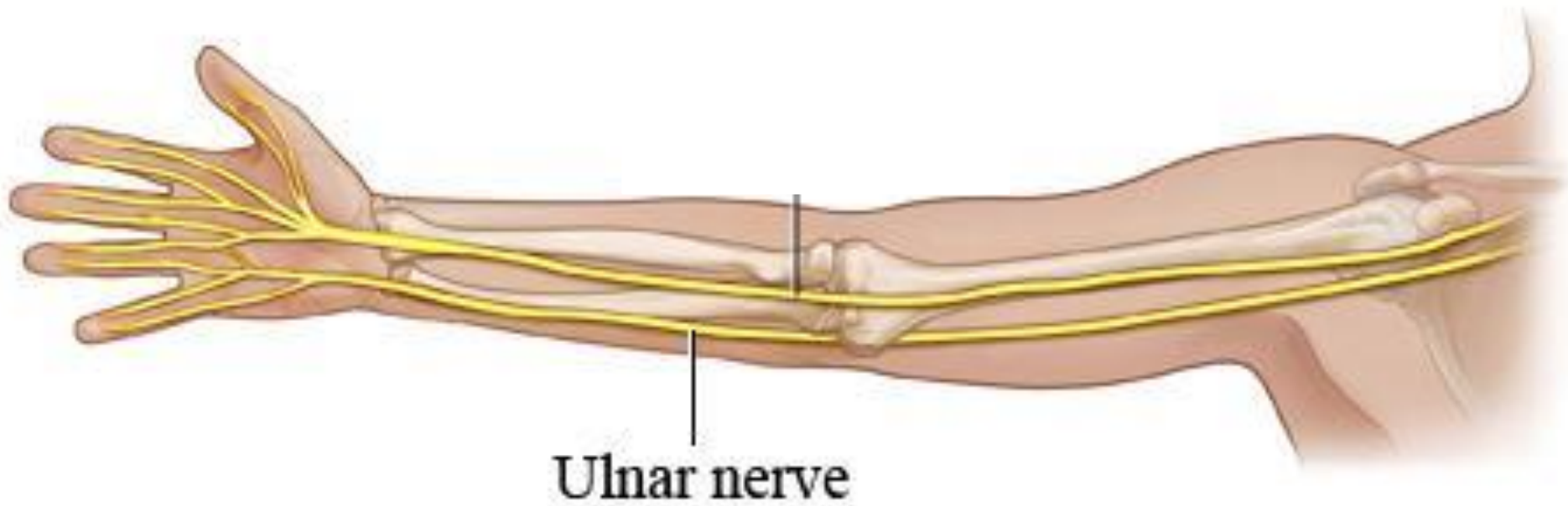




Nervio CUBITAL

- ▶ Anterior
- ▶ Medial (Ulnar - Cubital)
- ▶ Palmar

- ▶ Flexión MF
- ▶ Extensión IF's
- ▶ BALANCE entre flexión y extensión



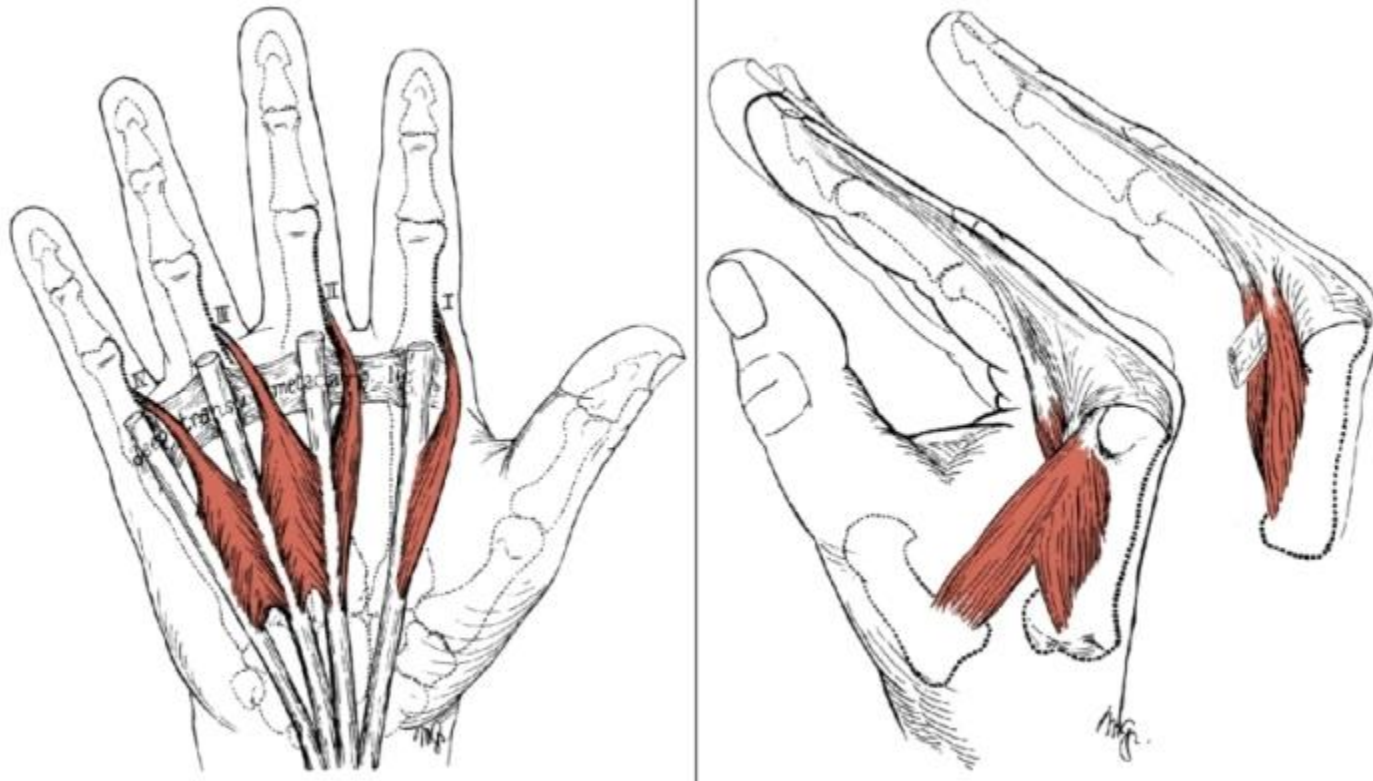
Nervio CUBITAL

- ▶ Anterior
- ▶ Medial (Ulnar - Cubital)
- ▶ Palmar

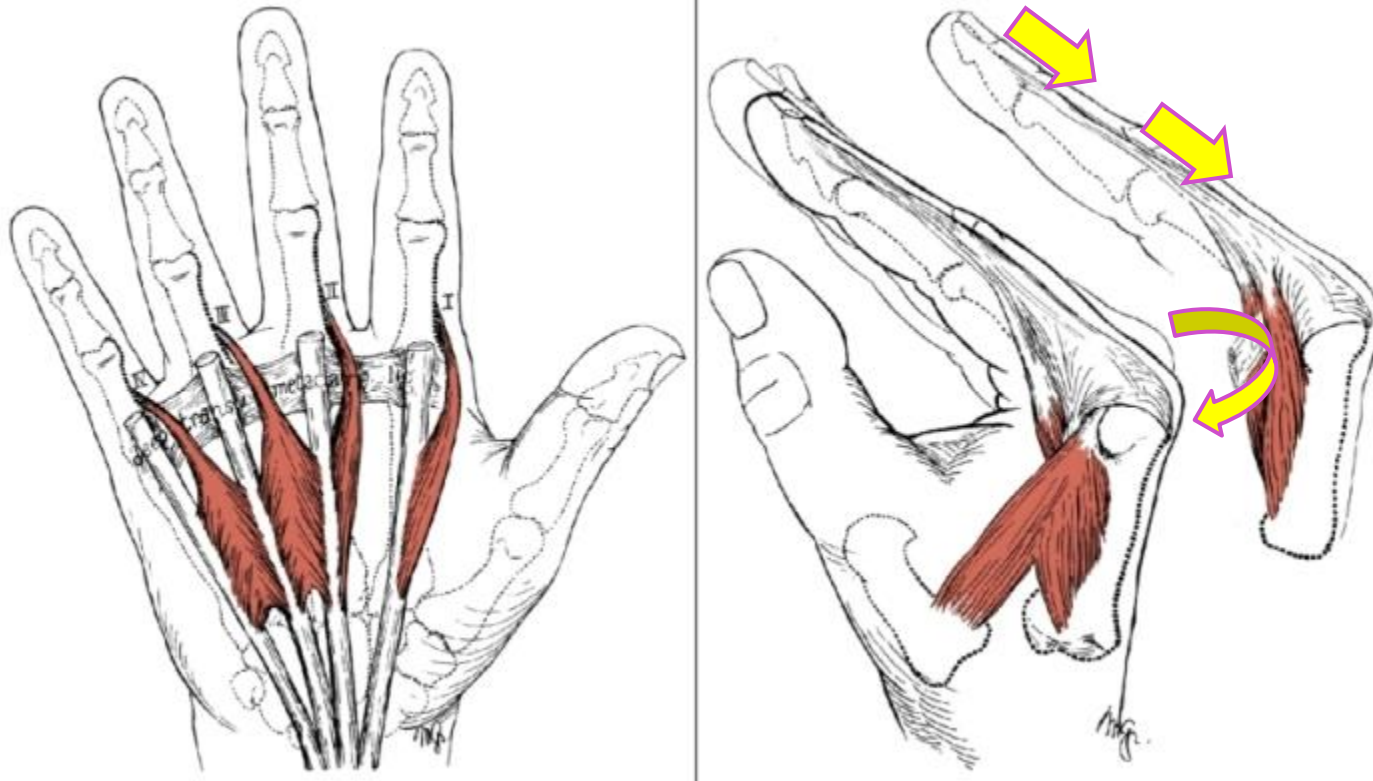
- ▶ Flexión MF
- ▶ Extensión IF's

▶ BALANCE entre flexión y extensión

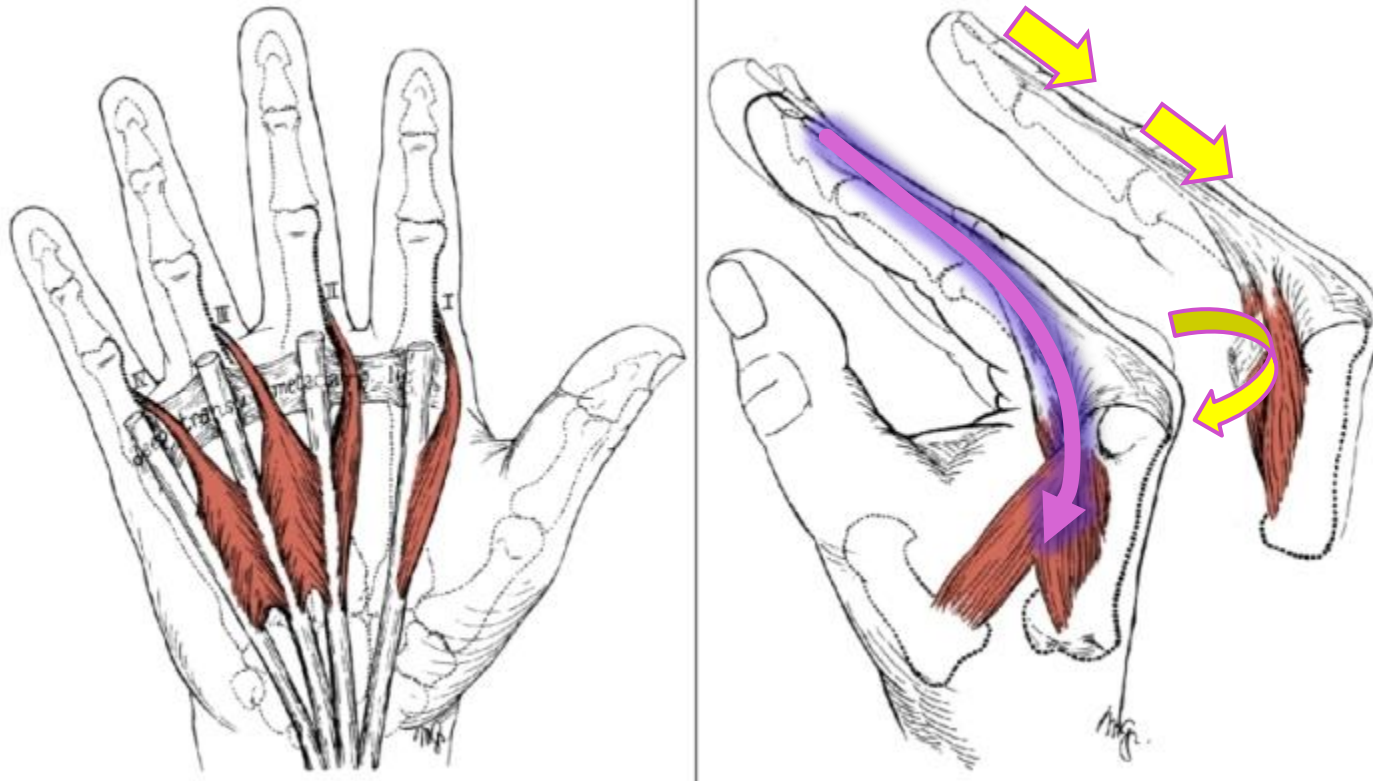
Intrínseco PLUS



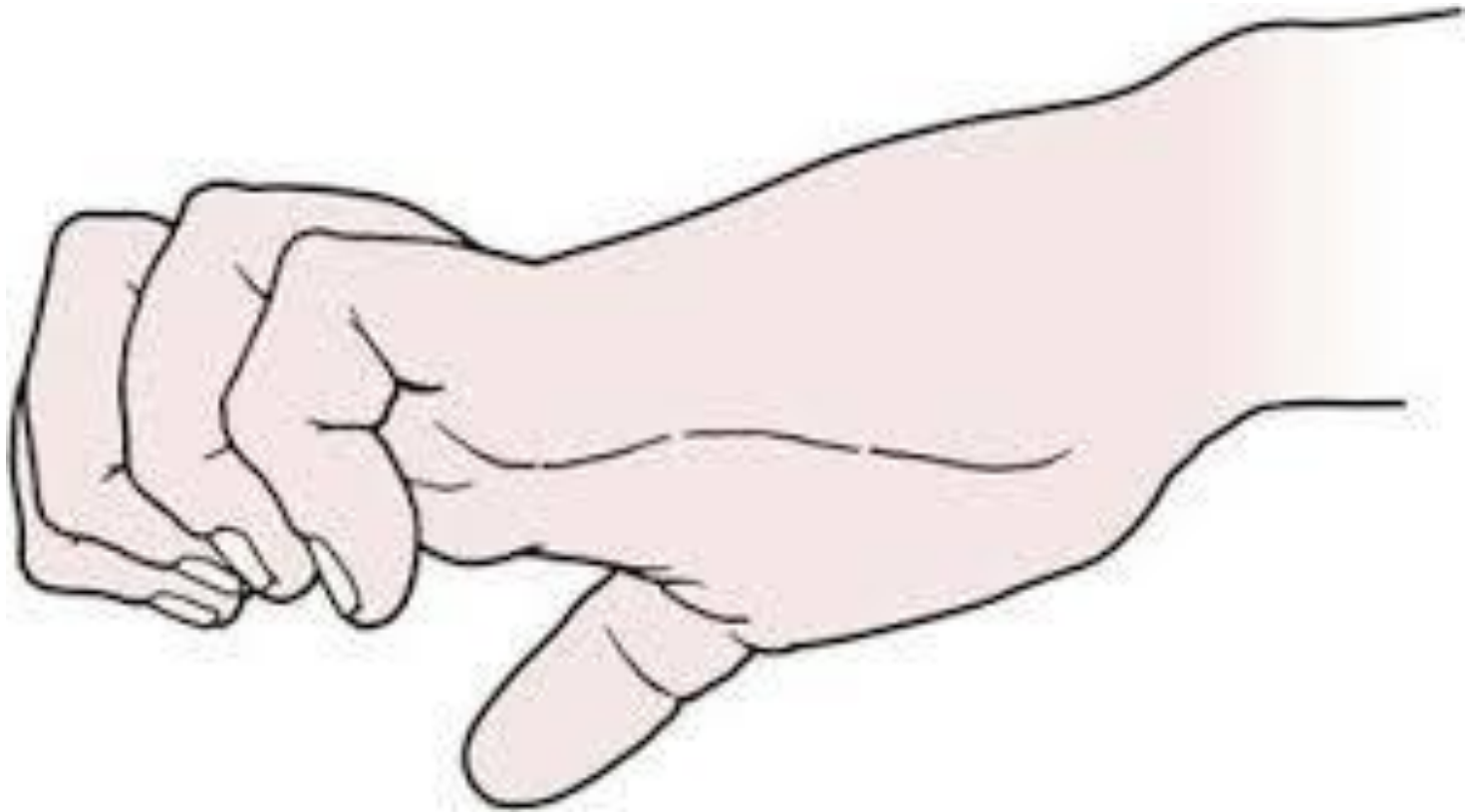
Intrínseco PLUS



Intrínseco PLUS

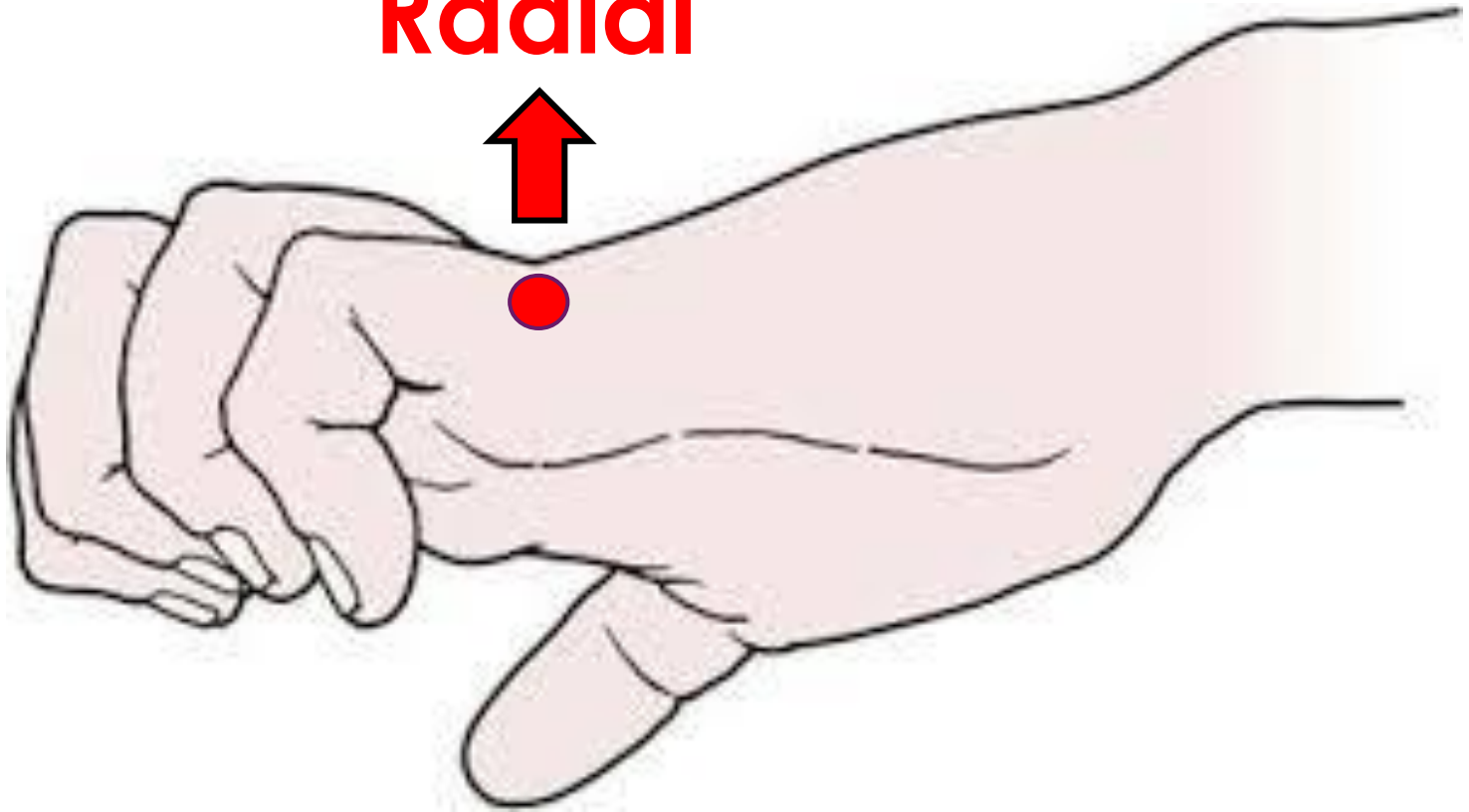


Intrínseco MINUS

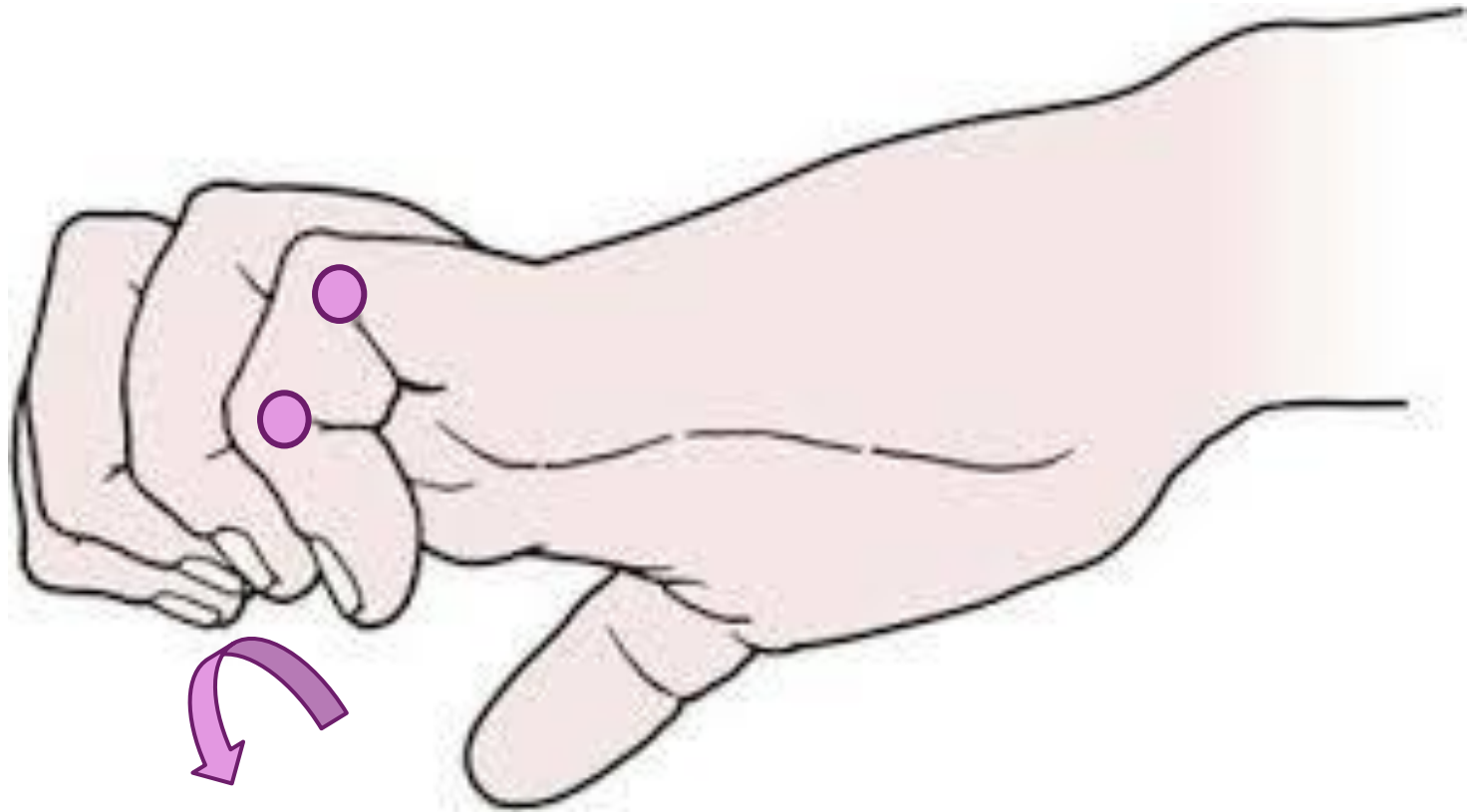


Intrínseco MINUS

Radial



Intrínseco MINUS



Mediano



Gabriele Ferrara
1543 - 1627

1593
Neurorrafia

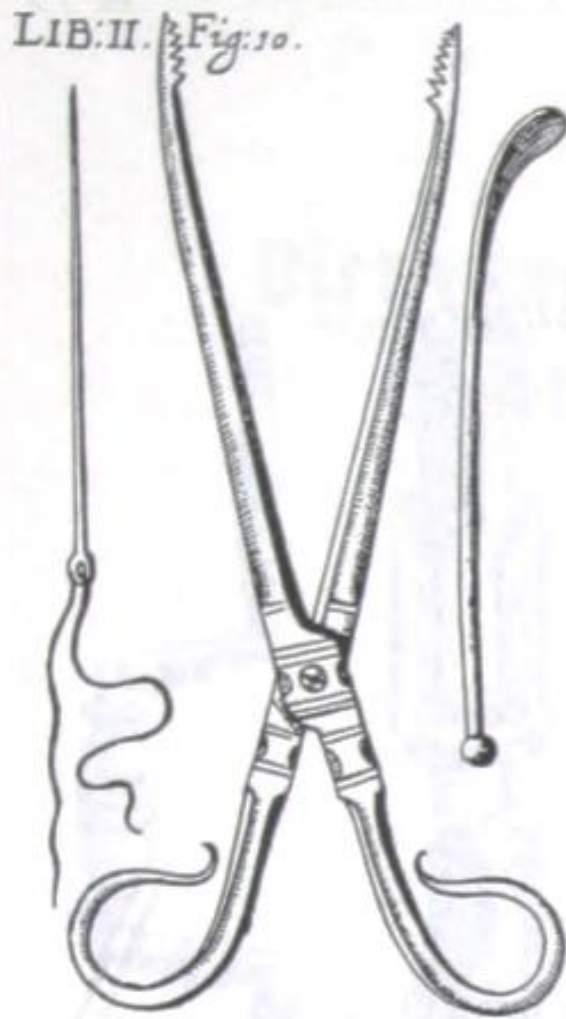


FIGURE 5. Scissors, specillum, and, on the *left*, a special needle with an eye used by Ferrara to suture nerve trunks.

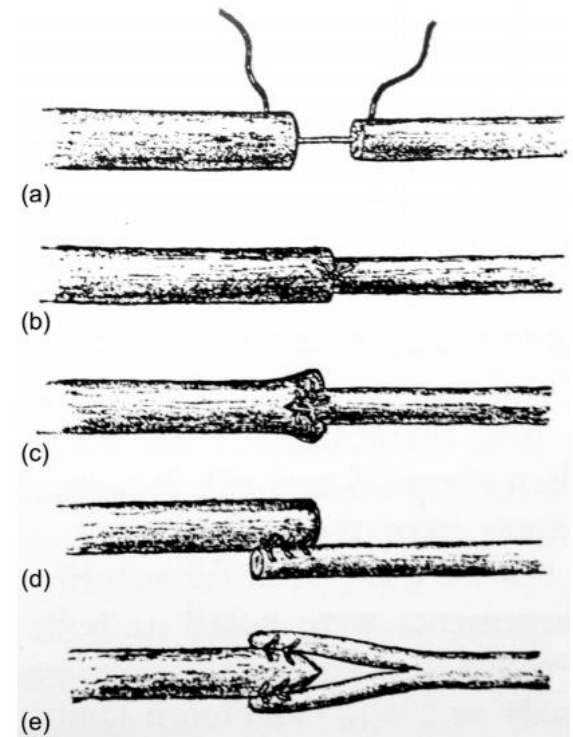
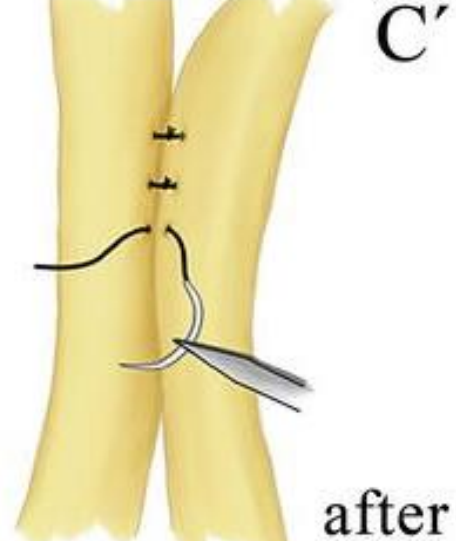
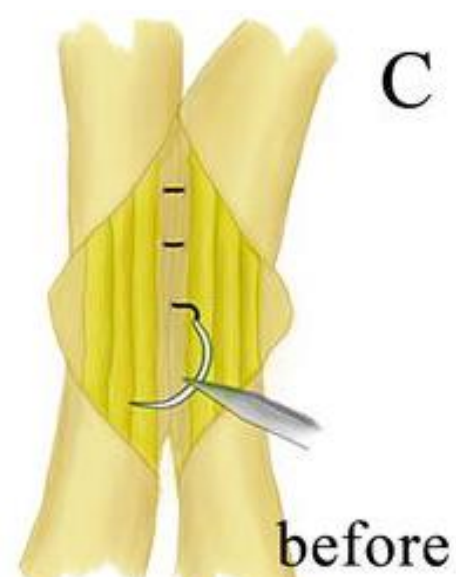
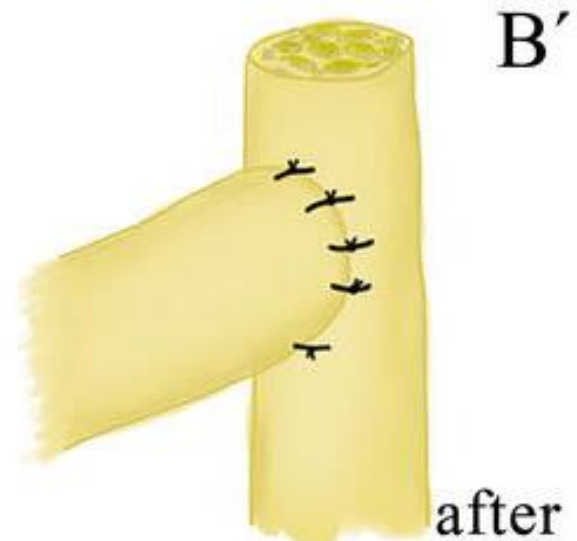
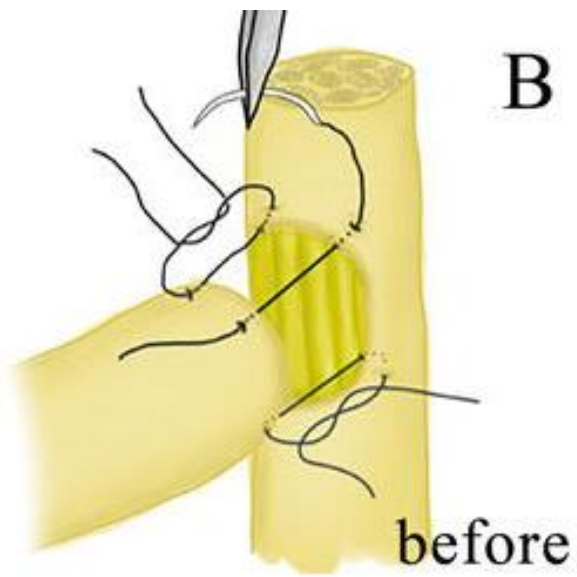
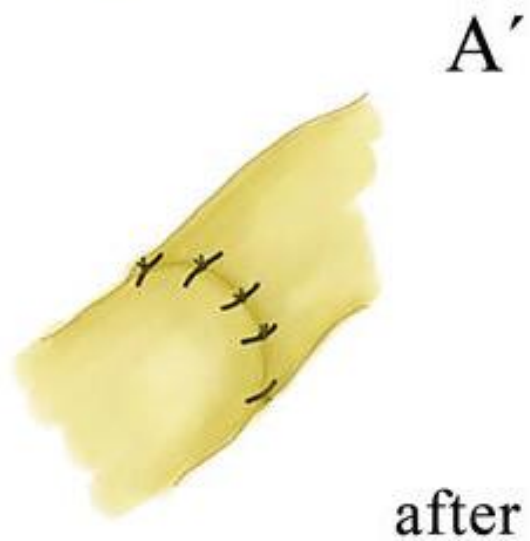
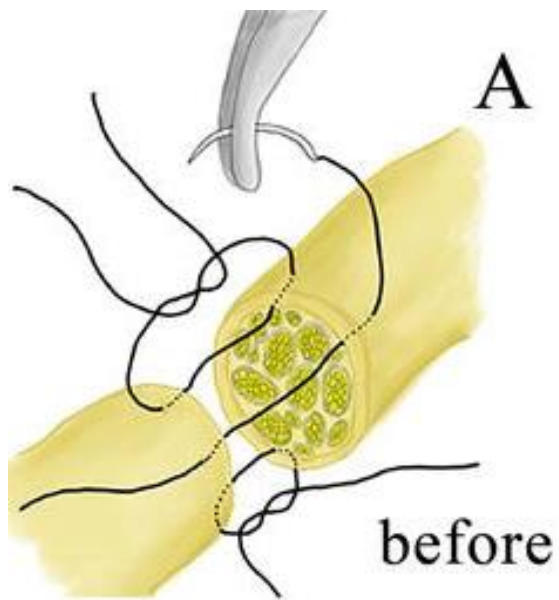
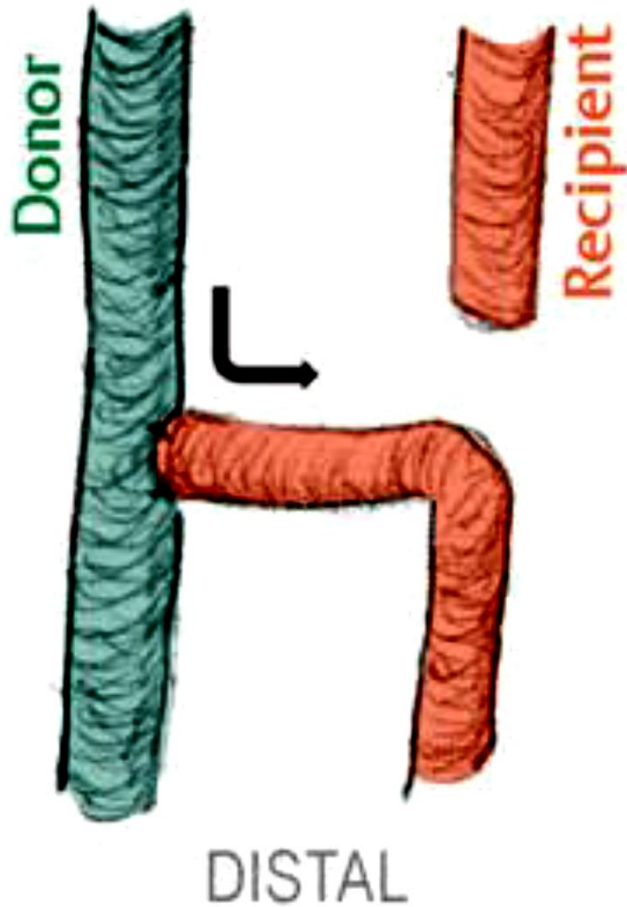


FIGURE 2.2 Nineteenth-century direct suture techniques. (a, b) Vulpian's center suture technique; (c, e) Wedge techniques of bulb suture; (d) Side-to-side nerve suture (Browne, 1951).

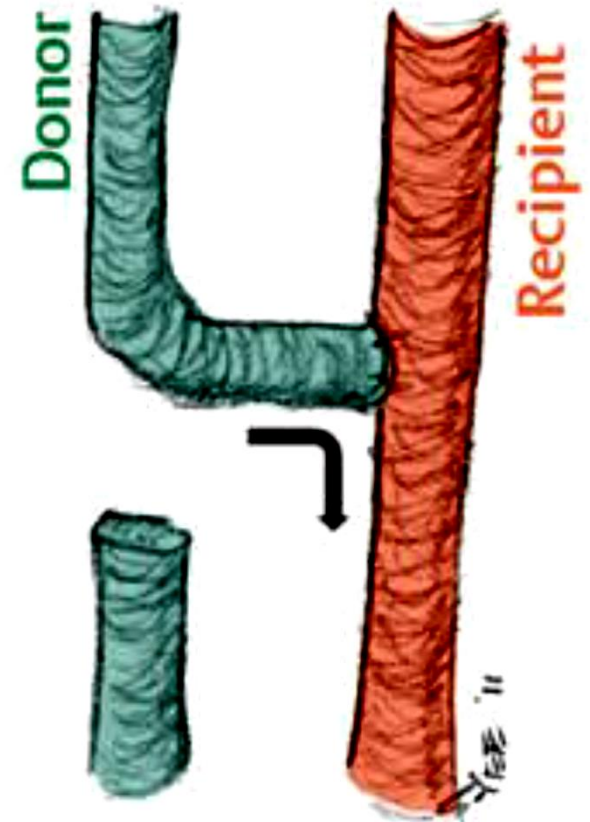
Siglo XIX
Técnicas de Neurorrafia



PROXIMAL
End-to-side
Nerve Transfer



Supercharge End-to-side
Nerve Transfer



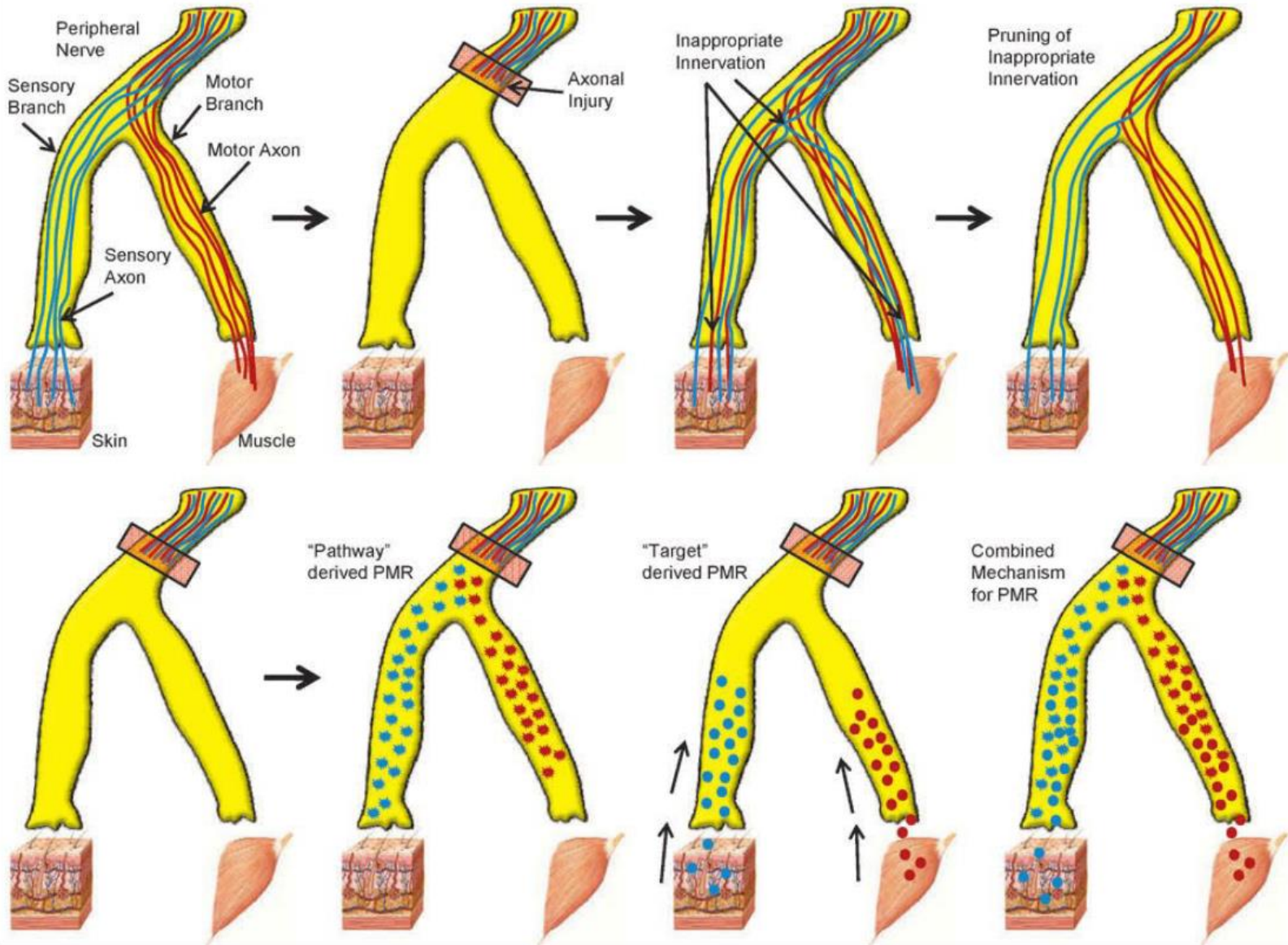
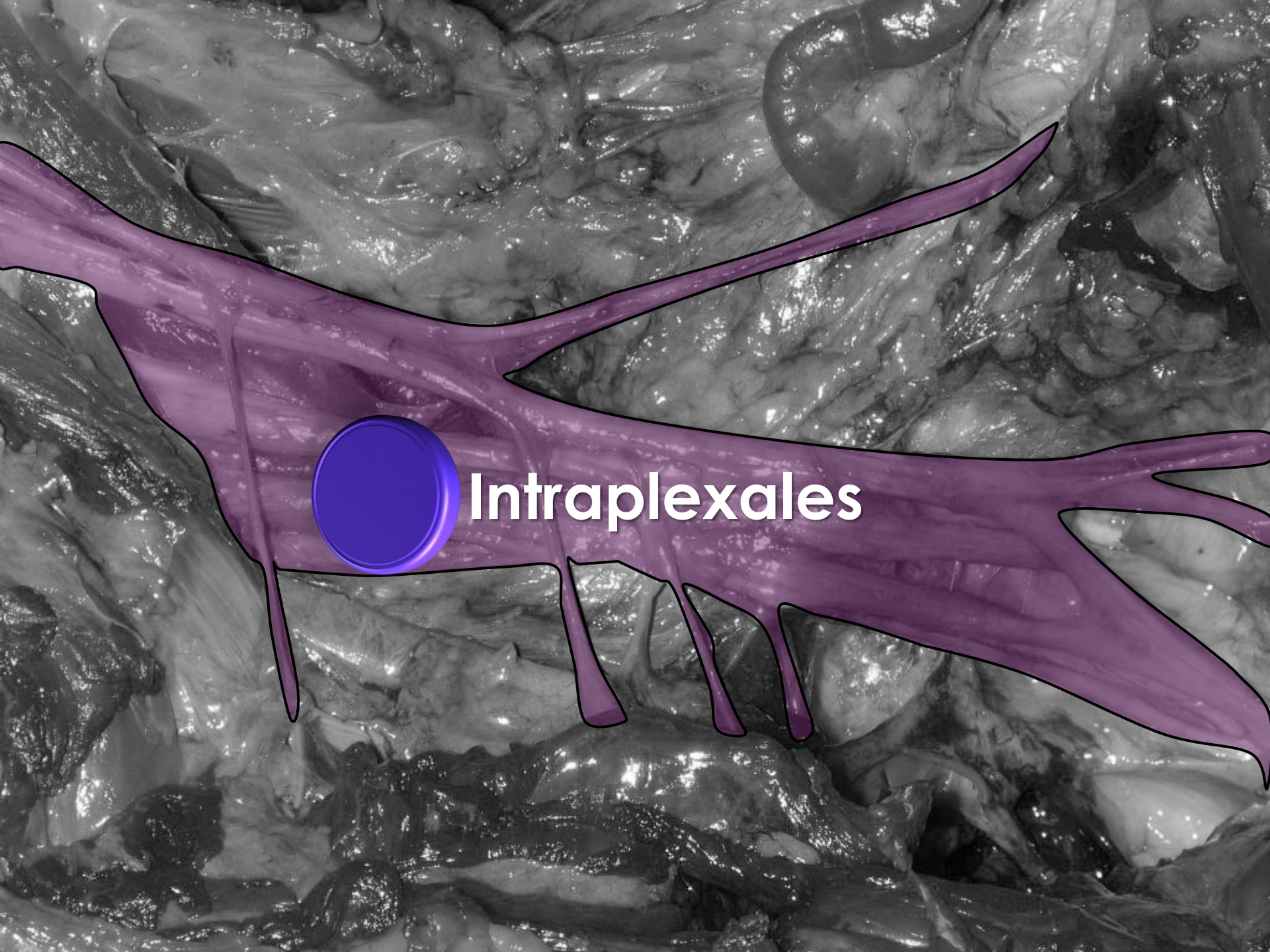


Fig. 1.15 Preferential motor reinnervation. Following injury to a mixed motor and sensory nerve, regenerating axons will preferentially regenerate down a modality-matched terminal pathway. A small proportion of the regenerating axons will inappropriately innervate a mismatched sensory or muscle target. However, over time these inappropriate connections are pruned back, leaving only appropriate end-organ association. The mechanism underlying this specificity is mediated through "pathway," "target," or combined signals.

Neurotizaciones para lesiones de Plexo Braquial

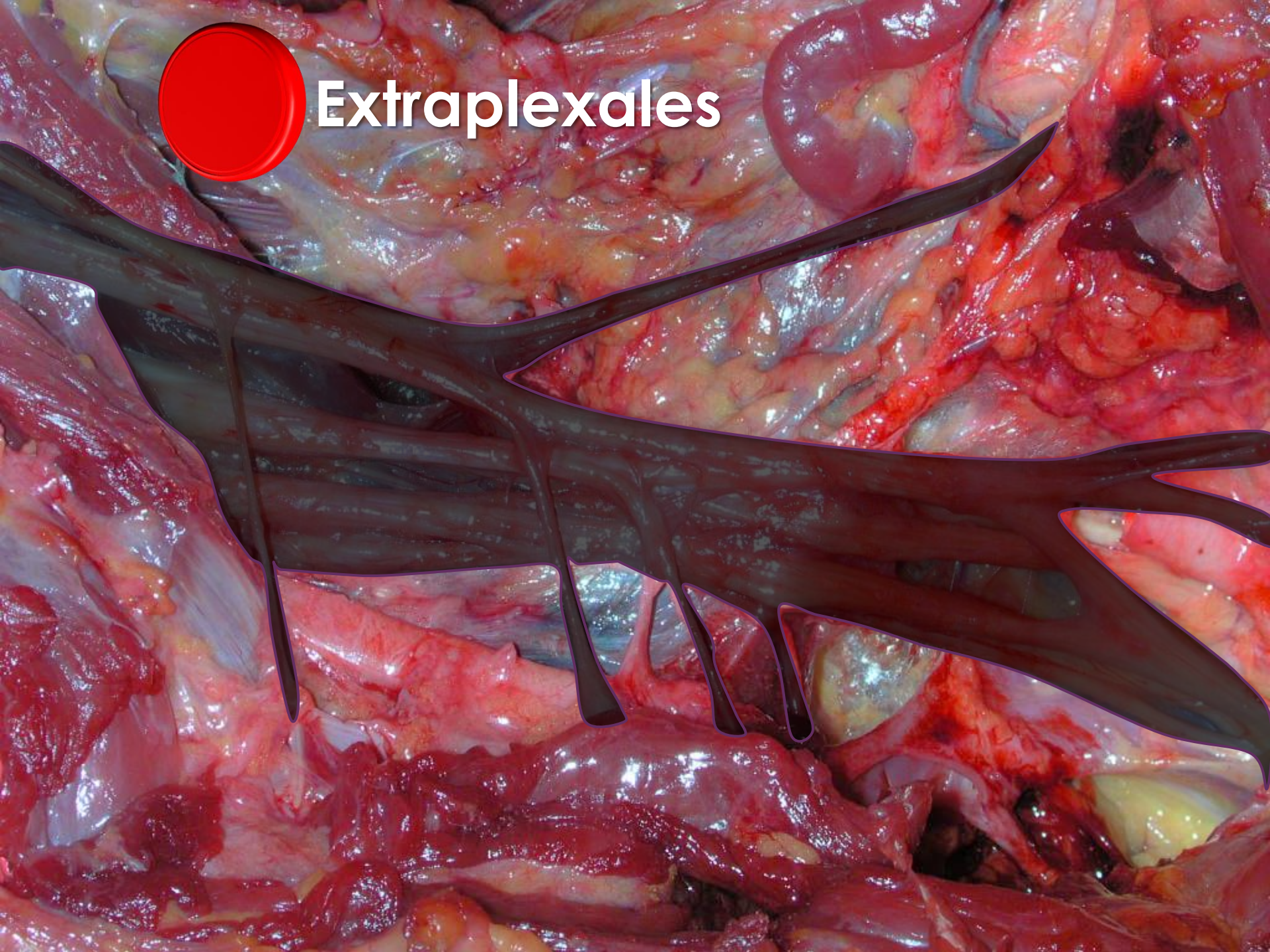




Intraplexales



Extraplexales



NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

Spinal Accessory Nerve

- C7 (Pectoral) to spinal accessory transfer

Suprascapular Nerve

- Spinal accessory to suprascapular transfer

Axillary Nerve

- Medial triceps to axillary transfer
- Medial pectoral to axillary transfer
- Thoracodorsal to axillary transfer

Long Thoracic Nerve

- Double-level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
- Intercostal to long thoracic transfer

AXILLARY NERVE

DOUBLE LEVEL TRANSFER
Medial Triceps to Axillary Nerve Transfer

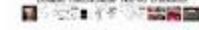


DOUBLE LEVEL TRANSFER
Medial Pectoral to Axillary Nerve Transfer



MUSCULOCUTANEOUS NERVE

DOUBLE LEVEL TRANSFER
Double Fascicular Nerve Transfer



DOUBLE LEVEL TRANSFER
Medial Pectoral to Musculocutaneous Nerve Transfer



DOUBLE LEVEL TRANSFER
Thoracodorsal to Musculocutaneous Nerve Transfer



SPINAL ACCESSORY NERVE

C7 (Pectoral) to Spinal Accessory Nerve Transfer



NERVE TRANSFER

TO RESTORE



NERVE TRANSFER

TO RESTORE



SUPRASCAPULAR NERVE

DOUBLE LEVEL TRANSFER
Spinal Accessory to Suprascapular Nerve Transfer



LONG THORACIC NERVE

DOUBLE-LEVEL NERVE TRANSFER FOR LONG THORACIC NERVE



TRICEPS BRACHII NERVE

Flexor Carpi Ulnaris to Triceps Brachii Nerve Transfer



DOUBLE LEVEL TRANSFER
Intercostal to Triceps Brachii Nerve Transfer



Restoration of Elbow Function

Musculocutaneous Nerve

- Double fascicular transfer
- Medial pectoral to musculocutaneous transfer
- Thoracodorsal to musculocutaneous transfer

Triceps Brachii Nerve

- Flexor carpi ulnaris to medial triceps transfer

NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

Spiral Accessory Nerve

- C7 (Pectoral) to spiral accessory transfer

Suprascapular Nerve

- Spinal accessory to suprascapular transfer

Axillary Nerve

- Medial triceps to axillary transfer
- Medial pectoral to axillary transfer
- Thoracodorsal to axillary transfer

Long Thoracic Nerve

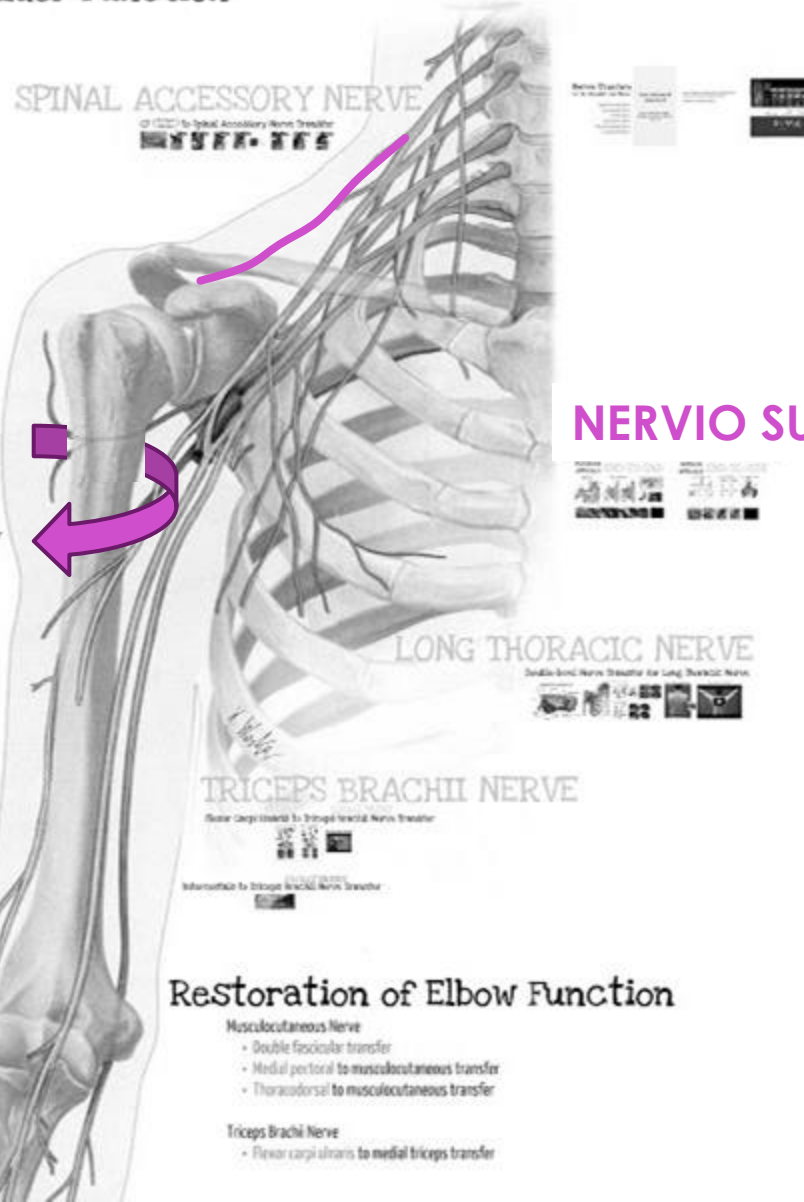
- Double-level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
- Intercostal to long thoracic transfer

AXILLARY NERVE

Double Level Transfer
 Medial Triceps to Axillary Nerve Transfer
 Medial Pectoral to Axillary Nerve Transfer

MUSCULOCUTANEOUS NERVE

Double Level Transfer
 Double Muscular Nerve Transfer
 Medial Pectoral to Musculocutaneous Nerve Transfer
 Thoracodorsal to Musculocutaneous Nerve Transfer



NERVIO SUPRAESCAPULAR

Restoration of Elbow Function

Musculocutaneous Nerve

- Double fascicular transfer
- Medial pectoral to musculocutaneous transfer
- Thoracodorsal to musculocutaneous transfer

Triceps Brachii Nerve

- Flexor carpi ulnaris to medial triceps transfer

NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

Spiral Accessory Nerve

- C7 (Pectoral) to spiral accessory transfer

Suprascapular Nerve

- Spinal accessory to suprascapular transfer

Axillary Nerve

- Medial triceps to axillary transfer
- Medial pectoral to axillary transfer
- Thoracodorsal to axillary transfer

Long Thoracic Nerve

- Double level transfer
- C7 (Pectoral) to long thoracic transfer
- Thoracodorsal to long thoracic transfer
- Intercostal to long thoracic transfer

Espinal Accesorio

Frénico

NERVIO SUPRAESCAPULAR

AXILLARY NERVE

Medial Triceps to Axillary Nerve Transfer

Medial Pectoral to Axillary Nerve Transfer

MUSCULOCUTANEOUS NERVE

Double Fascicular Nerve Transfer

Medial Pectoral to Musculocutaneous Nerve Transfer

Thoracodorsal to Musculocutaneous Nerve Transfer

LONG THORACIC NERVE

Double Level Nerve Transfer for Long Thoracic Nerve

TRICEPS BRACHII NERVE

Flexor Carpi Ulnaris to Triceps Brachii Nerve Transfer

Restoration of Elbow Function

Musculocutaneous Nerve

- Double fascicular transfer
- Medial pectoral to musculocutaneous transfer
- Thoracodorsal to musculocutaneous transfer

Triceps Brachii Nerve

- Flexor carpi ulnaris to medial triceps transfer

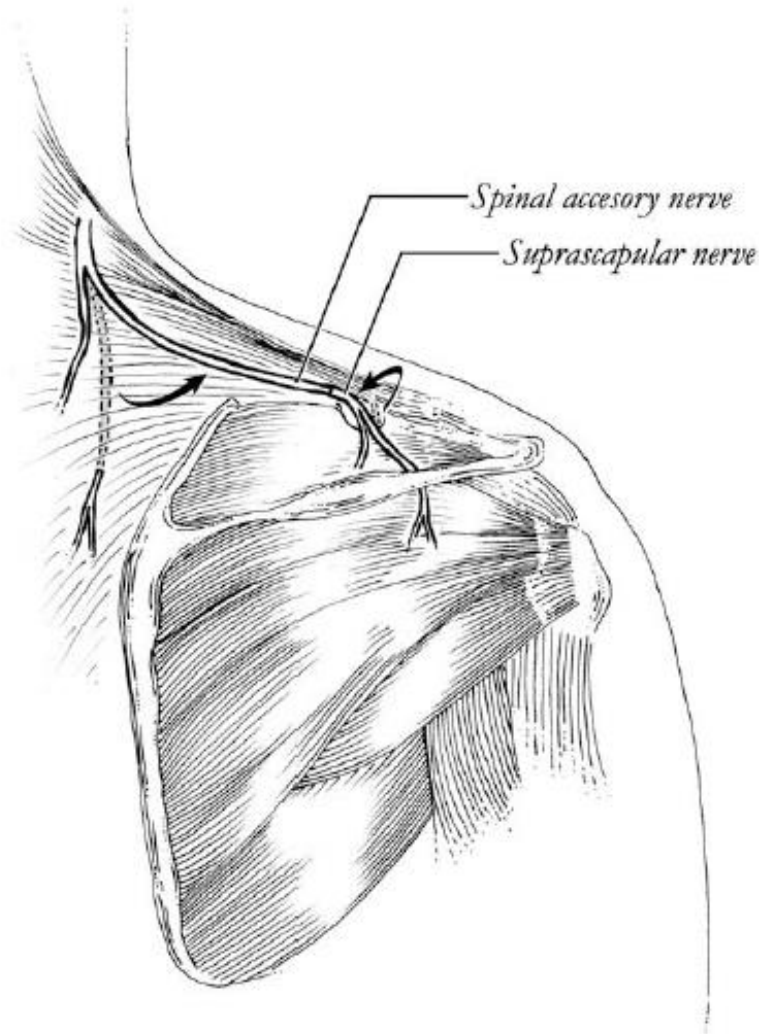
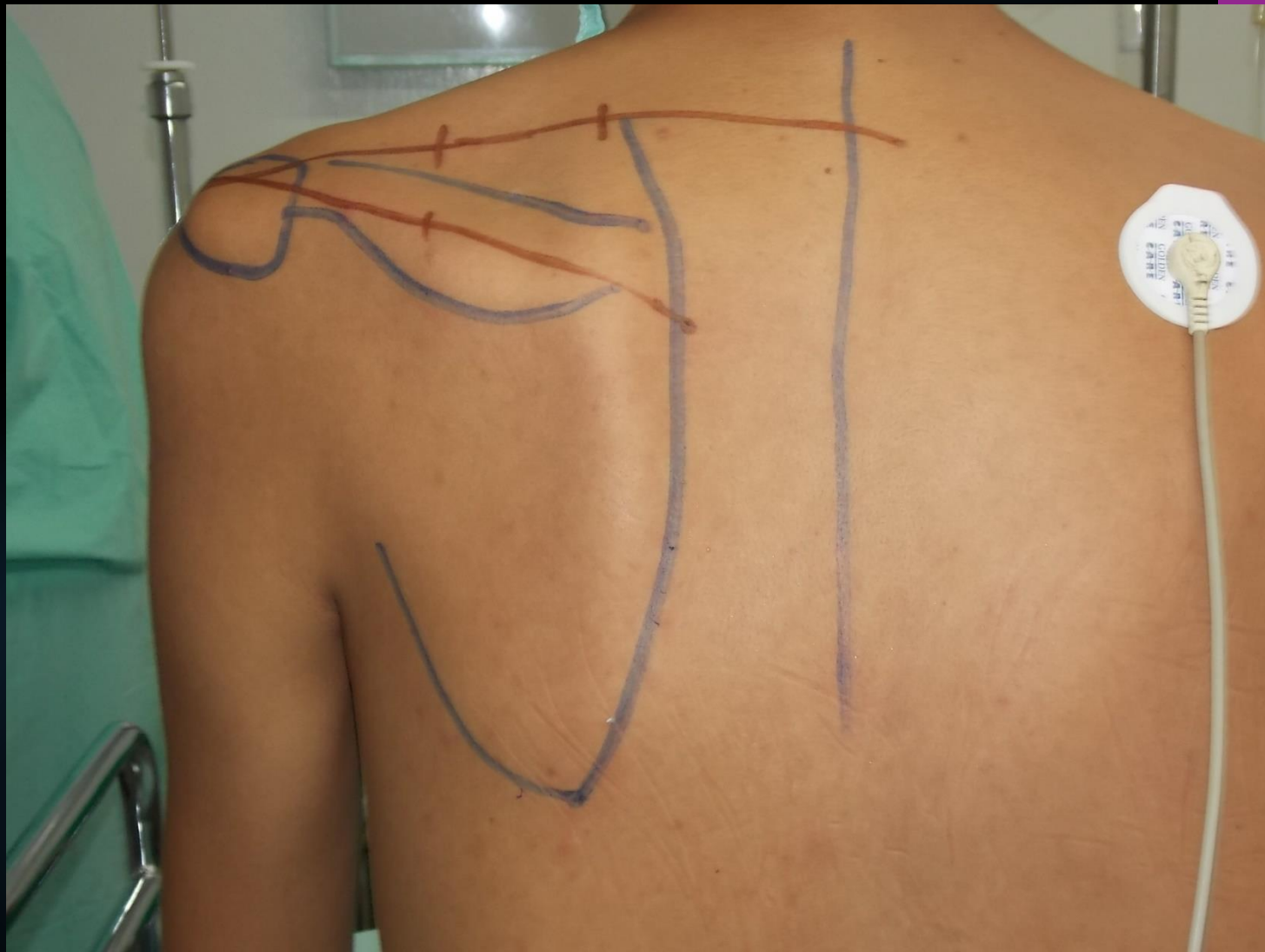
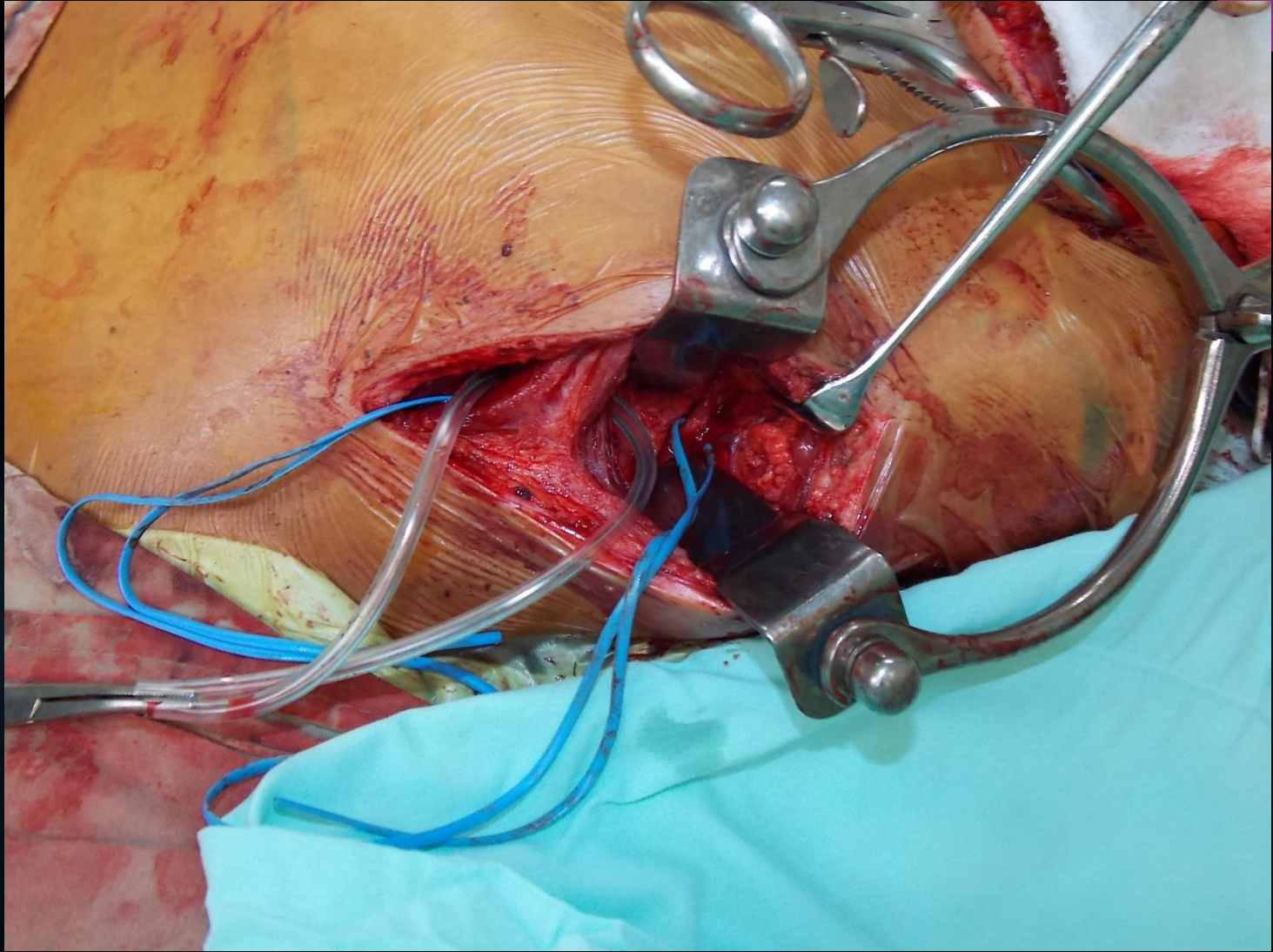
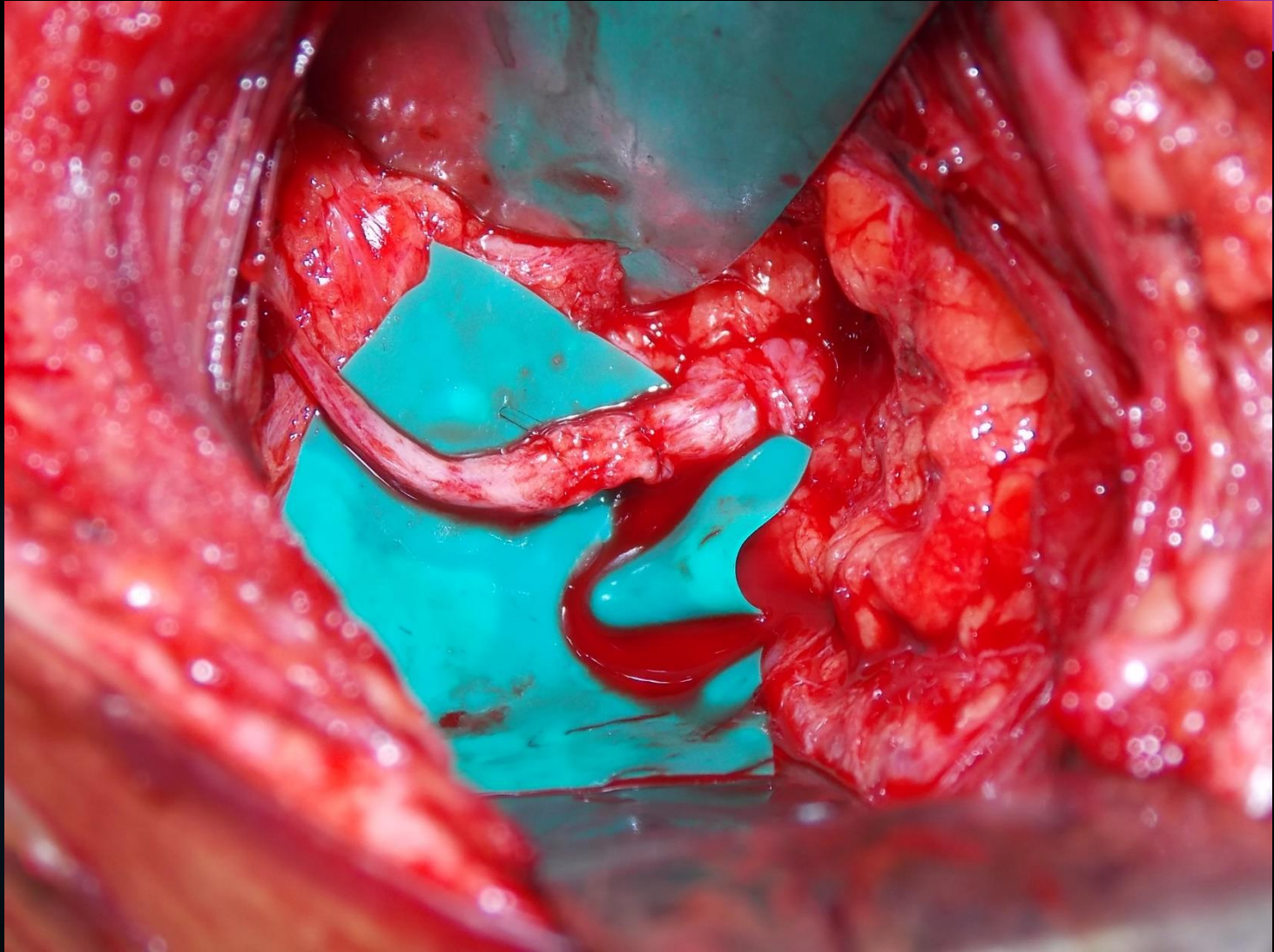


Fig. 5. Distal spinal accessory to suprascapular nerve transfer. The distal spinal accessory nerve has been transected distally and transferred to the suprascapular nerve, which has been transected proximally to the suprascapular notch. (From Mackinnon SE, Colbert SH. Nerve transfers in the hand and upper extremity surgery. *Tech Hand Up Extrem Surg* 2008;12(1):24; with permission.)







NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

Spiral Accessory Nerve

- C7 (Pectoral) to spiral accessory transfer

Suprascapular Nerve

- Spinal accessory to suprascapular transfer

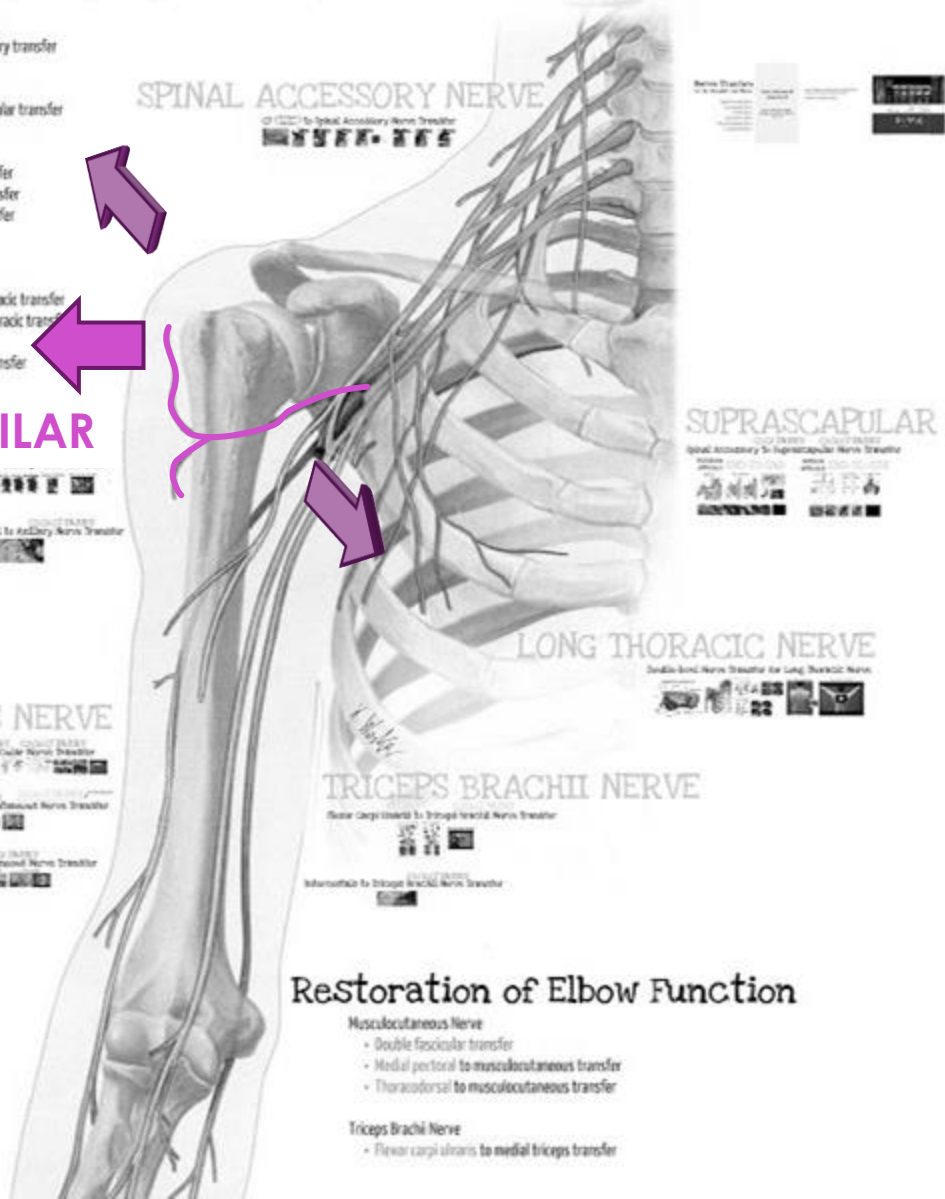
Axillary Nerve

- Medial triceps to axillary transfer
- Medial pectoral to axillary transfer
- Thoracodorsal to axillary transfer

Long Thoracic Nerve

- Double level transfer
- C7 (Pectoral) to long thoracic transfer
- Thoracodorsal to long thoracic transfer
- Intercostal to long thoracic transfer

NERVIO AXILAR



Restoration of Elbow Function

Musculocutaneous Nerve

- Double fascicular transfer
- Medial pectoral to musculocutaneous transfer
- Thoracodorsal to musculocutaneous transfer

Triceps Brachii Nerve

- Flexor carpi ulnaris to medial triceps transfer

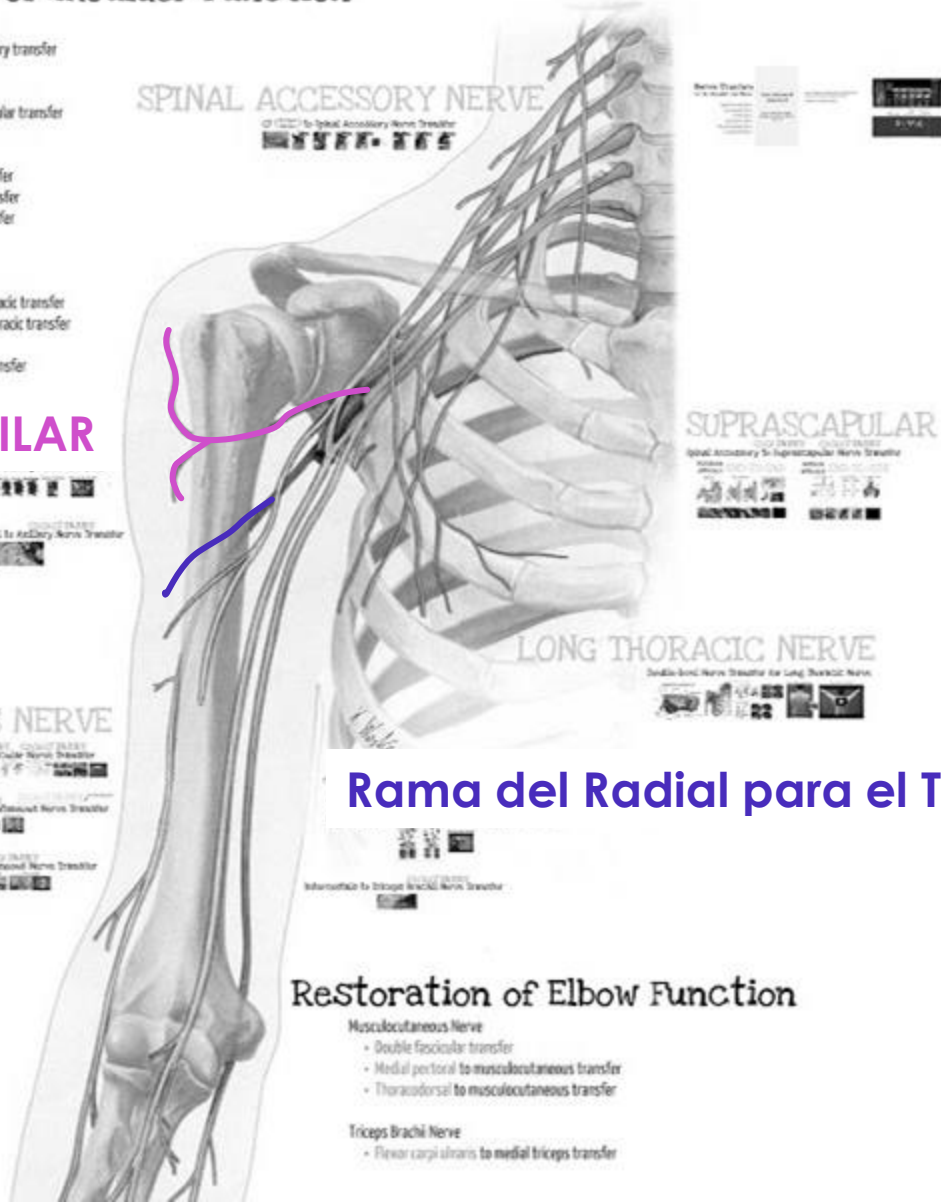
NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

- Spiral Accessory Nerve**
- C7 (Pectoral) to spiral accessory transfer
- Suprascapular Nerve**
- Spinal accessory to suprascapular transfer
- Axillary Nerve**
- Medial triceps to axillary transfer
 - Medial pectoral to axillary transfer
 - Thoracodorsal to axillary transfer
- Long Thoracic Nerve**
- Double level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
 - Intercostal to long thoracic transfer

NERVIO AXILAR

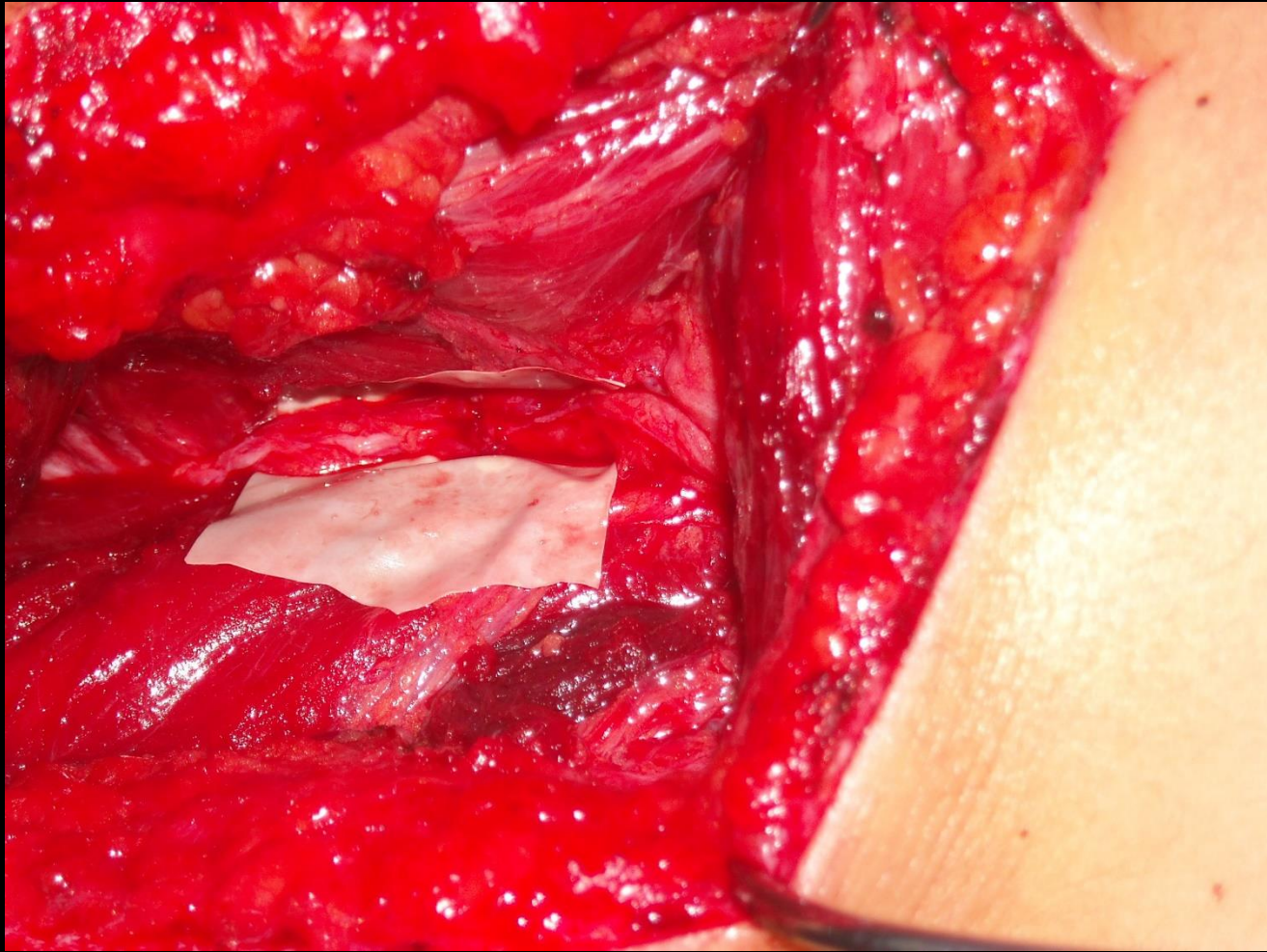


Rama del Radial para el Tríceps

Restoration of Elbow Function

- Musculocutaneous Nerve**
- Double fascicular transfer
 - Medial pectoral to musculocutaneous transfer
 - Thoracodorsal to musculocutaneous transfer
- Triceps Brachii Nerve**
- Flexor carpi ulnaris to medial triceps transfer





NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

Spinal Accessory Nerve

- C7 (Pectoral) to spinal accessory transfer

Suprascapular Nerve

- Spinal accessory to suprascapular transfer

Axillary Nerve

- Medial triceps to axillary transfer
- Medial pectoral to axillary transfer
- Thoracodorsal to axillary transfer

Long Thoracic Nerve

- Double-level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
- Intercostal to long thoracic transfer

AXILLARY NERVE

DOUBLE LEVEL TRANSFER
Medial Triceps to Axillary Nerve Transfer

DOUBLE LEVEL TRANSFER
Medial Pectoral to Axillary Nerve Transfer

DOUBLE LEVEL TRANSFER
Thoracodorsal to Axillary Nerve Transfer

DOUBLE LEVEL TRANSFER
Intercostal to Axillary Nerve Transfer

MUSCULOCUTANEOUS NERVE

DOUBLE LEVEL TRANSFER
Double Fascicular Nerve Transfer

DOUBLE LEVEL TRANSFER
Medial Pectoral to Musculocutaneous Nerve Transfer

DOUBLE LEVEL TRANSFER
Thoracodorsal to Musculocutaneous Nerve Transfer

DOUBLE LEVEL TRANSFER
Intercostal to Musculocutaneous Nerve Transfer

SPINAL ACCESSORY NERVE

C7 (Pectoral) to Spinal Accessory Nerve Transfer



SUPRASCAPULAR NERVE

DOUBLE LEVEL TRANSFER
Spinal Accessory to Suprascapular Nerve Transfer

DOUBLE LEVEL TRANSFER
C7 (Pectoral) to Suprascapular Nerve Transfer

DOUBLE LEVEL TRANSFER
Thoracodorsal to Suprascapular Nerve Transfer

DOUBLE LEVEL TRANSFER
Intercostal to Suprascapular Nerve Transfer

LONG THORACIC NERVE

DOUBLE LEVEL NERVE TRANSFER FOR LONG THORACIC NERVE

TRICEPS BRACHII NERVE

Flexor Carpi Ulnaris to Triceps Brachii Nerve Transfer

DOUBLE LEVEL TRANSFER
Intercostal to Triceps Brachii Nerve Transfer

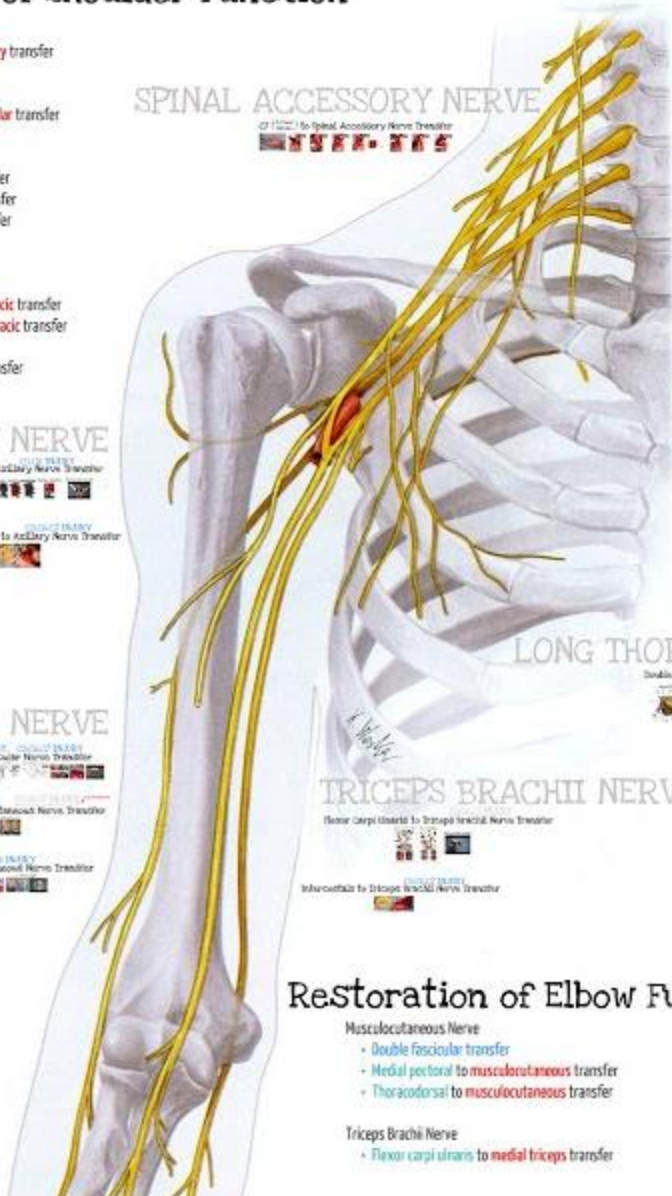
Restoration of Elbow Function

Musculocutaneous Nerve

- Double fascicular transfer
- Medial pectoral to musculocutaneous transfer
- Thoracodorsal to musculocutaneous transfer

Triceps Brachii Nerve

- Flexor carpi ulnaris to medial triceps transfer



NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

- Spiral Accessory Nerve**
- C7 (Pectoral) to spiral accessory transfer
- Suprascapular Nerve**
- Spinal accessory to suprascapular transfer
- Axillary Nerve**
- Medial triceps to axillary transfer
 - Medial pectoral to axillary transfer
 - Thoracodorsal to axillary transfer
- Long Thoracic Nerve**
- Double level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
 - Intercostal to long thoracic transfer

SPINAL ACCESSORY NERVE
C7 (Pectoral) to Spiral Accessory Nerve Transfer

NERVE TRANSFER
SPINAL ACCESSORY NERVE TO SUPRASCAPULAR NERVE TRANSFER

AXILLARY NERVE
MEDIAL TRICEPS TO AXILLARY NERVE TRANSFER
MEDIAL PECTORAL TO AXILLARY NERVE TRANSFER

SUPRASCAPULAR NERVE
SPINAL ACCESSORY TO SUPRASCAPULAR NERVE TRANSFER

LONG THORACIC NERVE
DOUBLE LEVEL NERVE TRANSFER FOR LONG THORACIC NERVE

TRICEPS BRACHII NERVE
FLXOR CARPI ULNARI TO TRICEPS BRACHII NERVE TRANSFER

NERVIO MUSCULOCUTÁNEO



Restoration of Elbow Function

- Musculocutaneous Nerve**
- Double fascicular transfer
 - Medial pectoral to musculocutaneous transfer
 - Thoracodorsal to musculocutaneous transfer
- Triceps Brachii Nerve**
- Flexor carpi ulnaris to medial triceps transfer

NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

Spiral Accessory Nerve

- C7 (Pectoral) to spiral accessory transfer

Suprascapular Nerve

- Spinal accessory to suprascapular transfer

Axillary Nerve

- Medial triceps to axillary transfer
- Medial pectoral to axillary transfer
- Thoracodorsal to axillary transfer

Long Thoracic Nerve

- Double-level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
- Intercostal to long thoracic transfer

AXILLARY NERVE

COUL FERRY
Medial Triceps to Axillary Nerve Transfer

COUL FERRY
Medial Pectoral to Axillary Nerve Transfer

SPINAL ACCESSORY NERVE

COUL FERRY
C7 (Pectoral) to Spinal Accessory Nerve Transfer

NERVE TRANSFERS

COUL FERRY
C7 (Pectoral) to Spinal Accessory Nerve Transfer

NERVE TRANSFERS

COUL FERRY
C7 (Pectoral) to Spinal Accessory Nerve Transfer

SUPRASCAPULAR NERVE

COUL FERRY
Spinal Accessory to Suprascapular Nerve Transfer

LONG THORACIC NERVE

COUL FERRY
Double-Level Nerve Transfer for Long Thoracic Nerve

NERVIO
MUSCULOCUTÁNEO

Mediano NERVE

Cubital

Restoration of Elbow Function

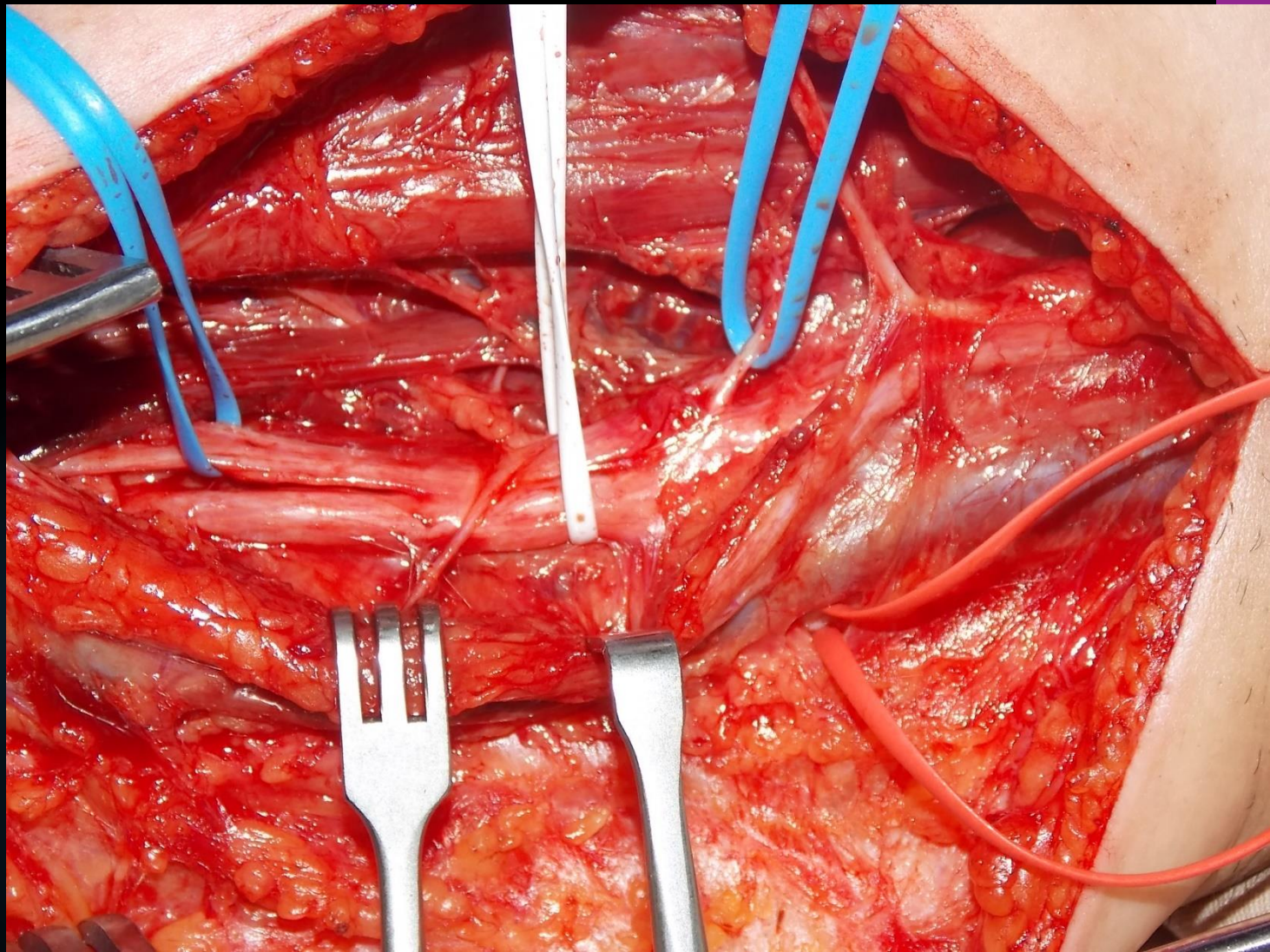
Musculocutaneous Nerve

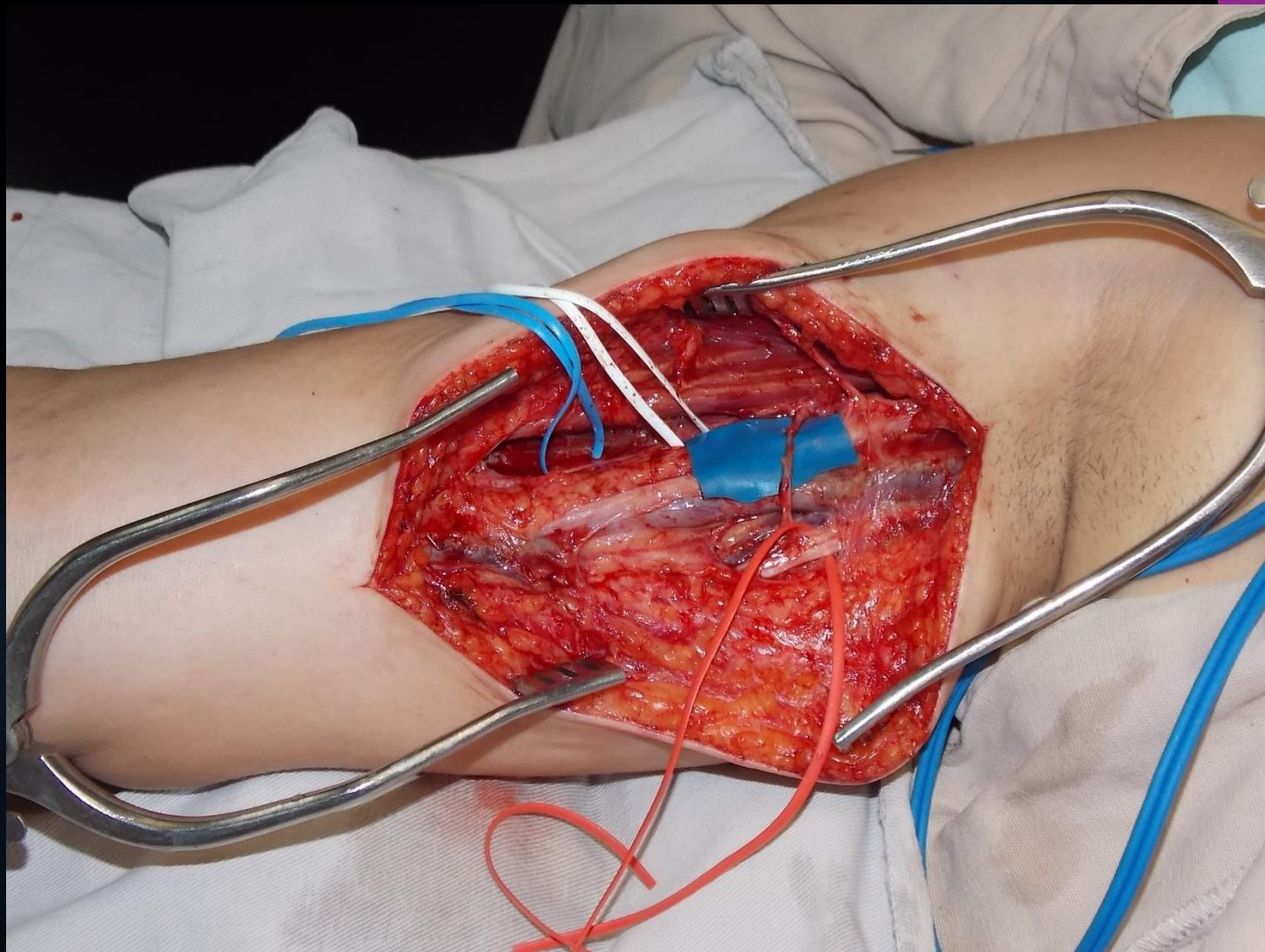
- Double fascicular transfer
- Medial pectoral to musculocutaneous transfer
- Thoracodorsal to musculocutaneous transfer

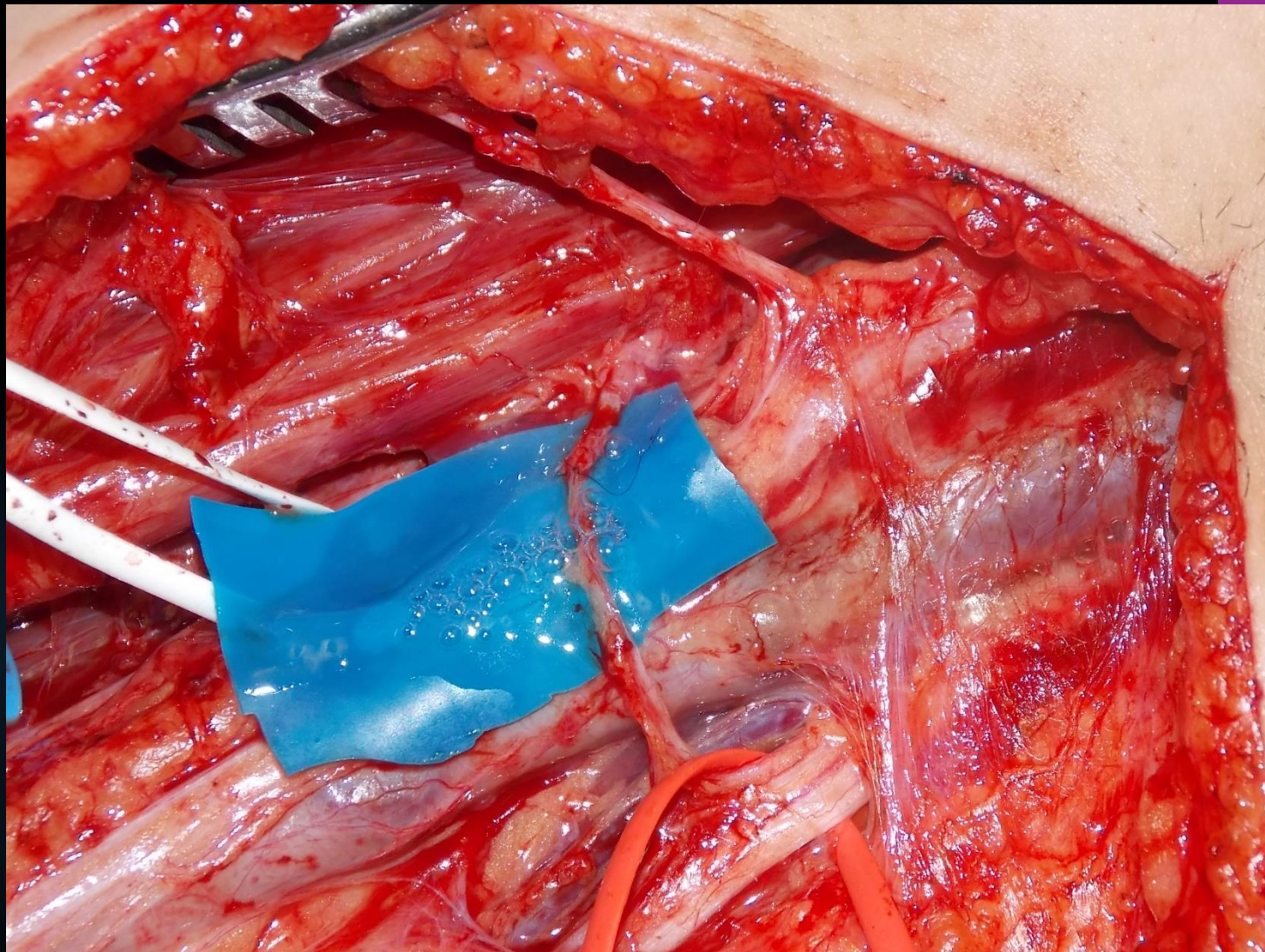
Triceps Brachii Nerve

- Flexor carpi ulnaris to medial triceps transfer









NERVE TRANSFERS

FOR BRACHIAL PLEXUS INJURIES

Restoration of Shoulder Function

- Spiral Accessory Nerve**
- C7 (Pectoral) to spiral accessory transfer
- Suprascapular Nerve**
- Spinal accessory to suprascapular transfer
- Axillary Nerve**
- Medial triceps to axillary transfer
 - Medial pectoral to axillary transfer
 - Thoracodorsal to axillary transfer
- Long Thoracic Nerve**
- Double-level transfer
 - C7 (Pectoral) to long thoracic transfer
 - Thoracodorsal to long thoracic transfer
 - Intercostal to long thoracic transfer

SPINAL ACCESSORY NERVE
C7 (Pectoral) to Spiral Accessory Nerve Transfer



AXILLARY NERVE
Medial Triceps to Axillary Nerve Transfer
Medial Pectoral to Axillary Nerve Transfer

SUPRASCAPULAR NERVE
Spiral Accessory to Suprascapular Nerve Transfer

LONG THORACIC NERVE
Double-level Nerve Transfer for Long Thoracic Nerve
Intercostal to Long Thoracic Nerve Transfer

NERVIO MUSCULOCUTÁNEO

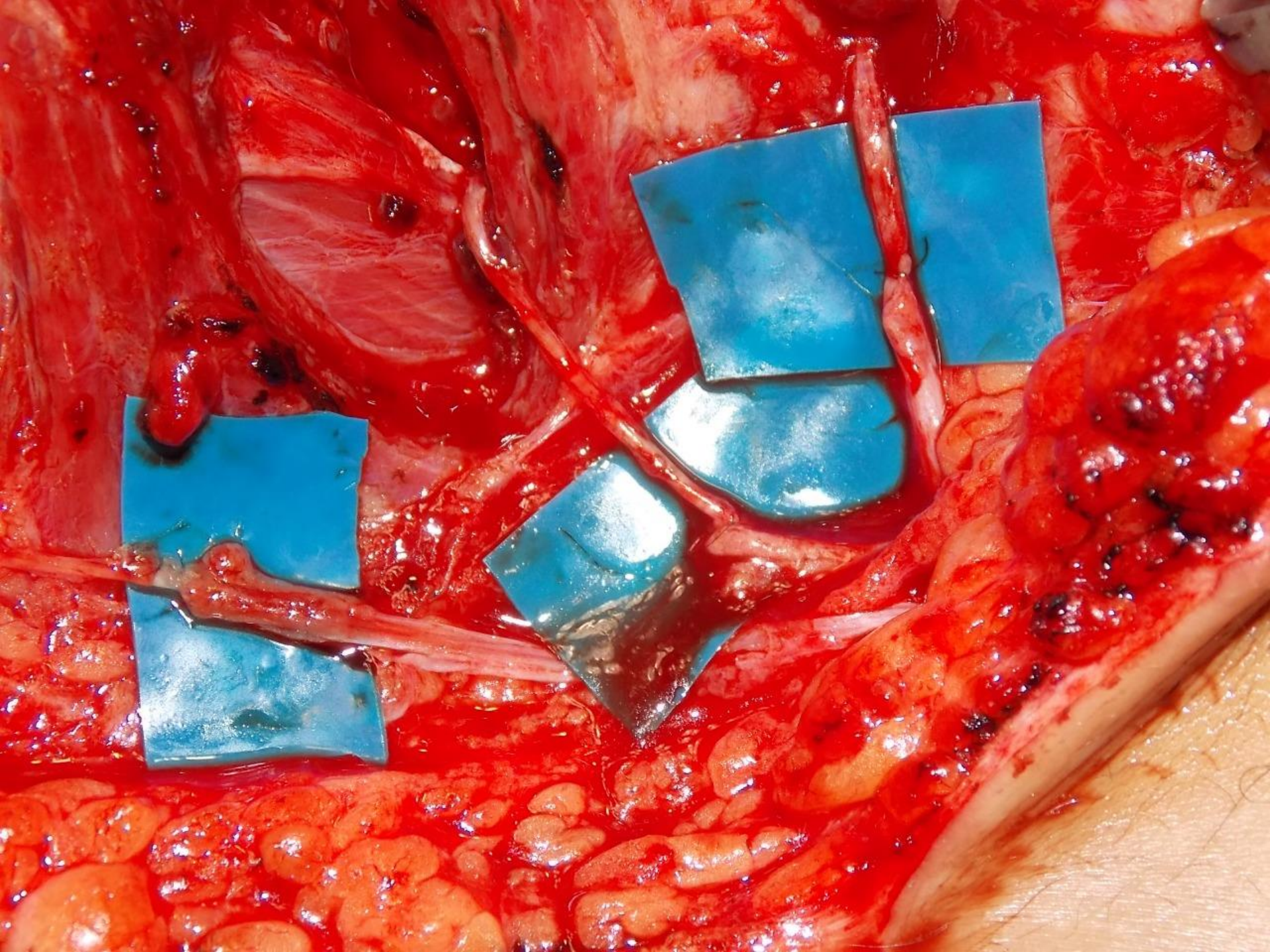
Intercostales

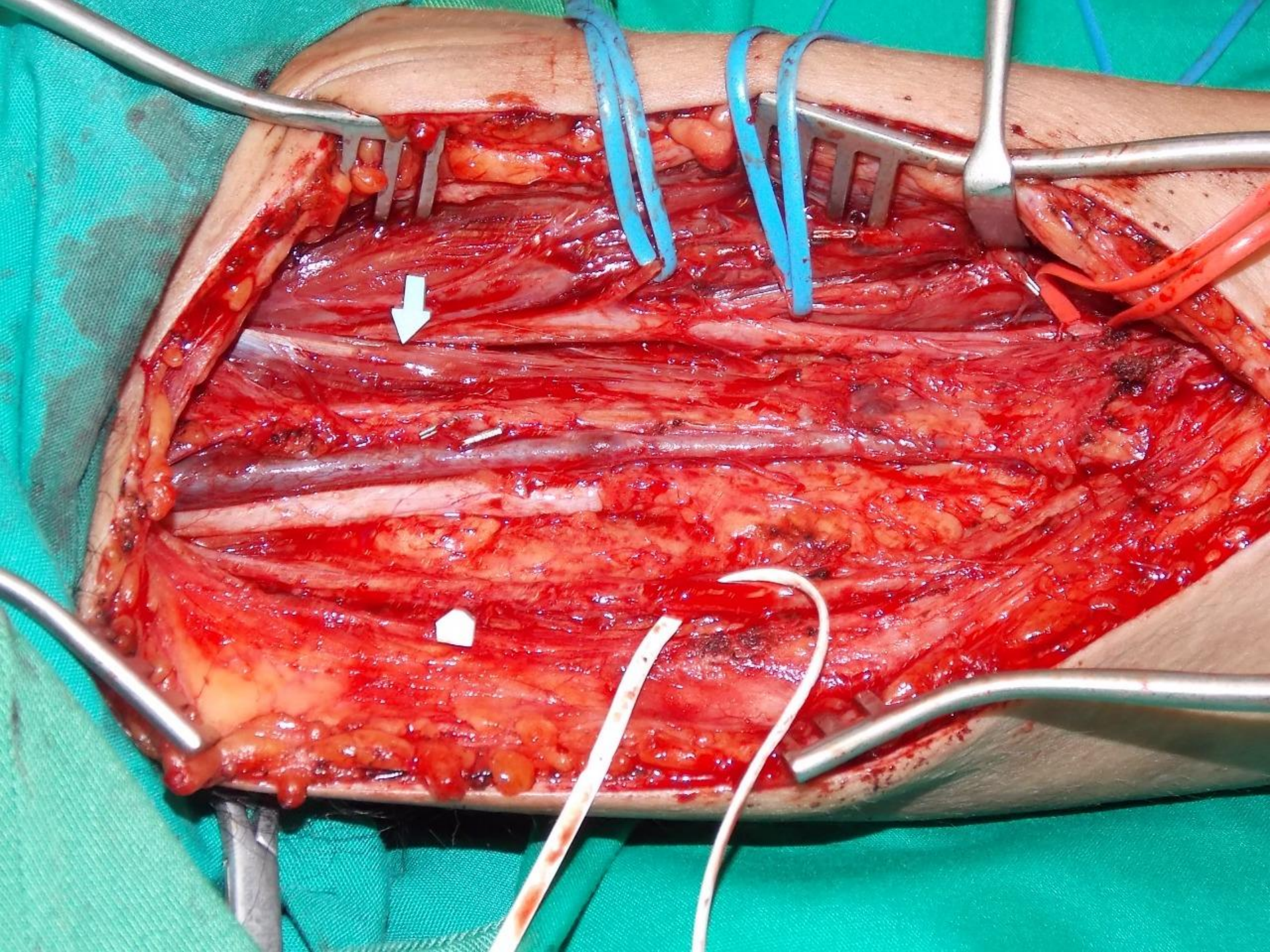
TRICEPS BRACHII NERVE
Flexor Carpi Ulnaris to Medial Triceps Transfer
Intercostal to Long Thoracic Nerve Transfer

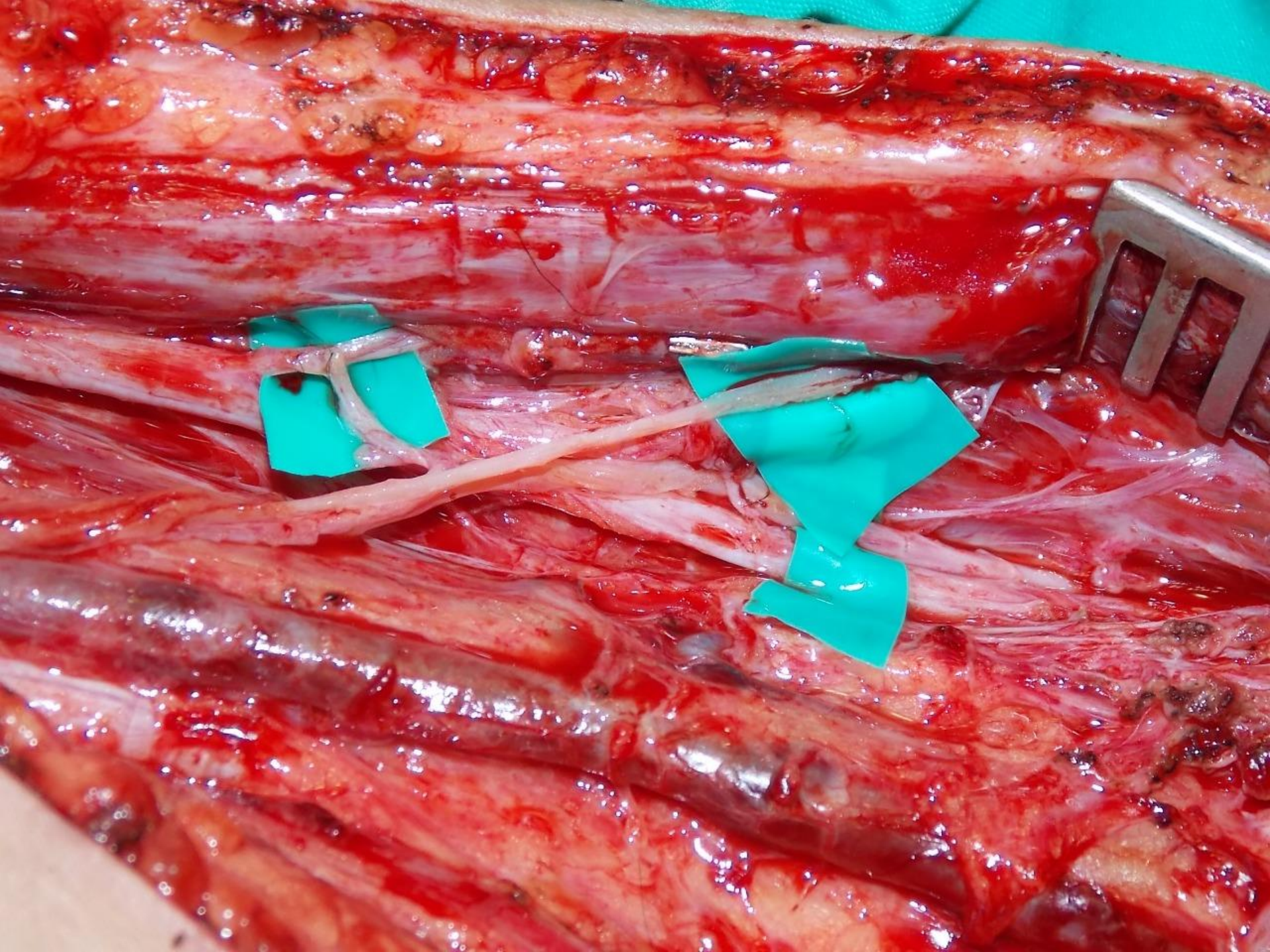
Restoration of Elbow Function

- Musculocutaneous Nerve**
- Double fascicular transfer
 - Medial pectoral to musculocutaneous transfer
 - Thoracodorsal to musculocutaneous transfer
- Triceps Brachii Nerve**
- Flexor carpi ulnaris to medial triceps transfer











Neurotizaciones para lesiones en Antebrazo y Mano



Interóseo anterior a cubital

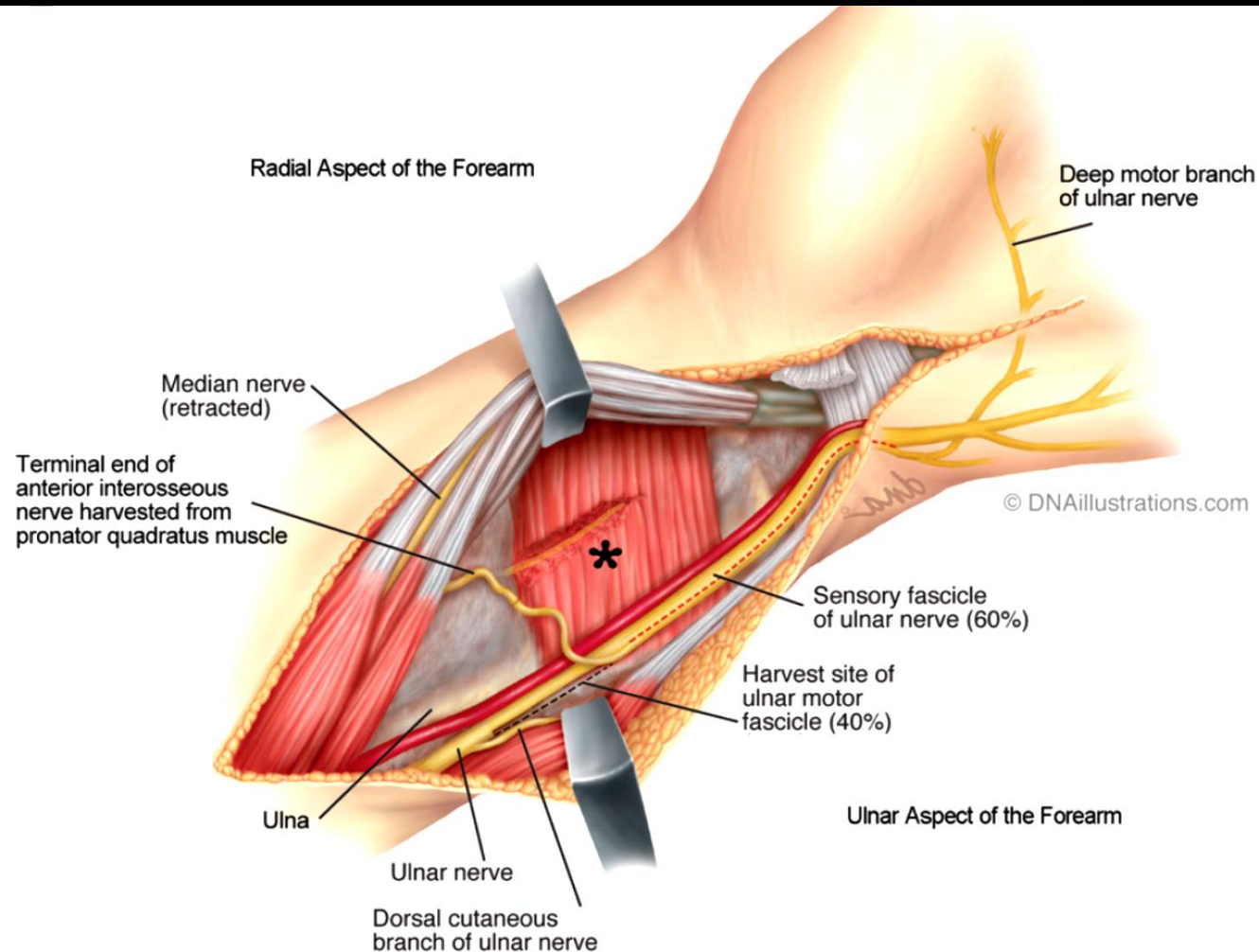
☐ Susan Mackinnon

☐ Abril 1991.

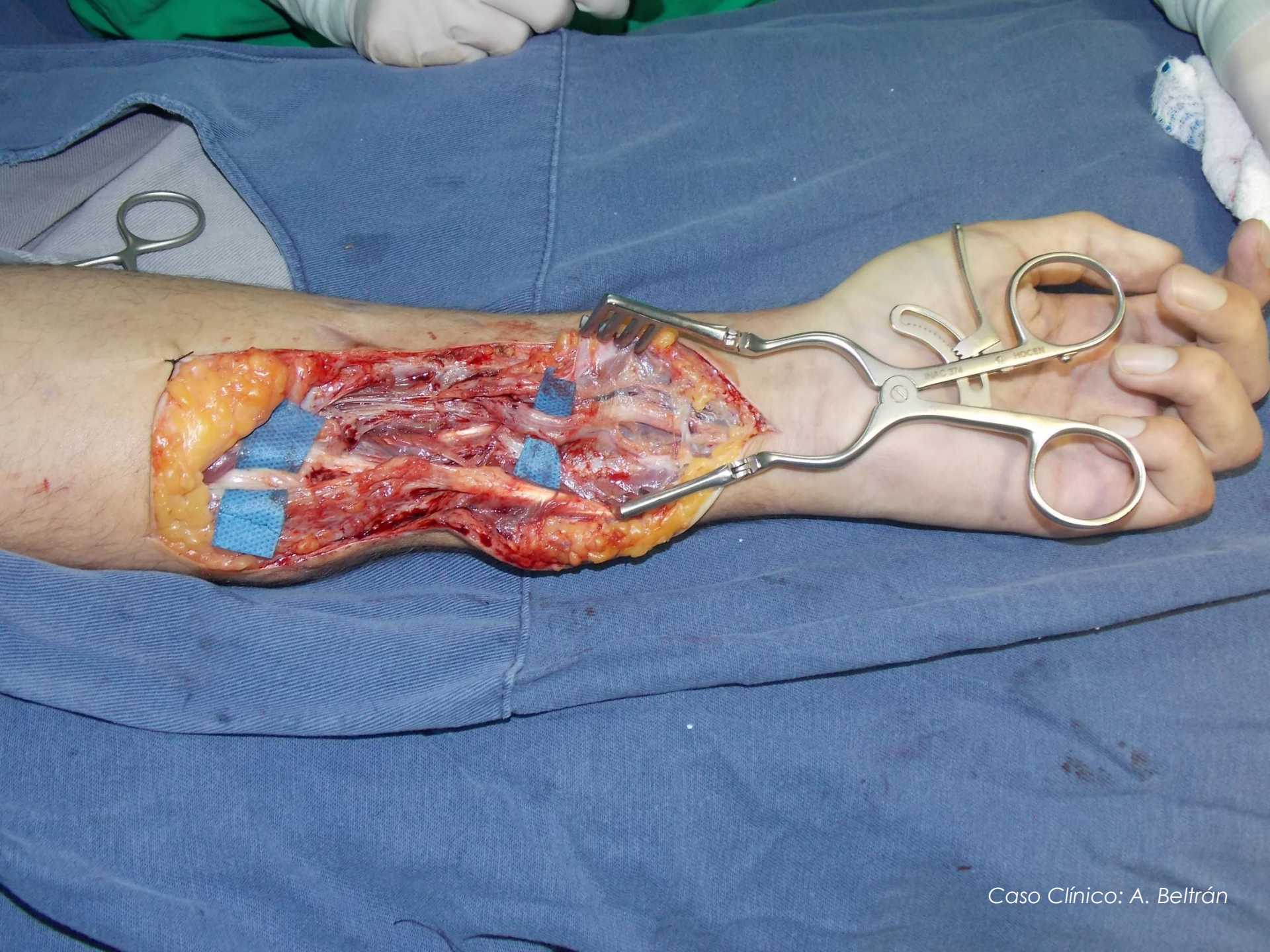
☐ Función antagónica

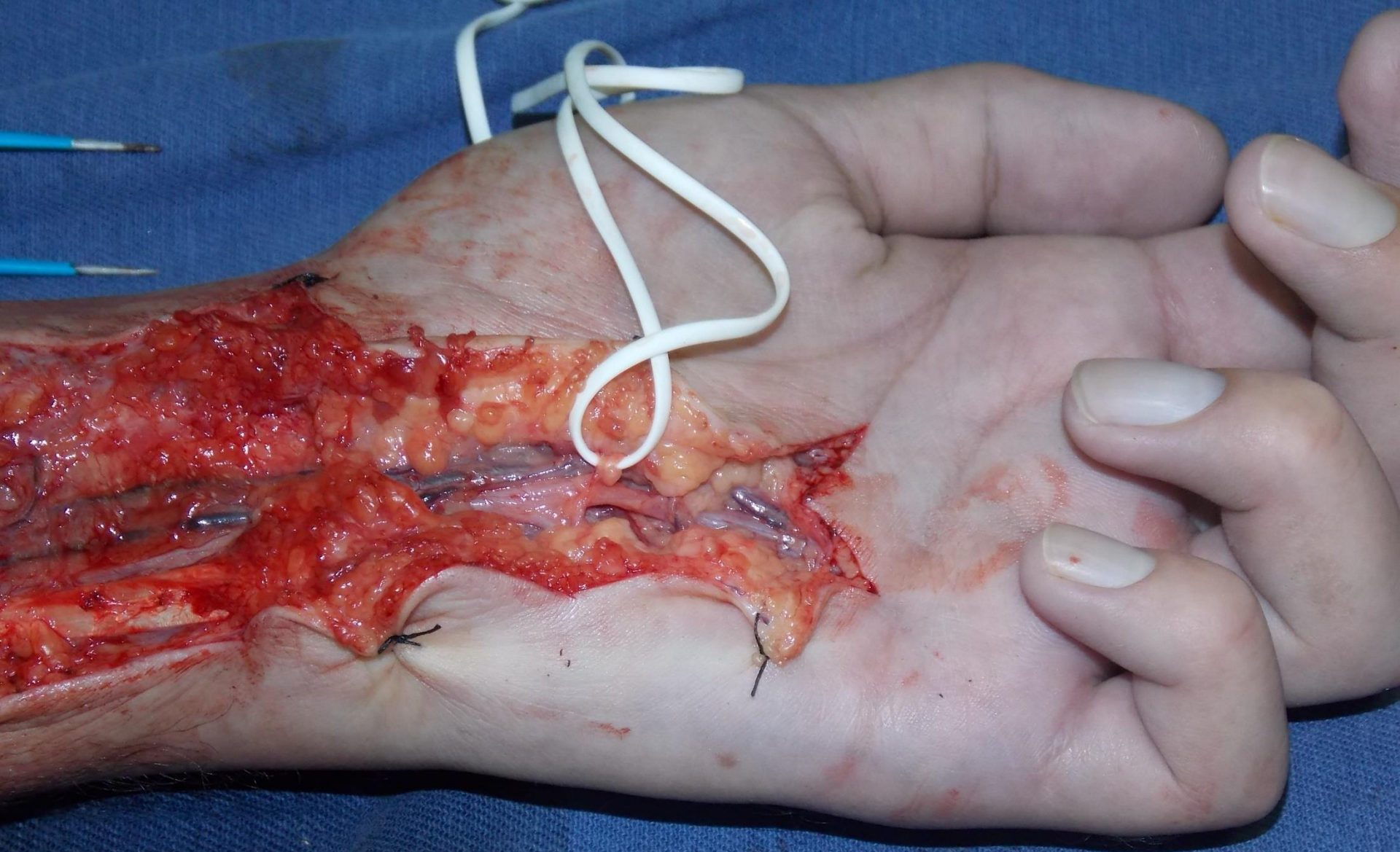
☐ Discrepancia tamaños

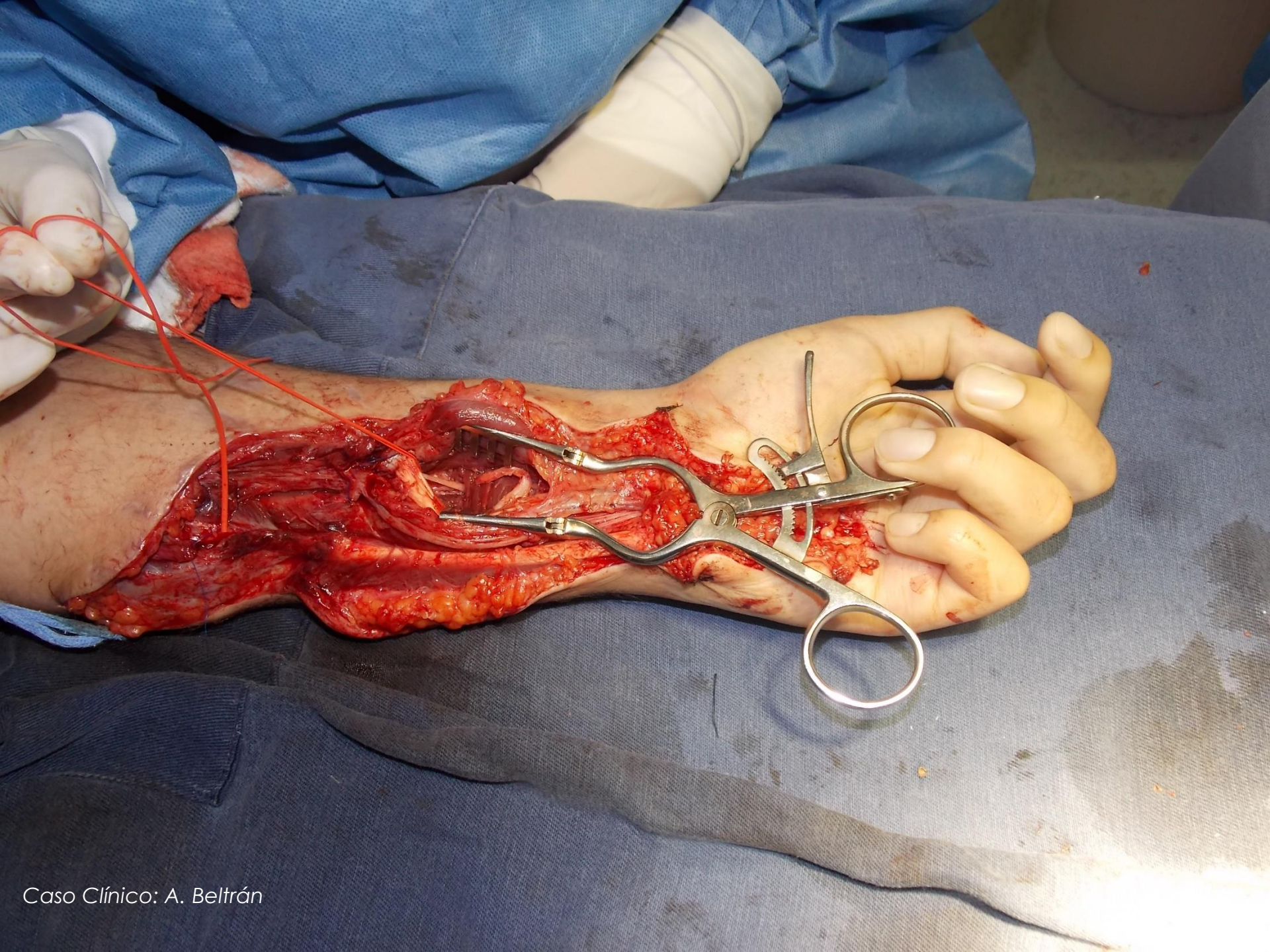
☐ Suficientes axones motores para reinervar intrínsecos.



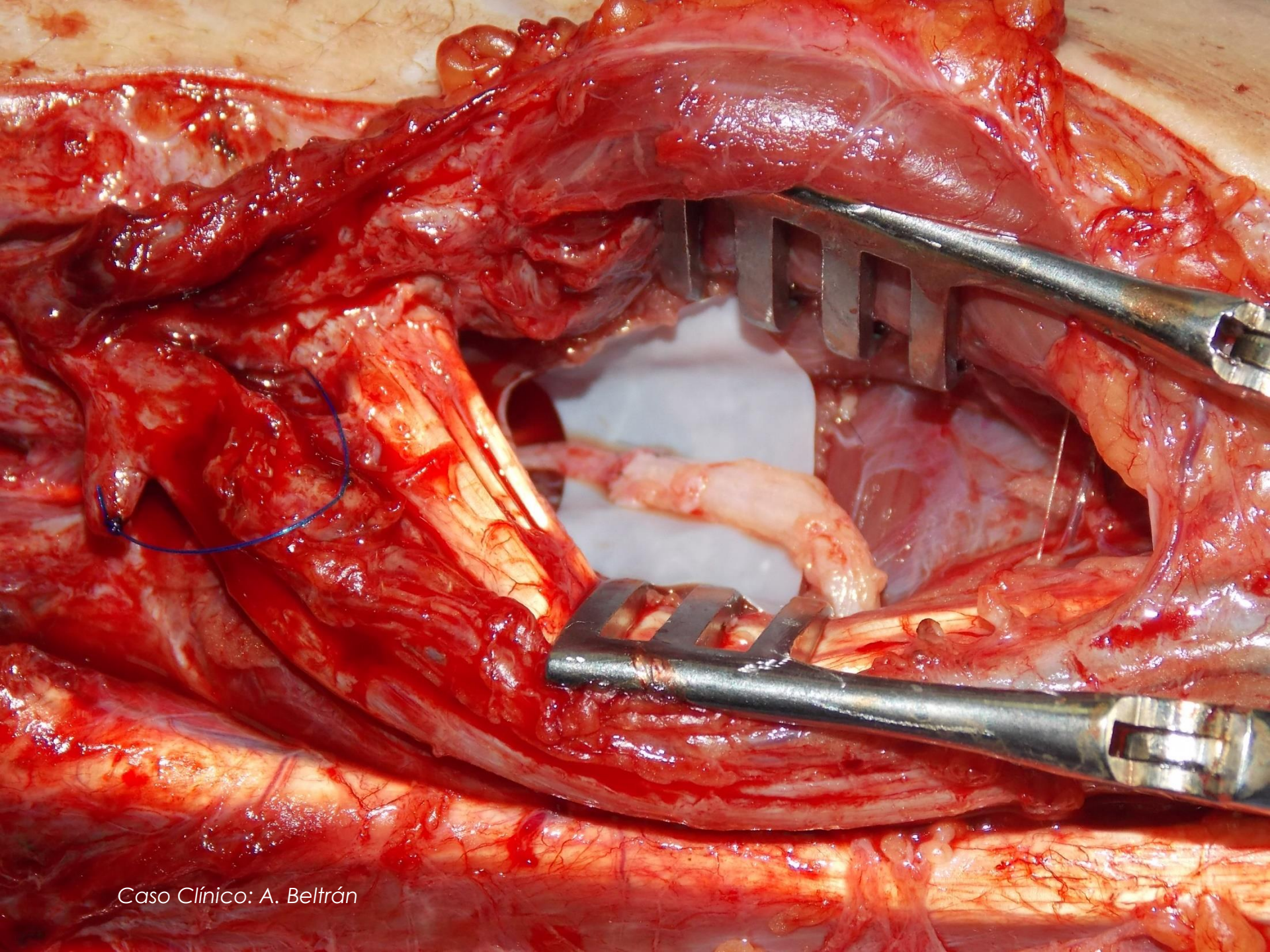




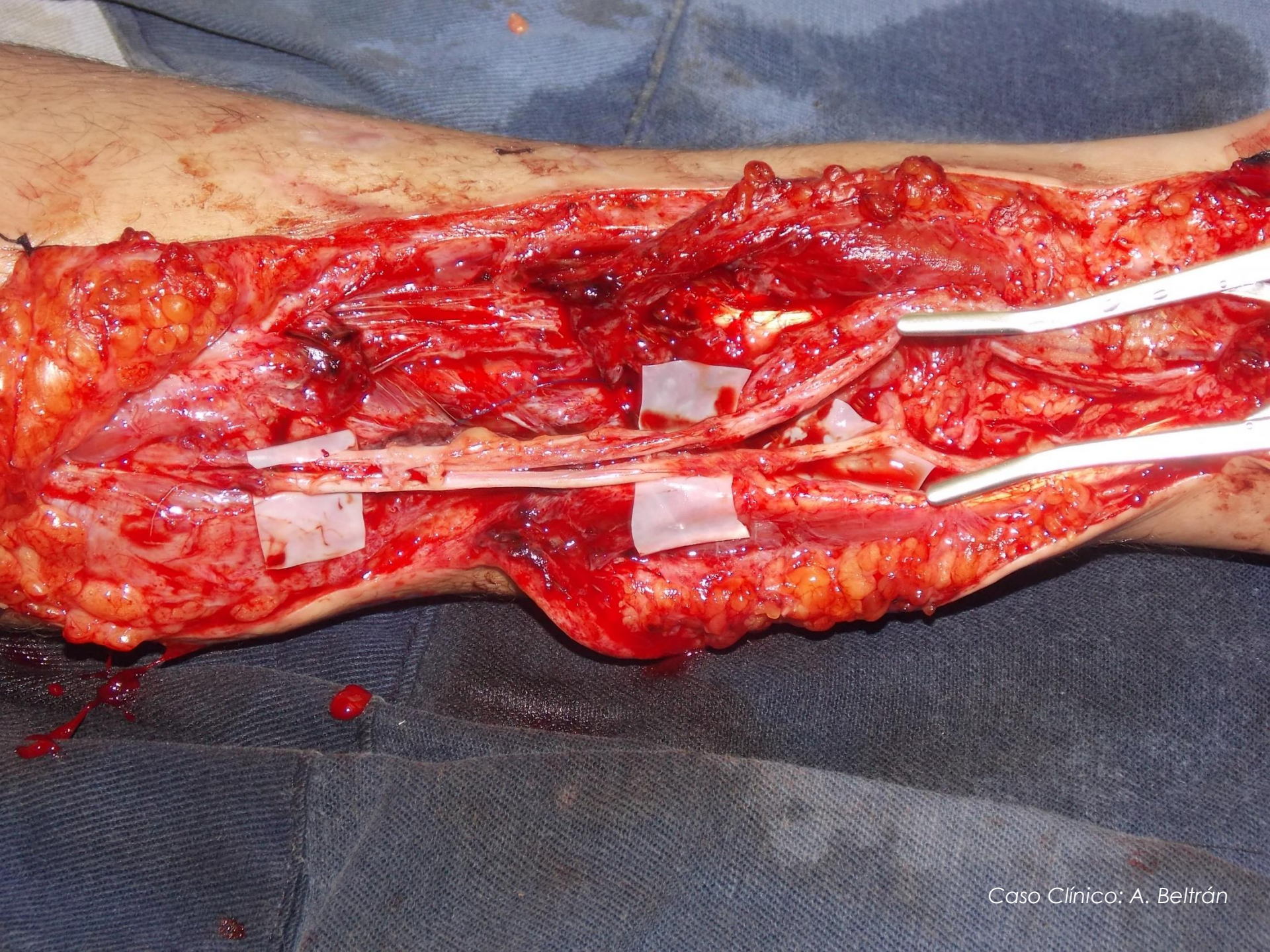


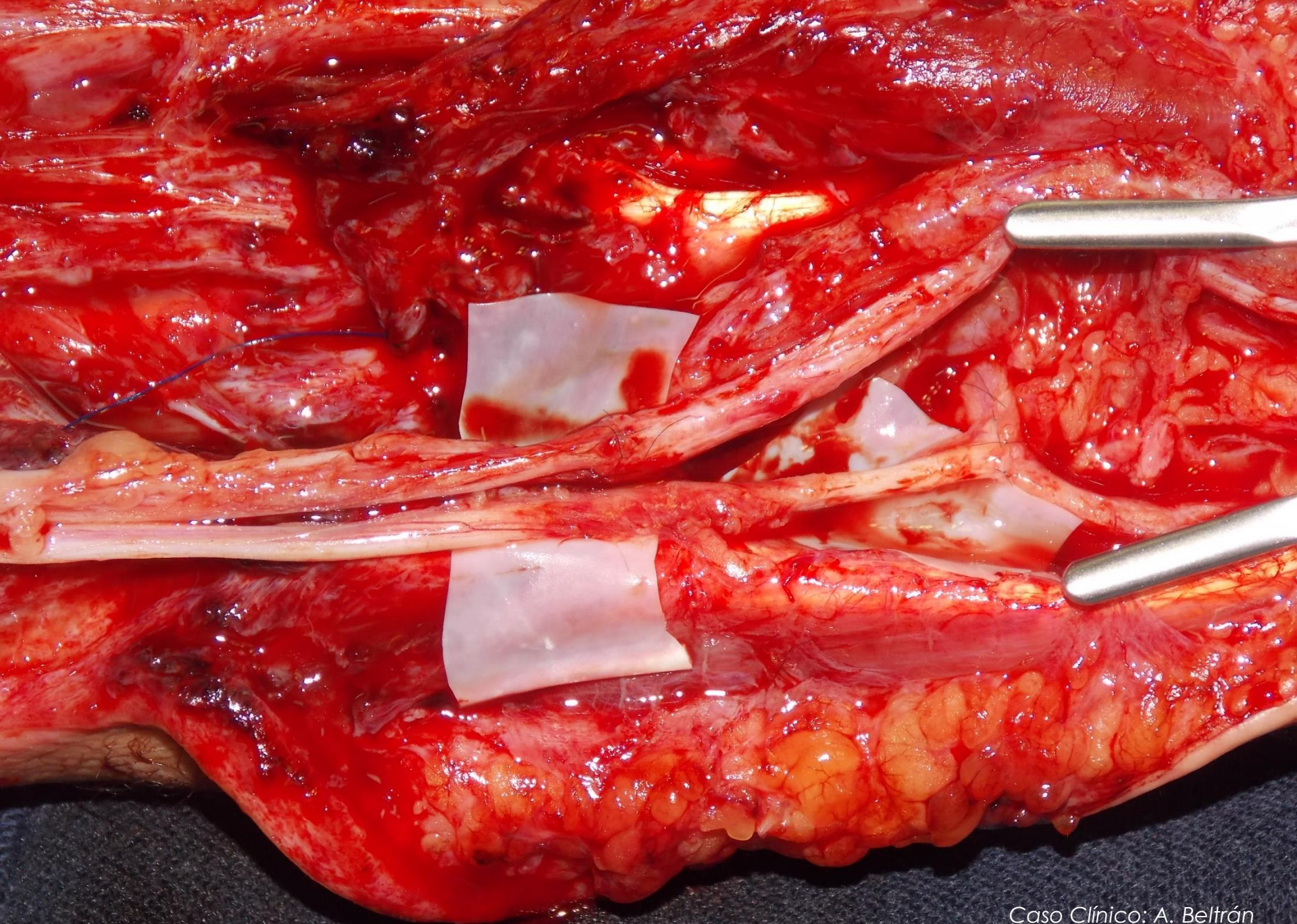


Caso Clínico: A. Beltrán



Caso Clínico: A. Beltrán







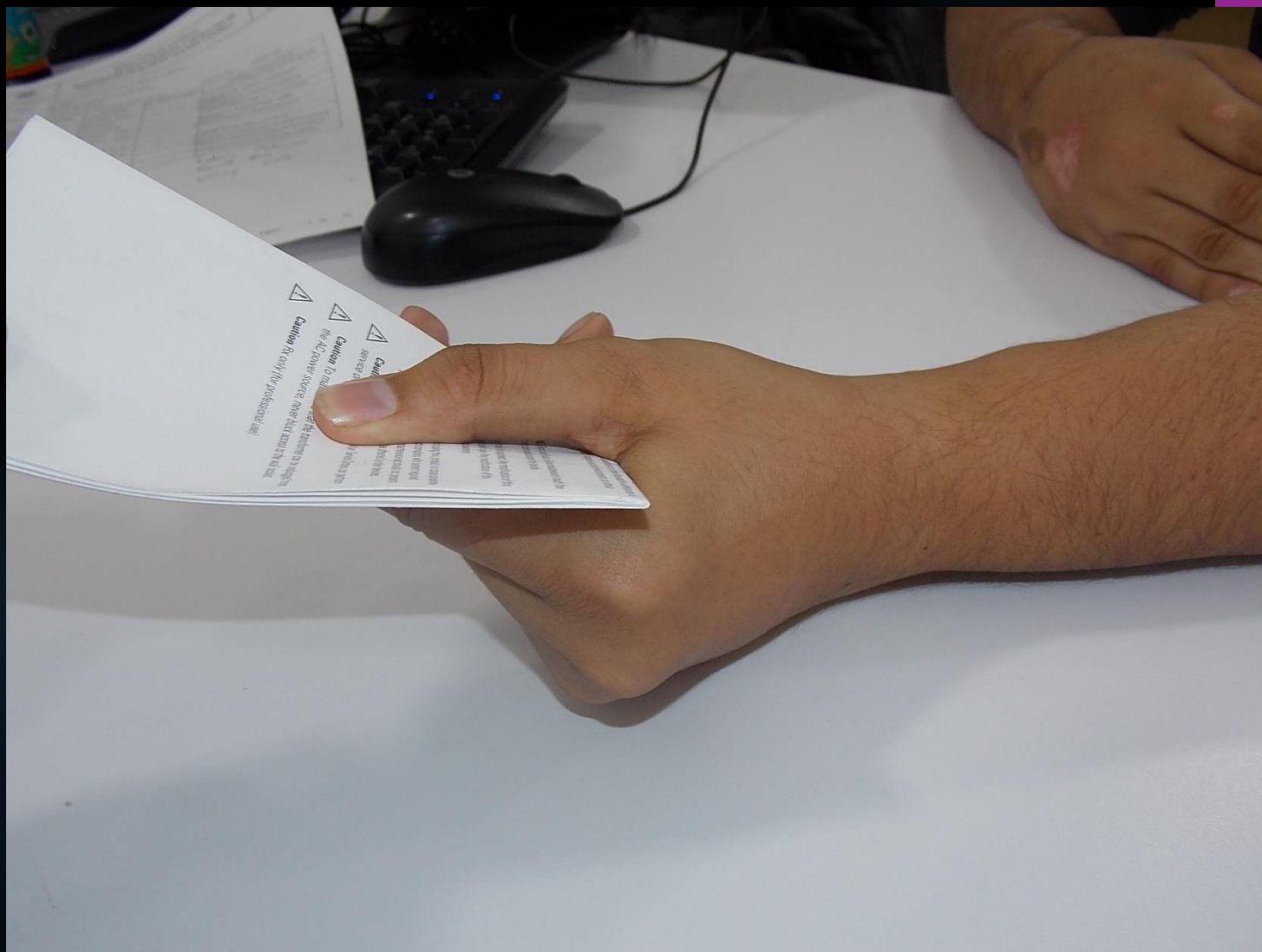








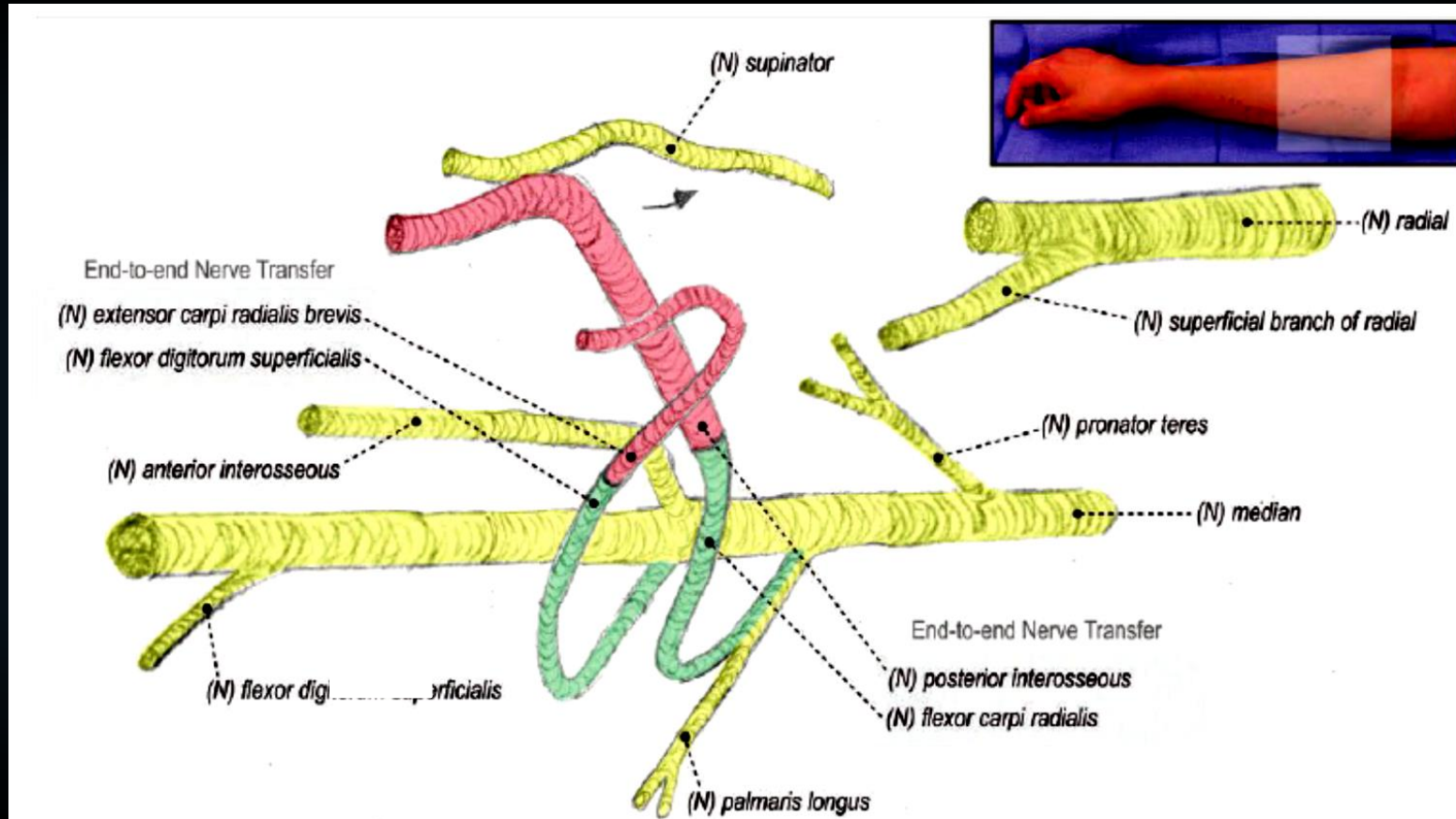




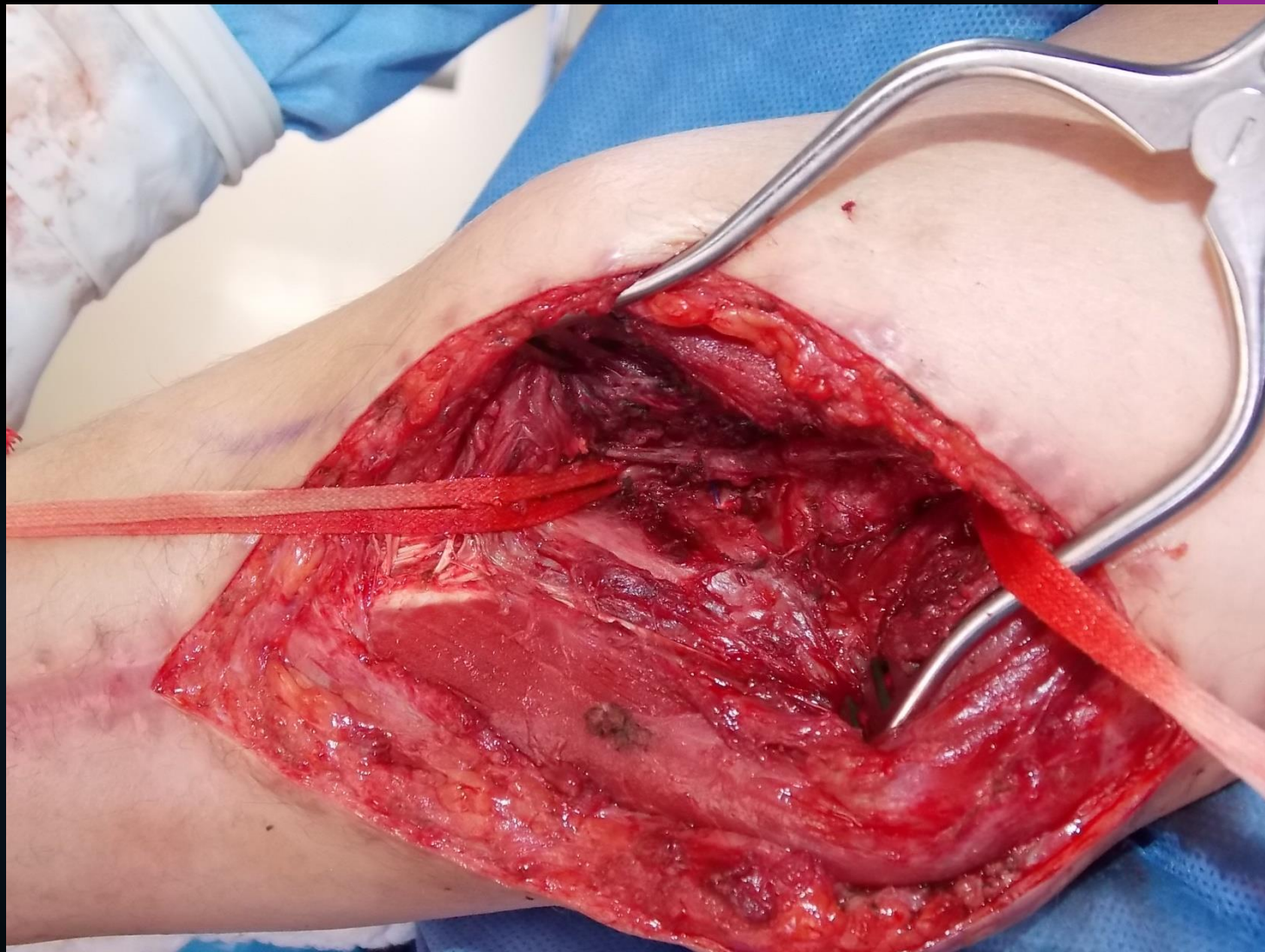


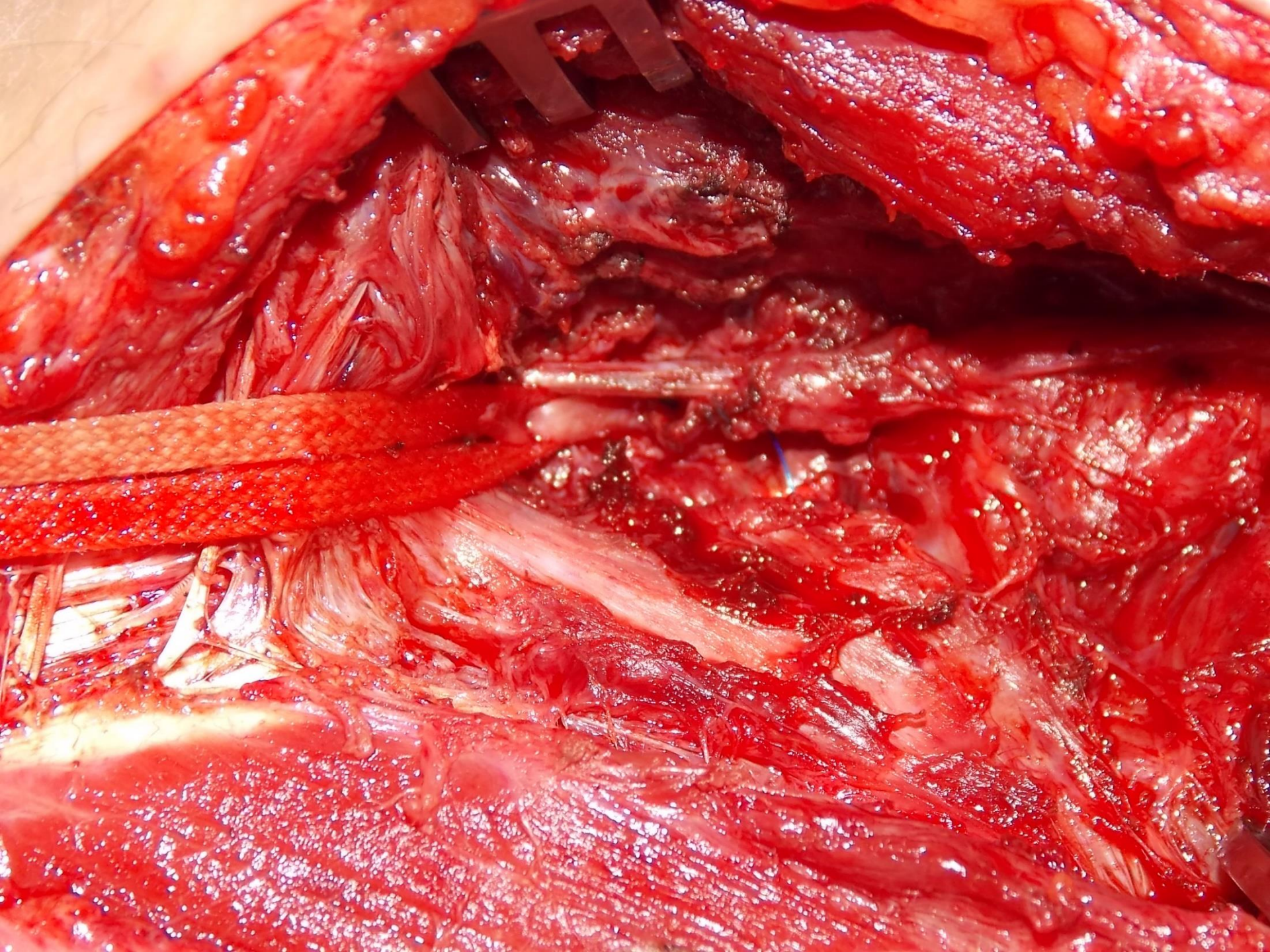


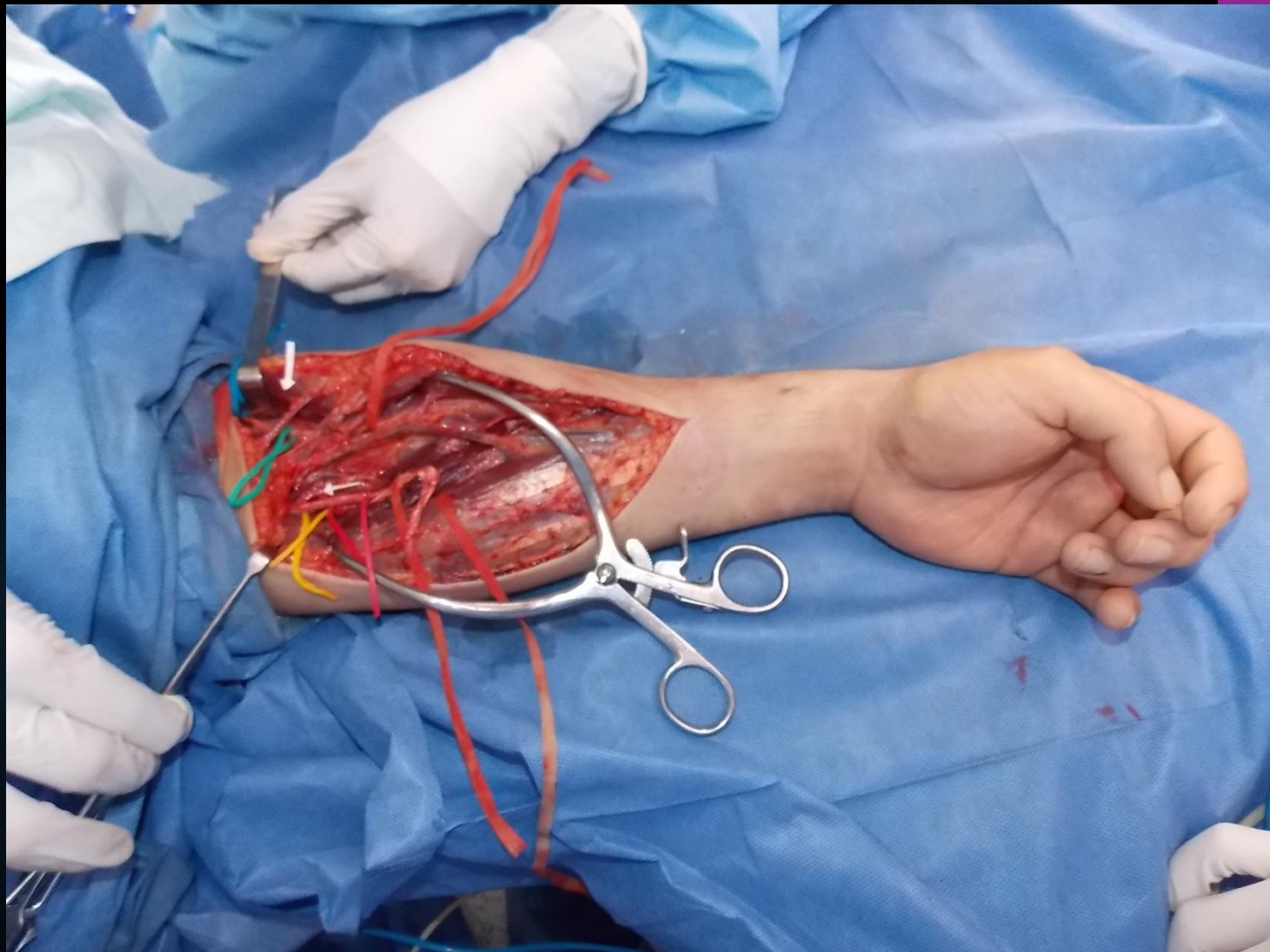
Ramas Mediano a interóseo posterior (Radial)

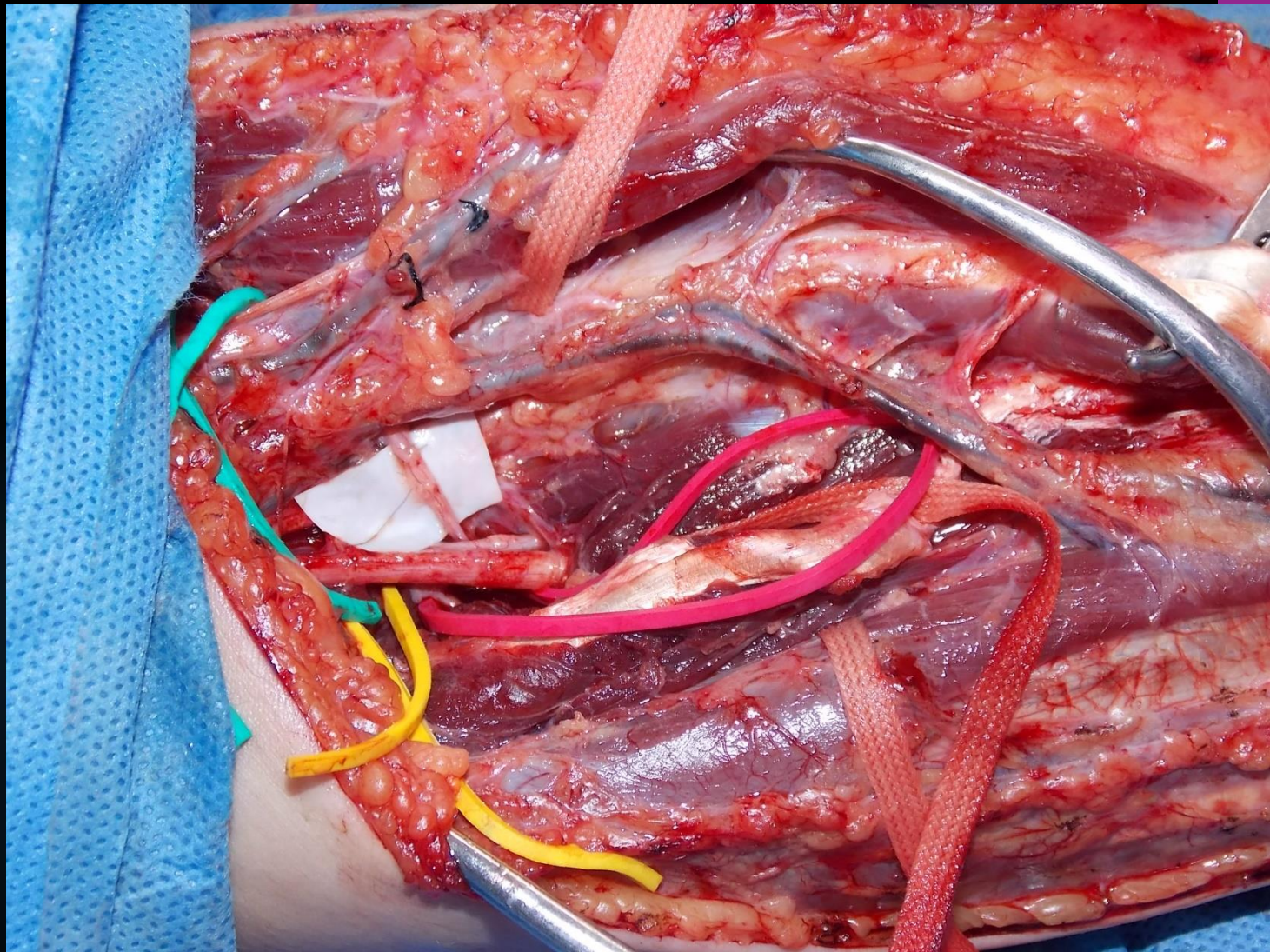












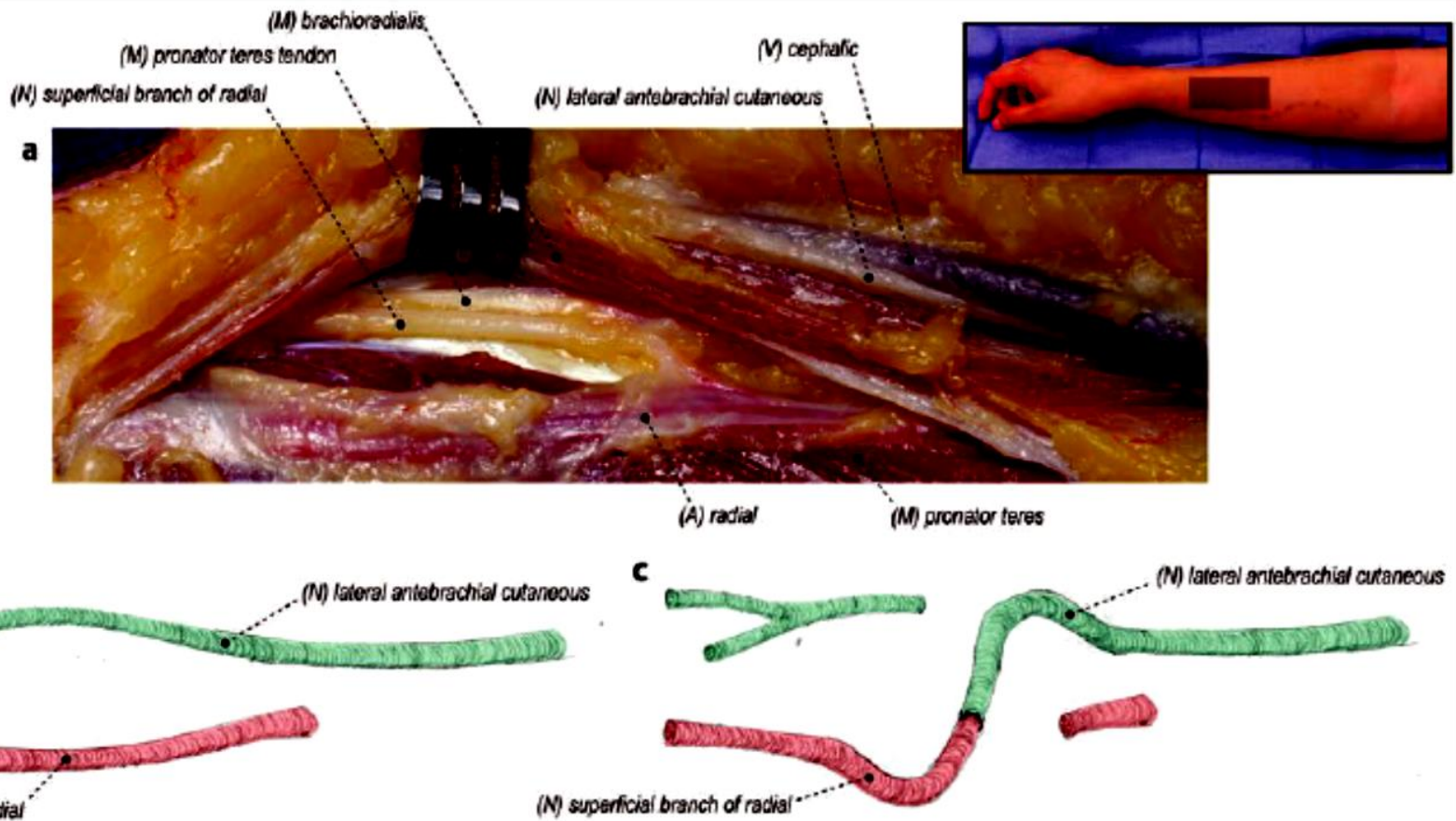
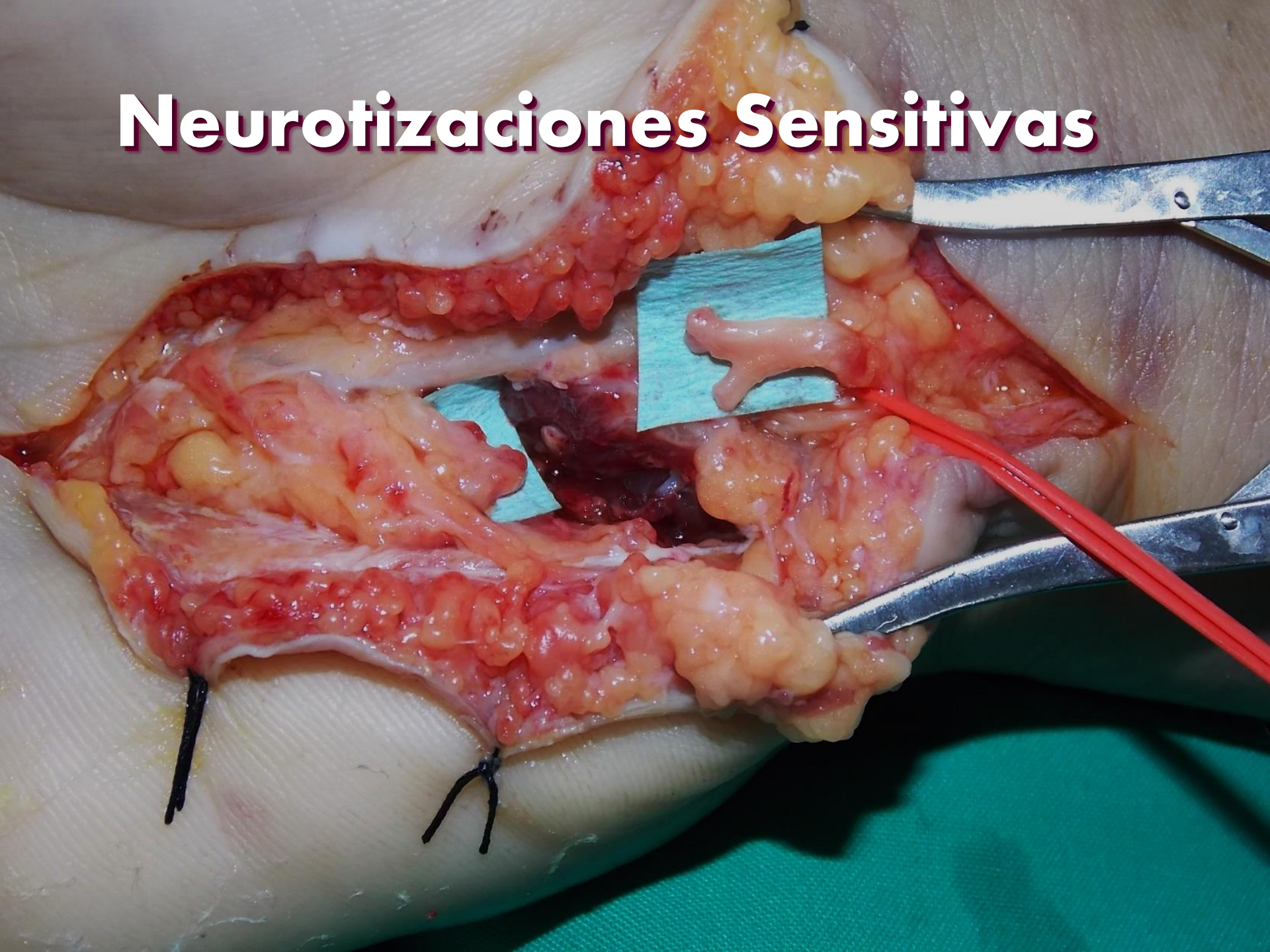


Fig. 5.23 Lateral antebrachial cutaneous (LABC)-to-superficial branch of radial (radial sensory) nerve transfer. (a) The donor LABC nerve is identified superficially. The recipient radial sensory nerve is identified deep by retracting the brachioradialis. (b) Donor (green) and recipient (red) anatomy for nerve transfer is shown. (c) The donor LABC nerve is end-to-end transferred to the recipient radial sensory nerve.

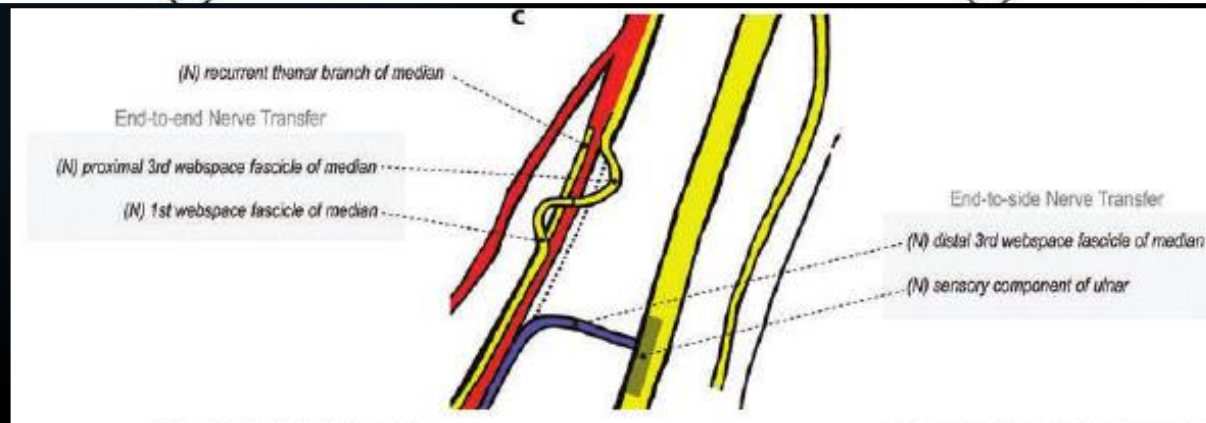
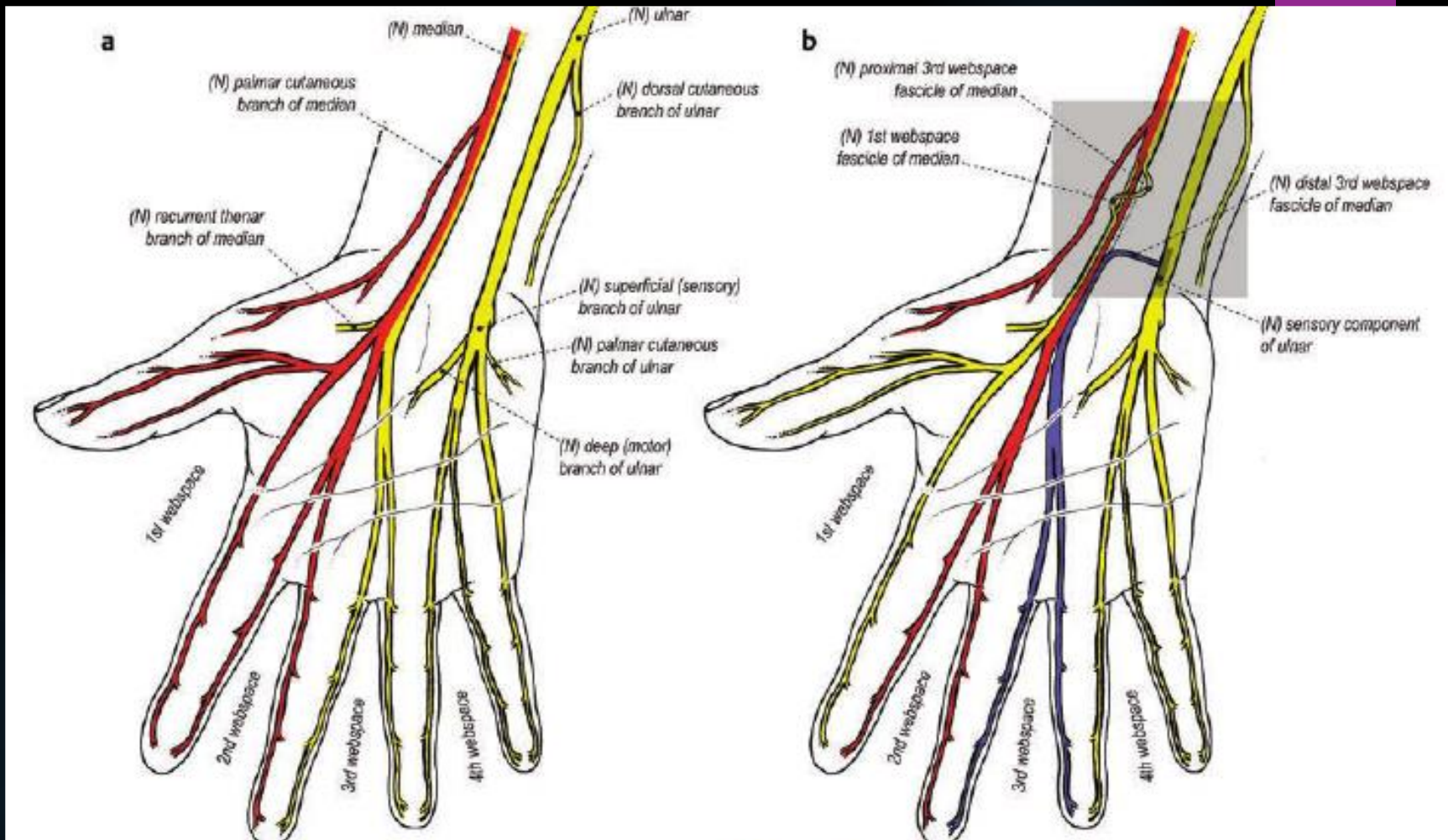


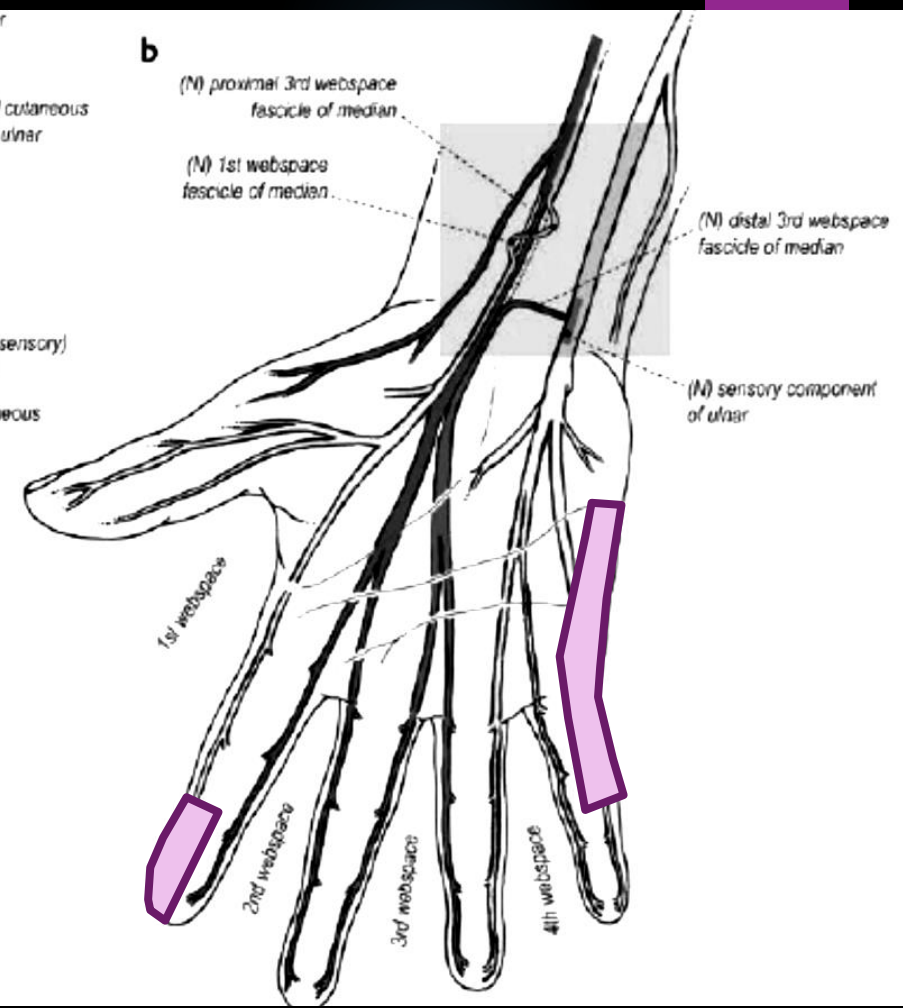
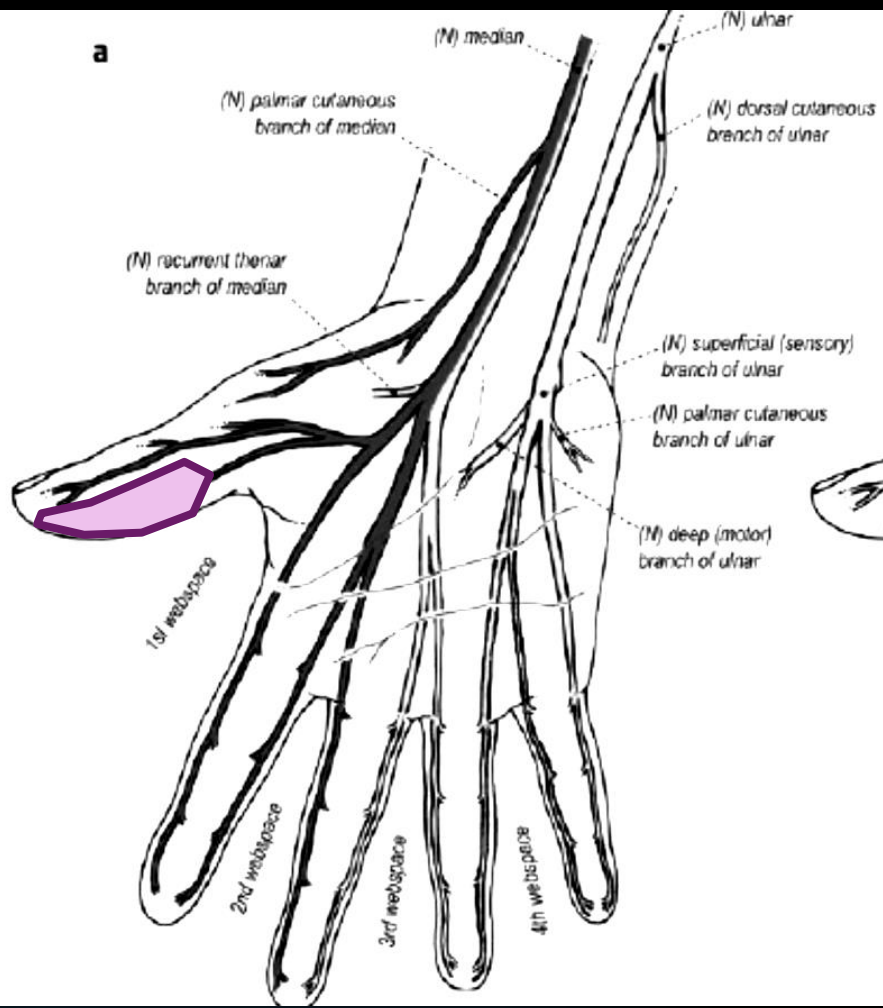


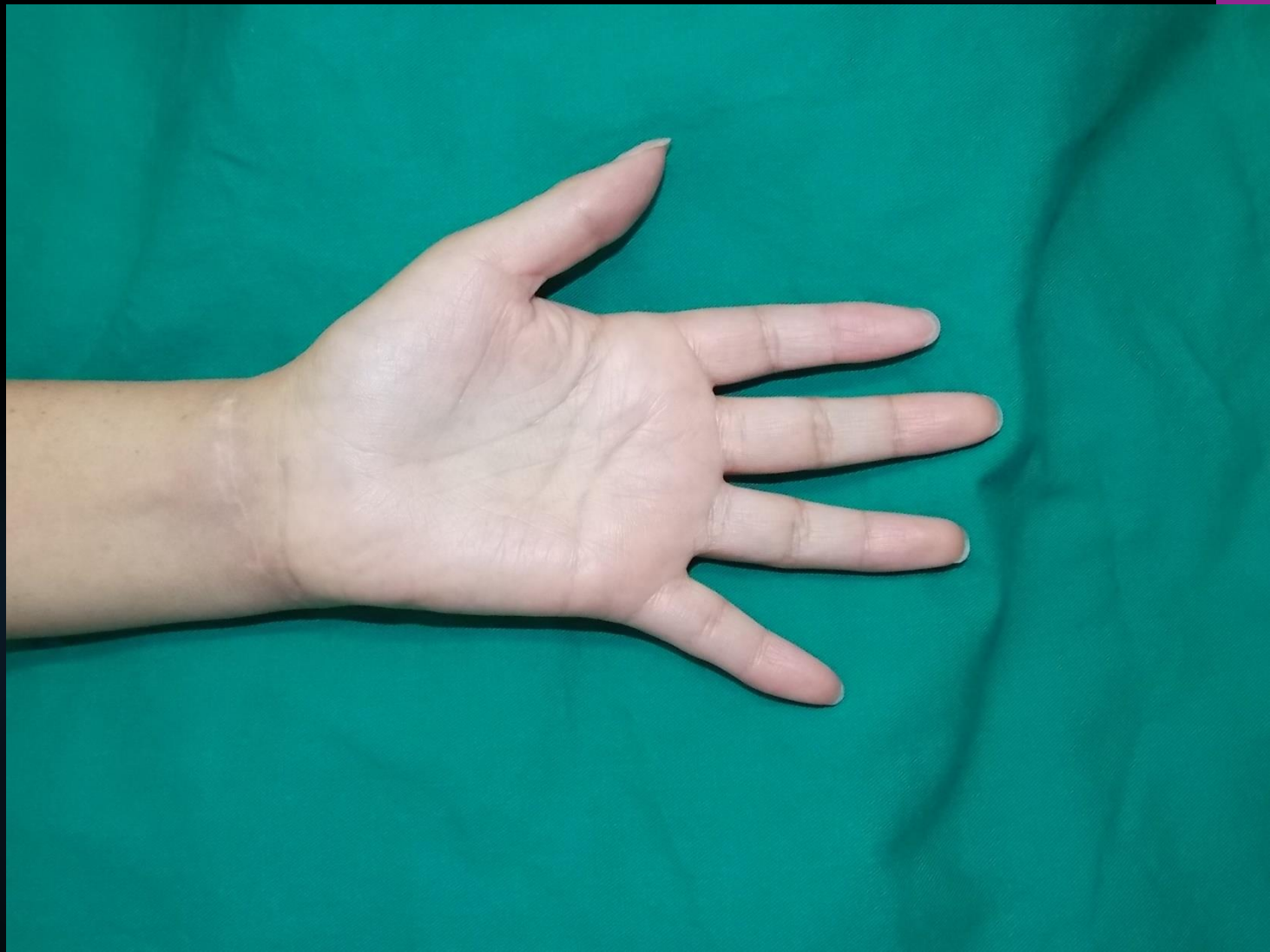
Neurotizaciones Sensitivas



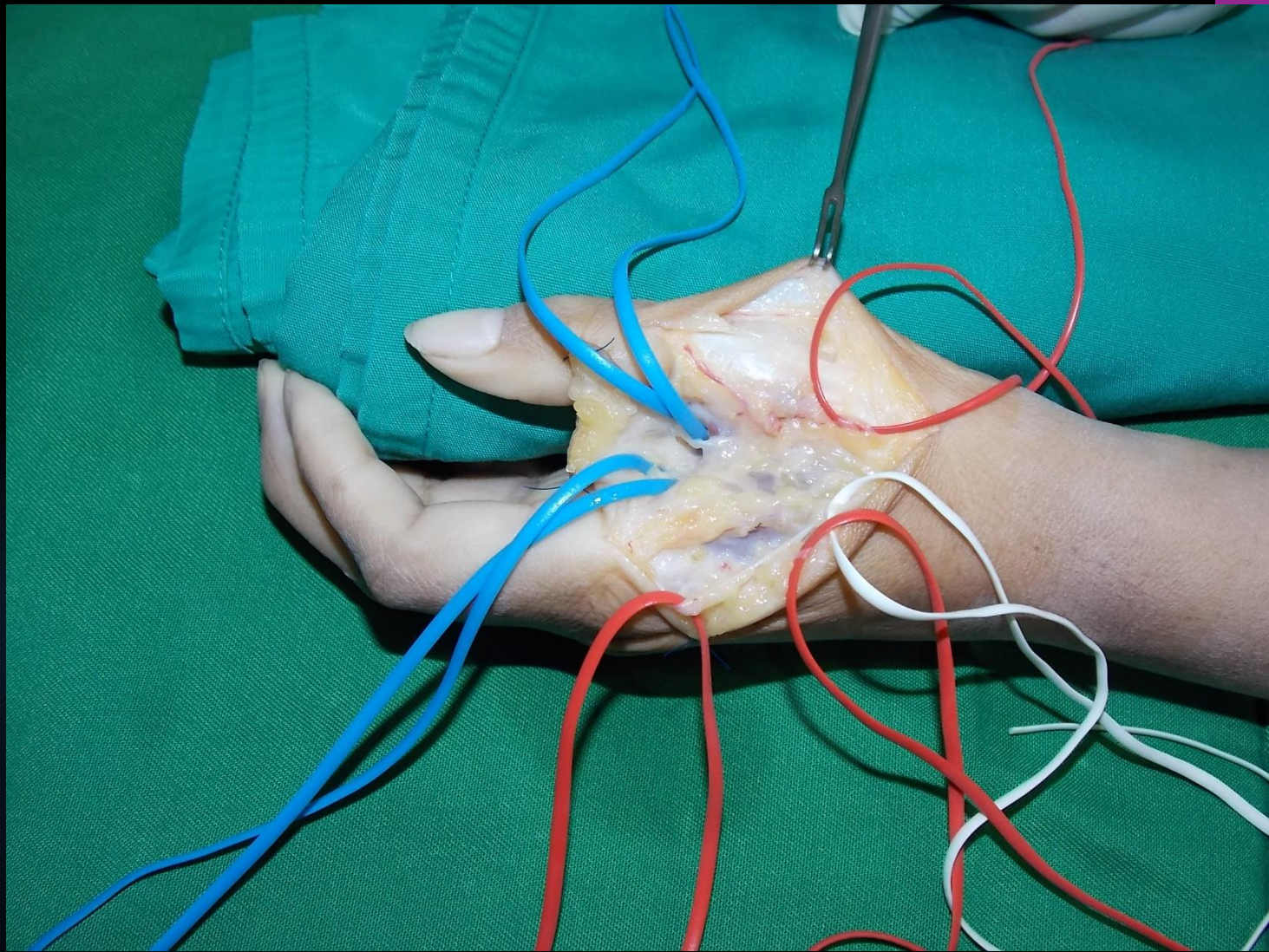


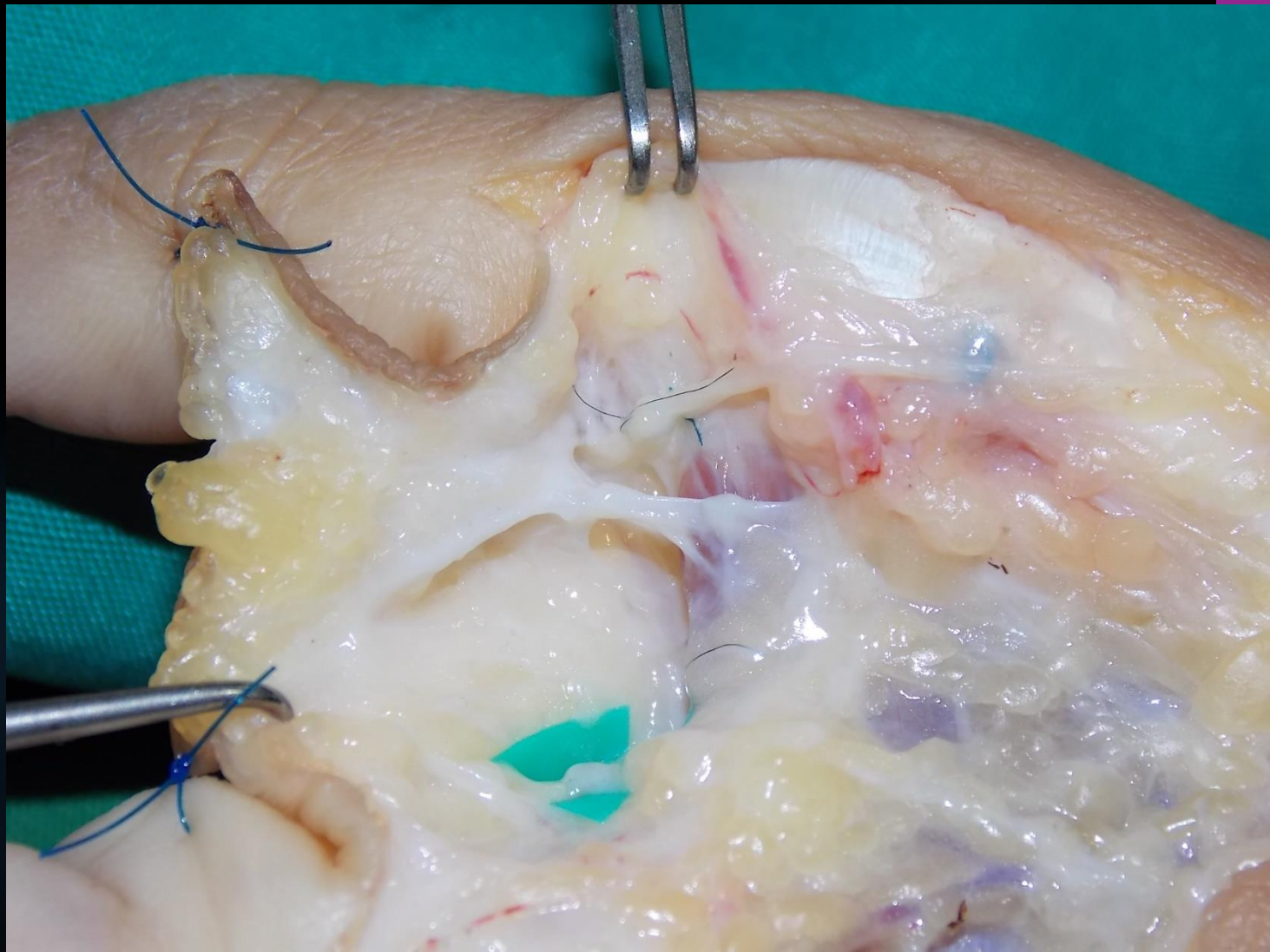




















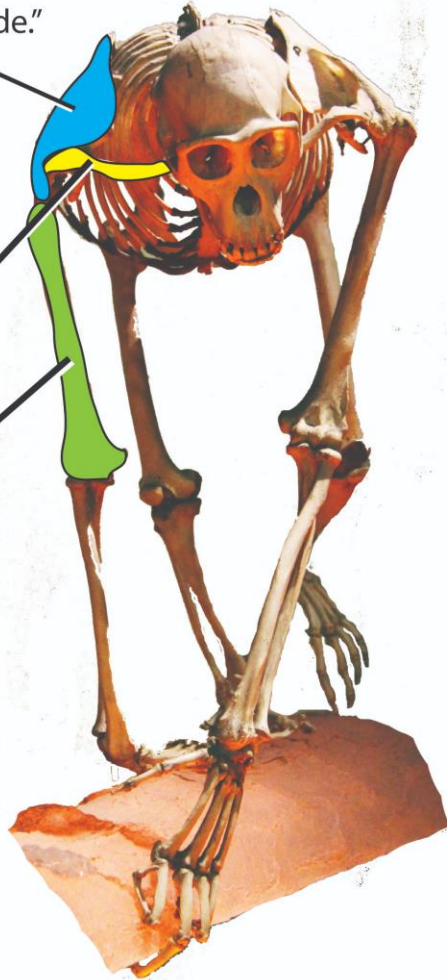


Shoulder Bones

Scapula, also called the "shoulder blade."

Clavicle, also called the "collar bone." Attaches to the top of the breast bone. The only bony attachment of the shoulder

Humerus, the upper -arm bone

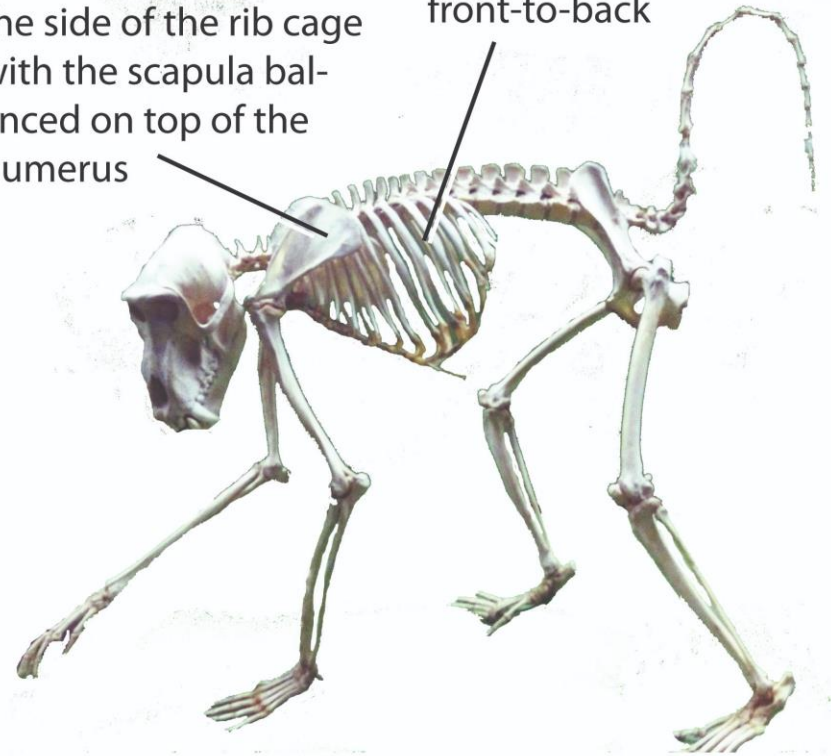


A skeleton of a chimpanzee

Typical Mammal Shoulder

Shoulder is placed on the side of the rib cage with the scapula balanced on top of the humerus

The rib cage is narrow side-to-side and deep front-to-back



A baboon exhibits the typical, quadrupedal arrangement of the shoulder



Chimpanzee shoulder

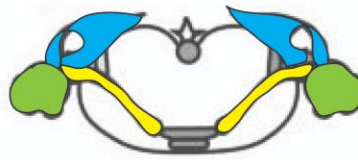
Chest is wide front-to-back

Scapula is placed on the back

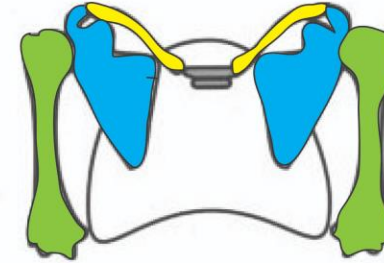
Clavicles are long and angled

Humerus on the side of the rib cage

Top View



Front View



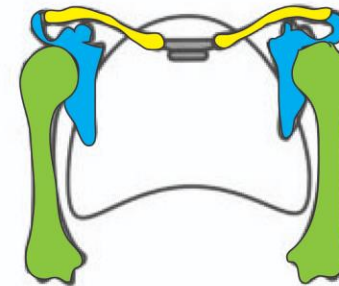
Right Side View



Top View



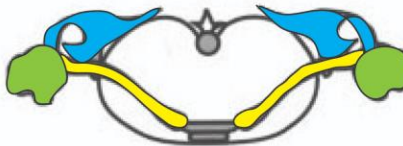
Front View



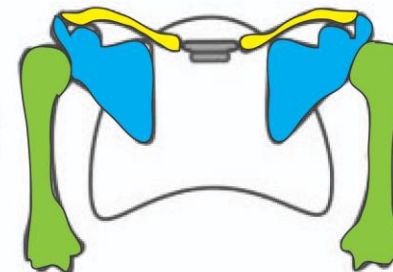
Right Side View



Top View



Front View



Right Side View



Homo erectus shoulder

Chest is wide front-to-back

Scapula is placed on the *side*

Clavicles are long and *horizontal*

Humerus is pulled forward, limiting rotation of the arm backwards



Homo sapiens shoulder

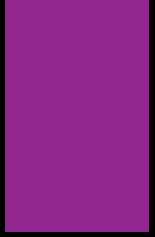
Chest is wide front-to-back

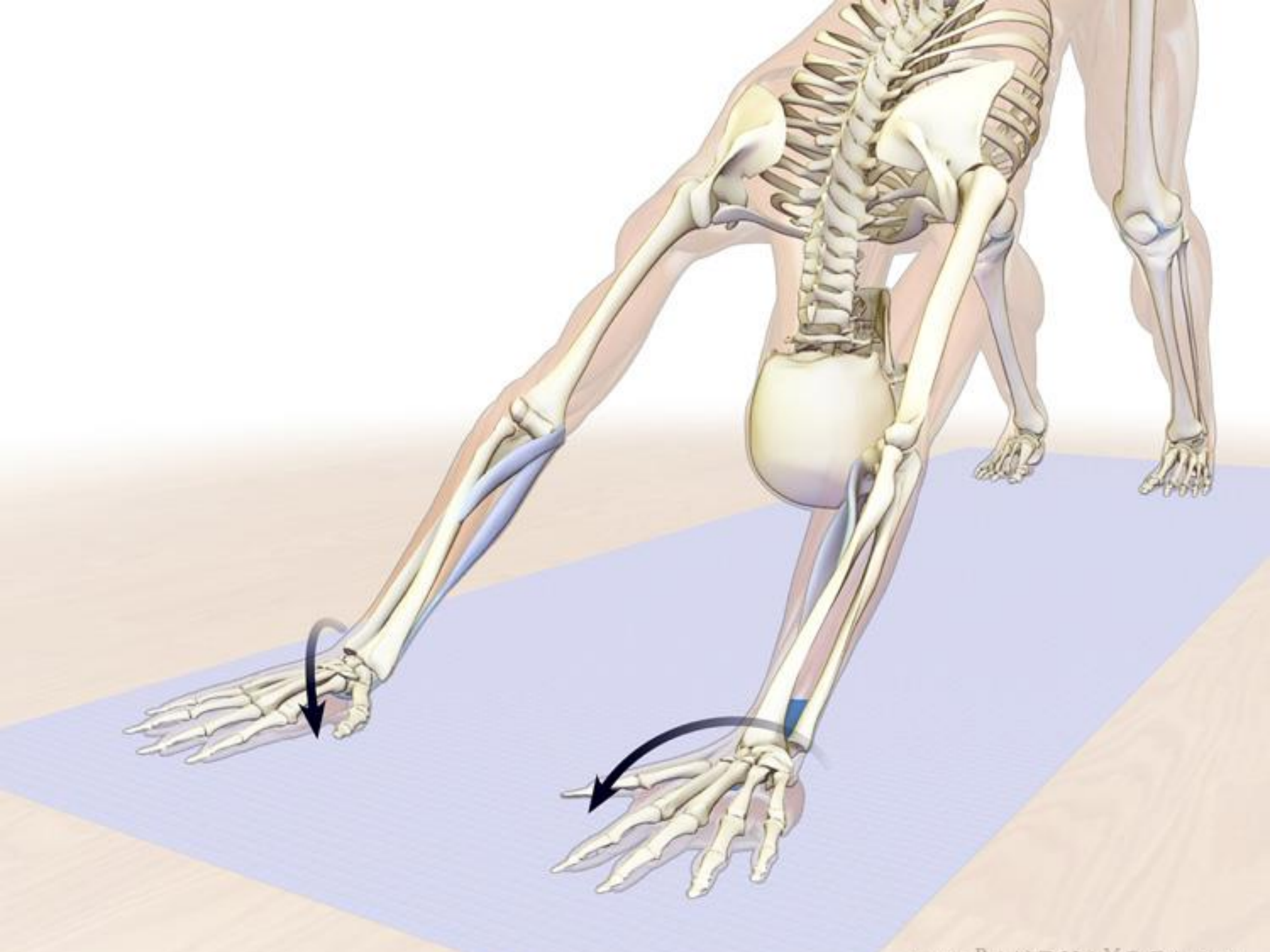
Scapula is placed on the back

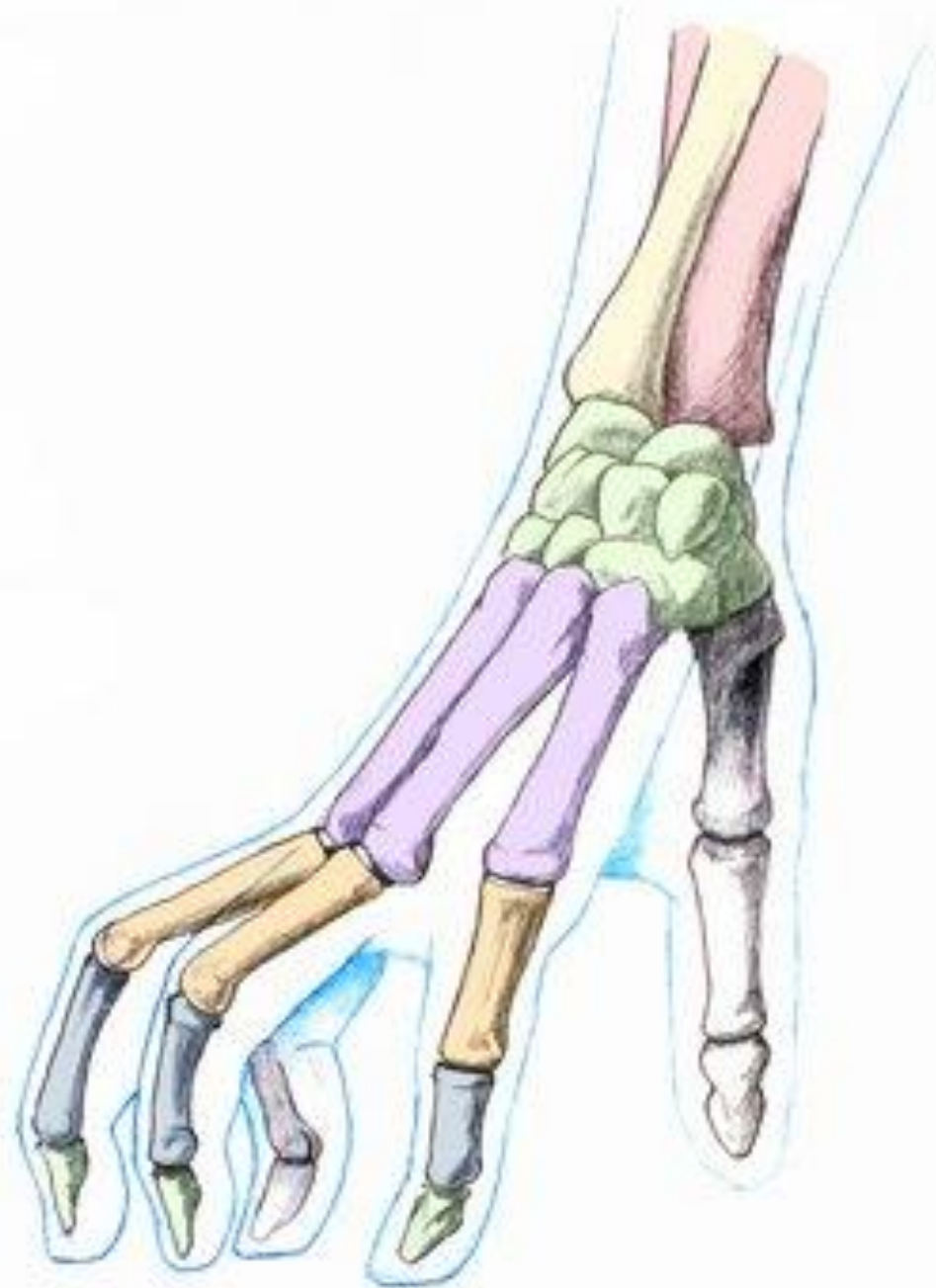
Clavicles are *short* and *horizontal*

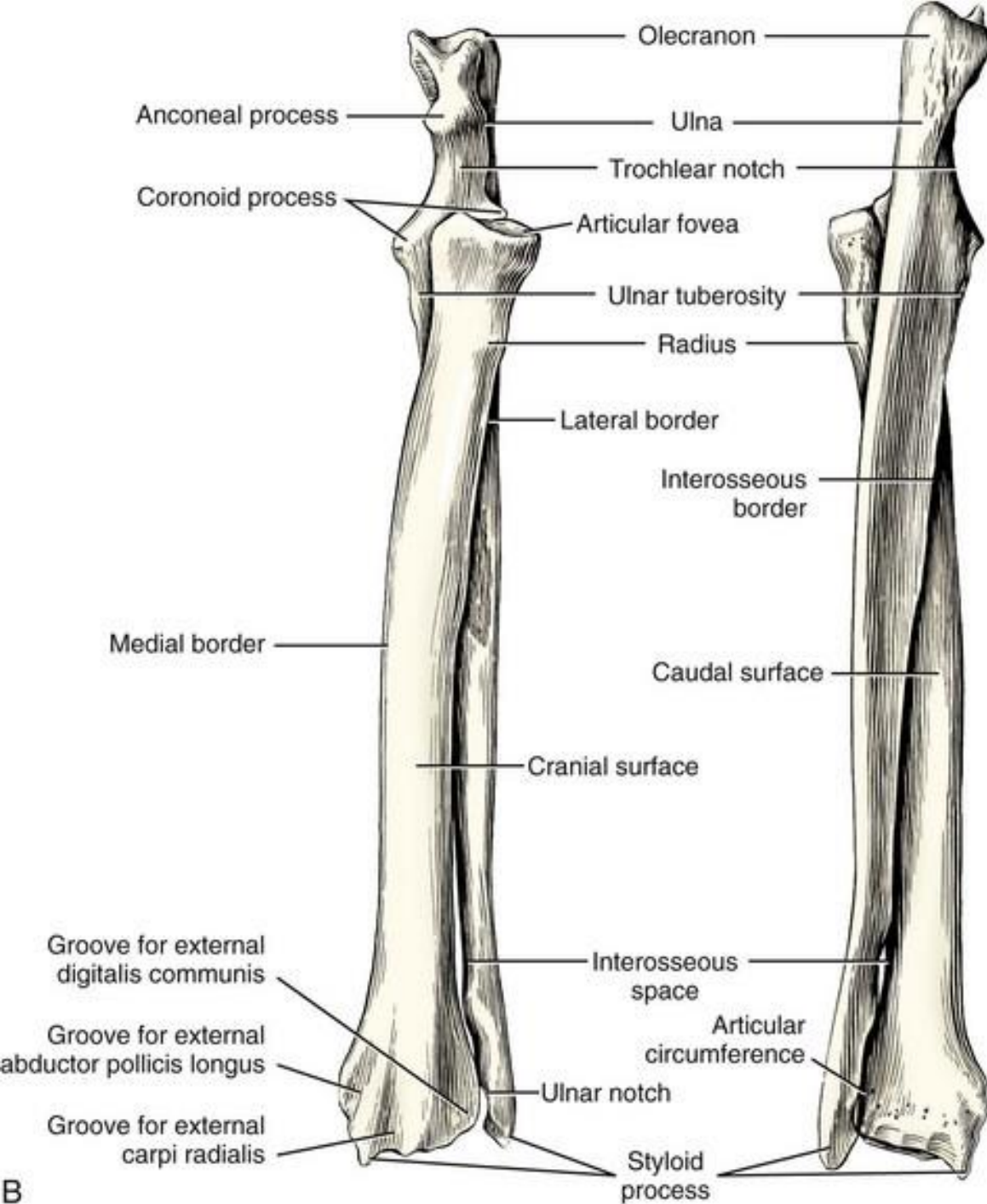
Humerus is placed on the side of our rib cage so we can pull our arms back to throw and run











Articulación Radio - Cubital



Palmar

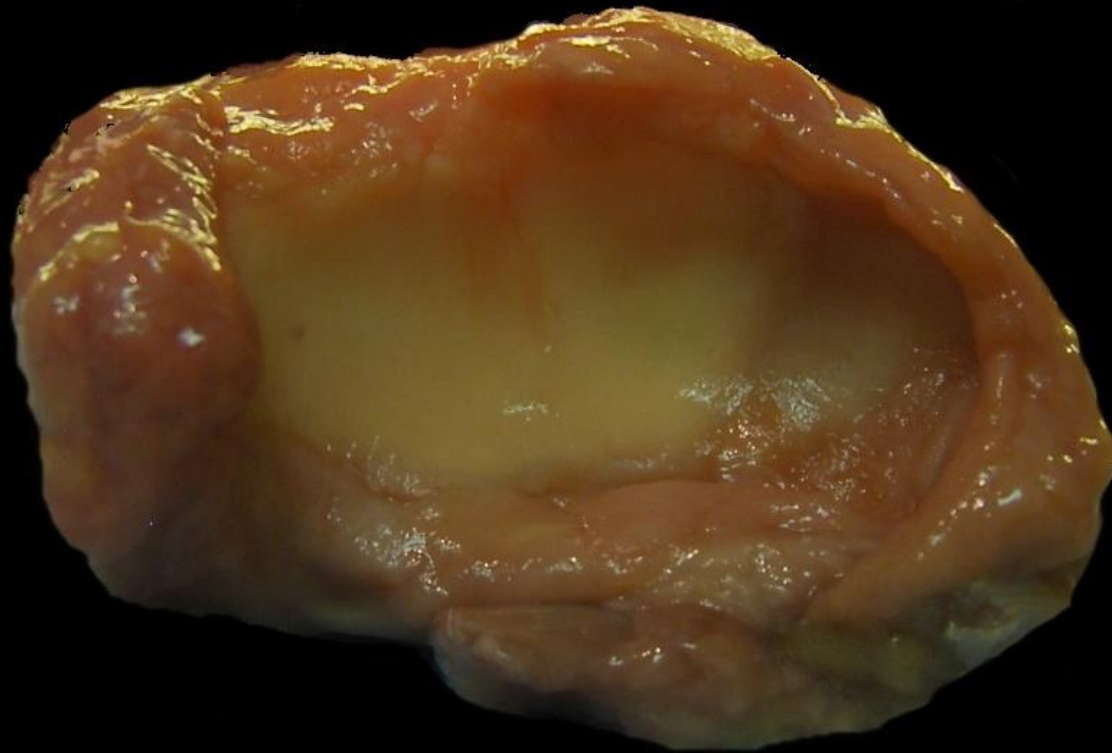
Dorsal

Articulación Radio cubital distal

Dorsal

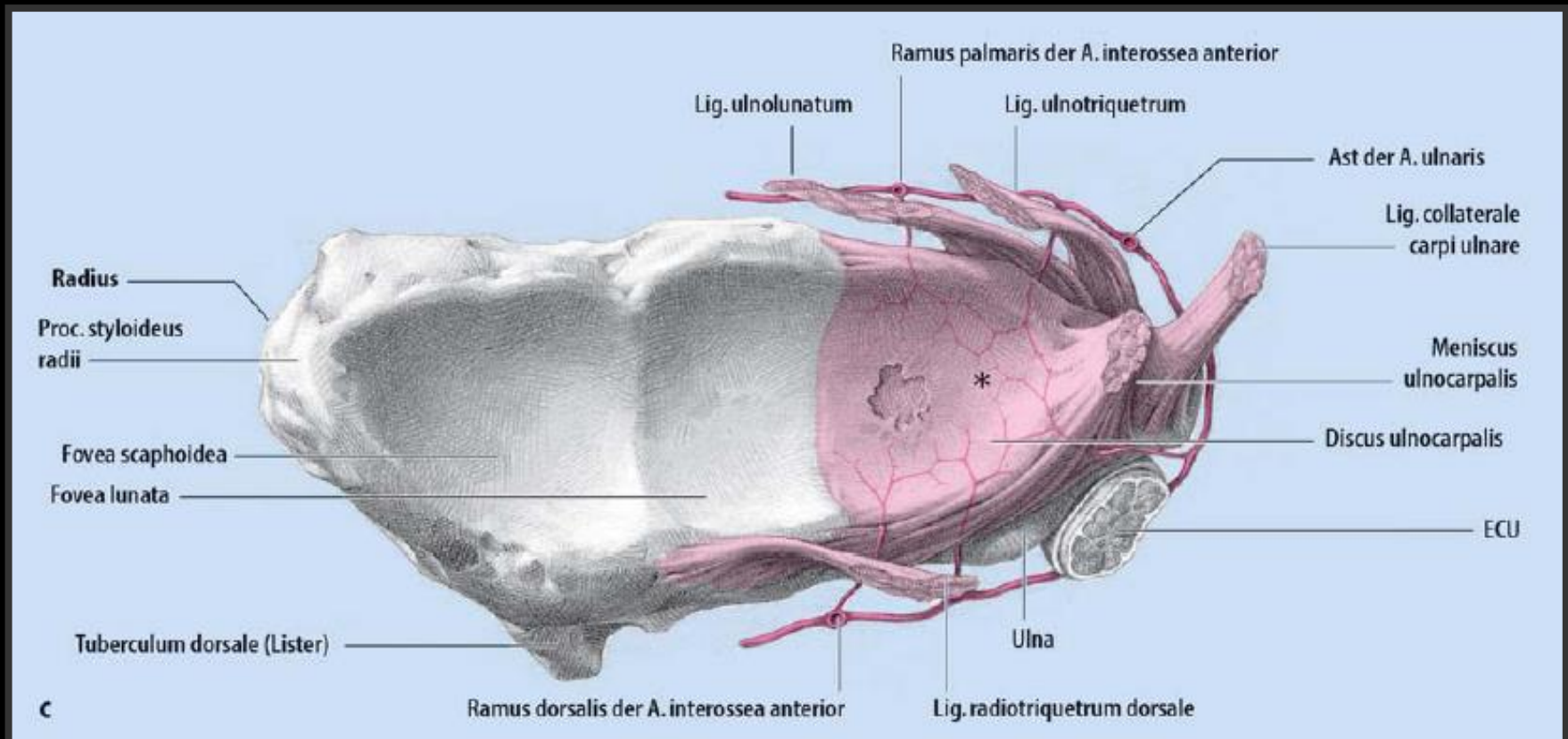
Radio

Cúbito



Palmar

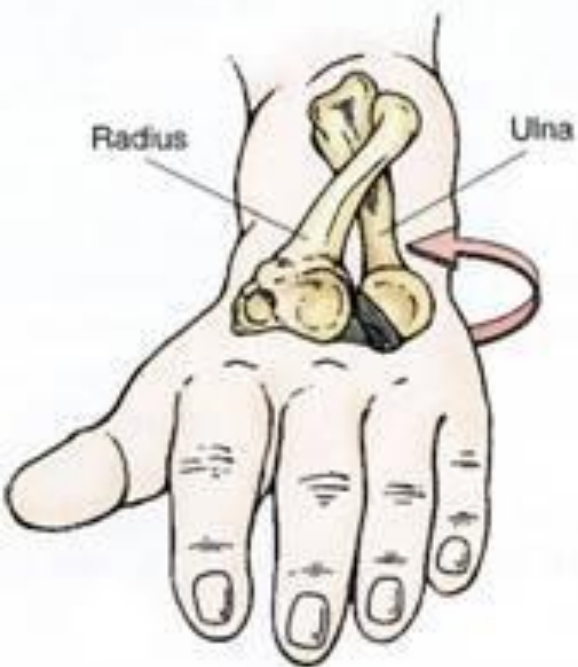
Fibrocartilago triangularis



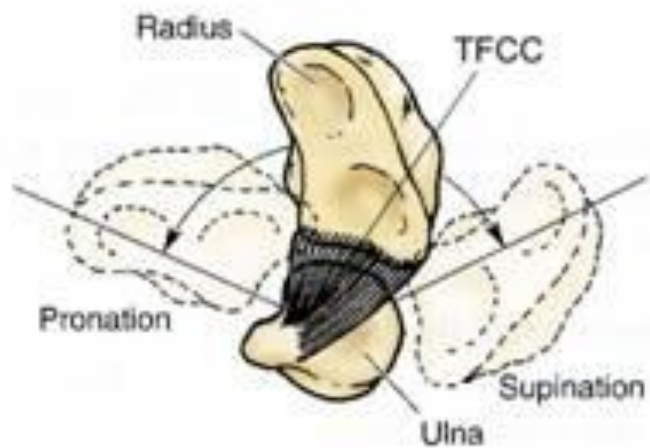




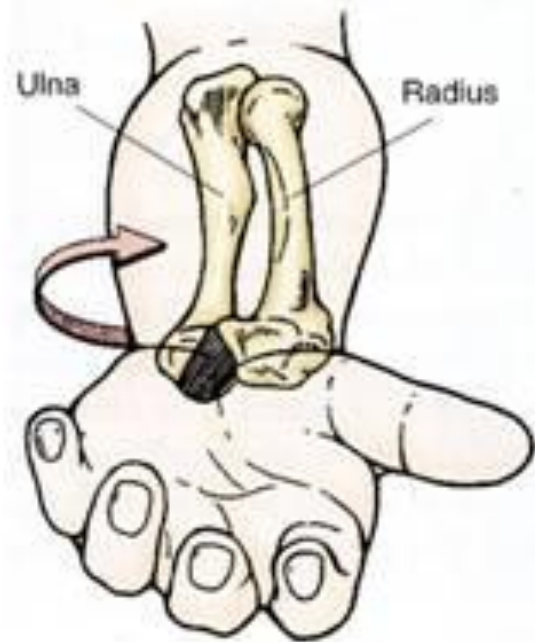




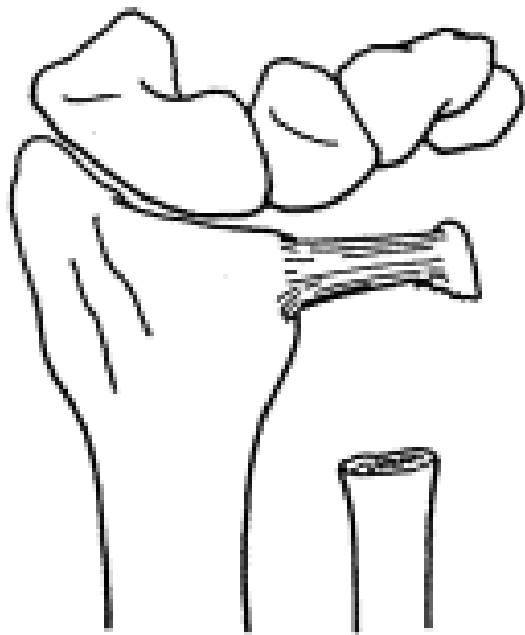
Pronation



Neutral Position

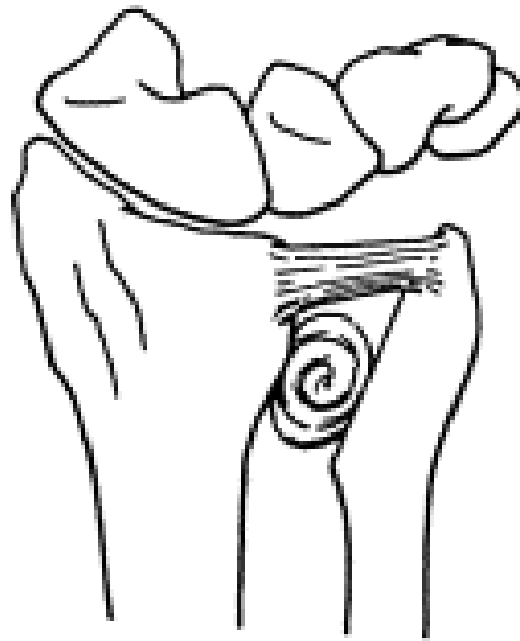


Supination



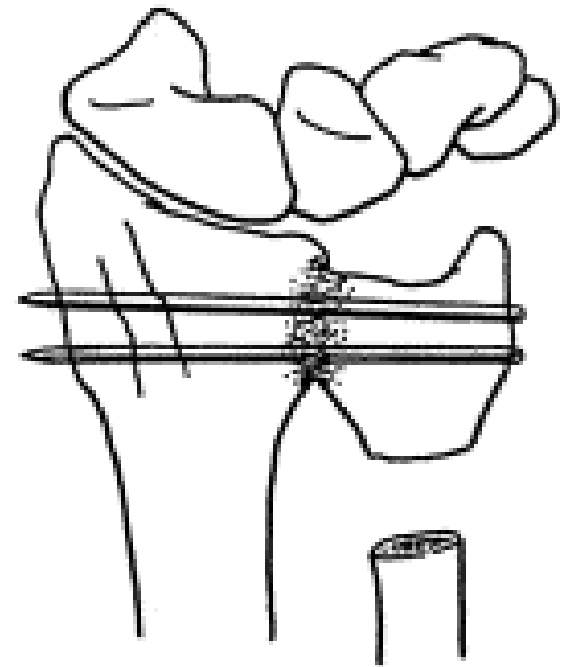
A
Darrach
resection

1912
Moore 1880
Lauenstein 1887



B
Hemiresection with
tendon interposition

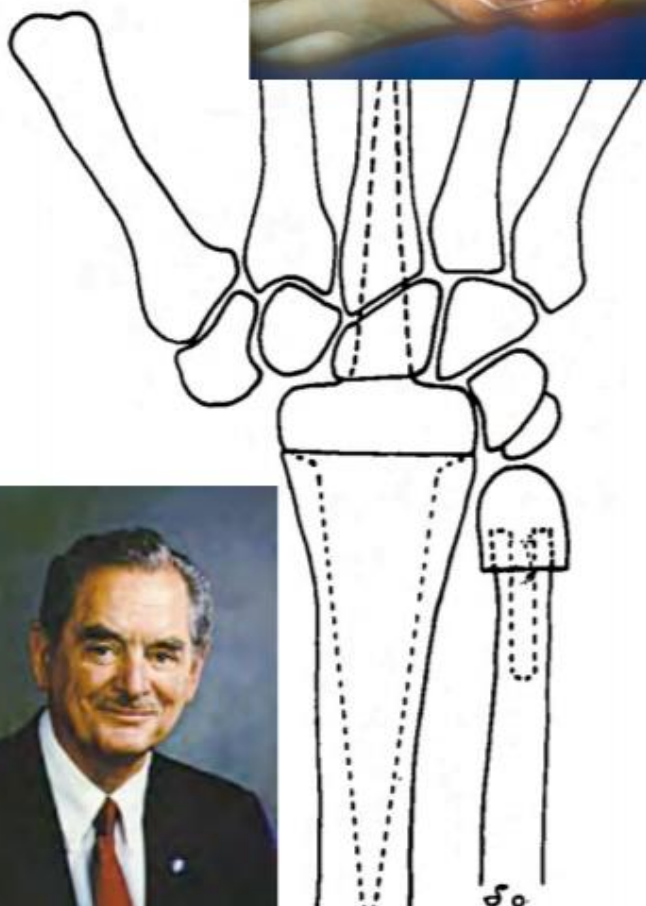
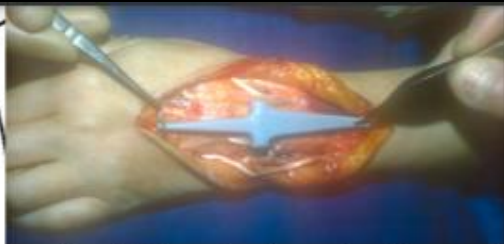
1985
Bowers



C
Sauve-Kapandji
procedure

1936

Swanson
1972



Weber
1995





Scheker
2001

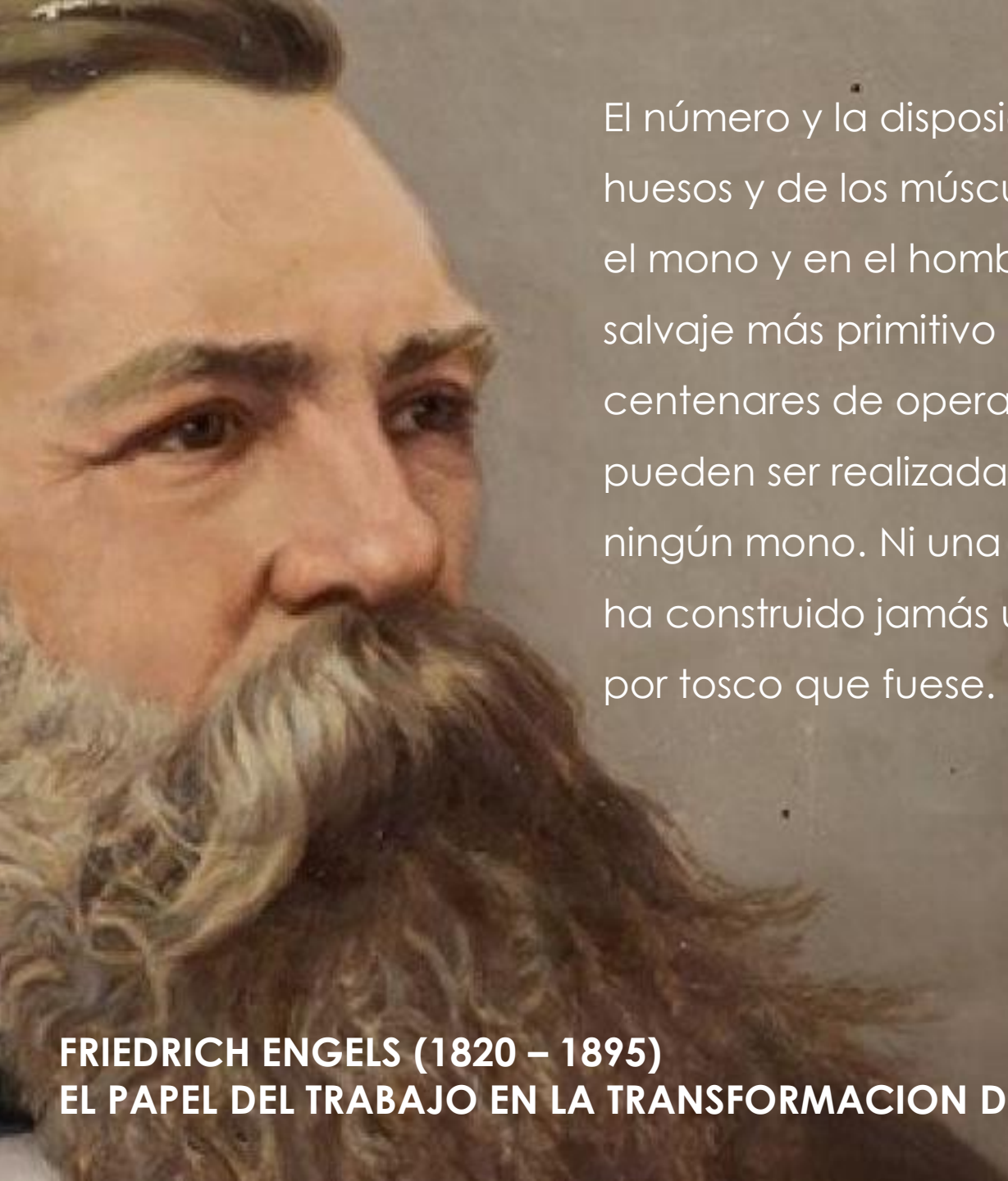


Ascension
2010









El número y la disposición general de los huesos y de los músculos son los mismos en el mono y en el hombre, pero la mano del salvaje más primitivo es capaz de ejecutar centenares de operaciones que no pueden ser realizadas por la mano de ningún mono. Ni una sola mano simiesca ha construido jamás un cuchillo de piedra, por tosco que fuese.

FRIEDRICH ENGELS (1820 – 1895)

EL PAPEL DEL TRABAJO EN LA TRANSFORMACION DEL MONO EN HOMBRE





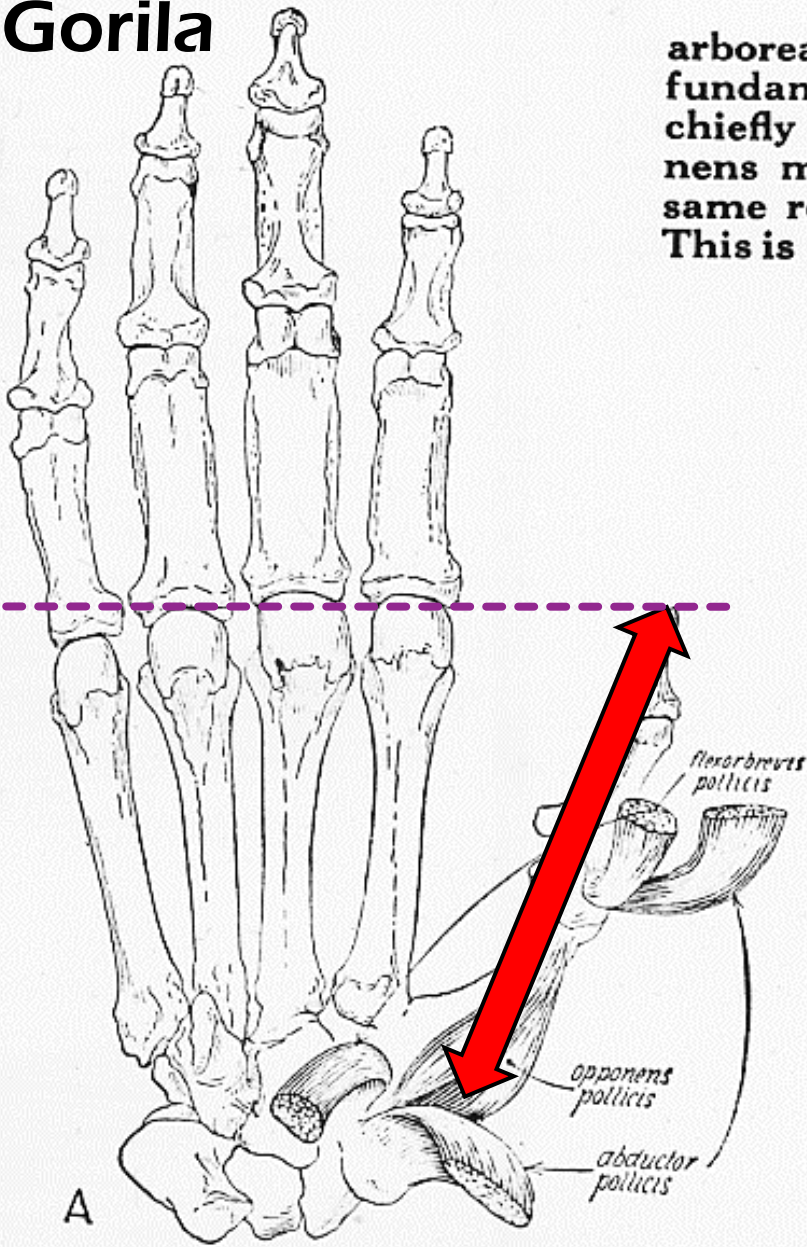


Pulgar

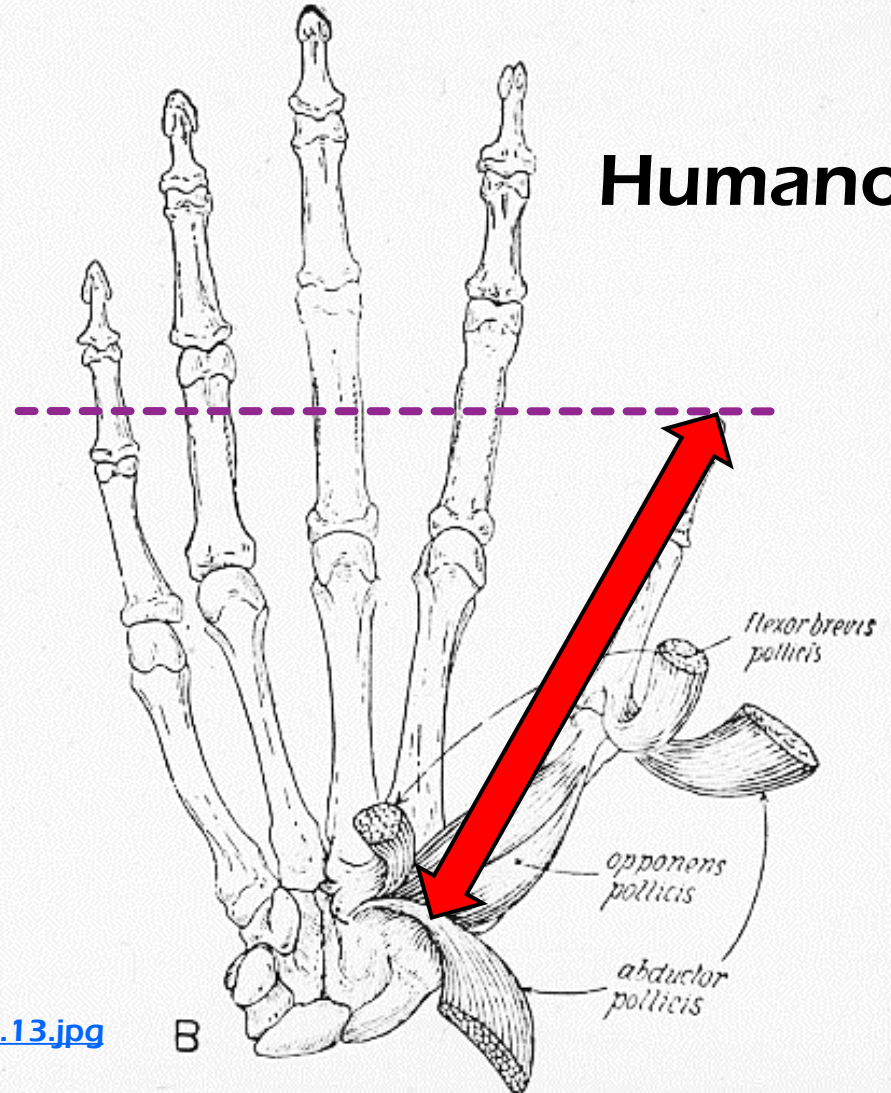
- ▣ Especialización en funciones finas de la mano
 - ▣ Pulgar oponible
 - ▣ FPL, permite mayor flexibilidad
 - ▣ Longitud relativa

Gorila

The testimony of man's hand as to his arboreal origin. Man's thumb, it will be seen, is fundamentally similar to that of the gorilla, differing chiefly in its relatively greater length. The opponens muscle is present in the gorilla and has the same relations to surrounding muscles as in man. This is shown in the drawings. (From Gregory, 1928)



Humano



The Original SINCE 2000 [®]
HANDWRENCH



Naomi Thellier (England)



Paul Julius (U.S.A)



(a) Transverse volar grip



(b) Spherical volar grip



(c) Lateral pinch



(d) Diagonal volar grip



(e) Extension grip



(f) Tripod grip



(g) Five finger pinch



(h) Pulp pinch

Articulación Trapezio metacarpiana

- ▶ Articulación BICÓNCAVO CONVEXA
 - ▶ Silla de montar

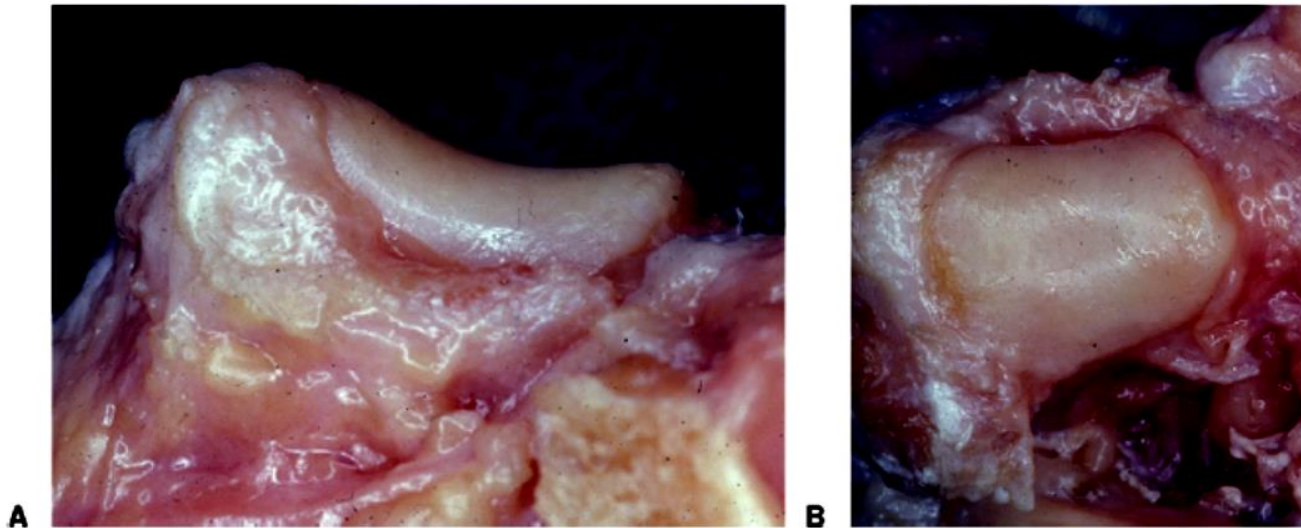
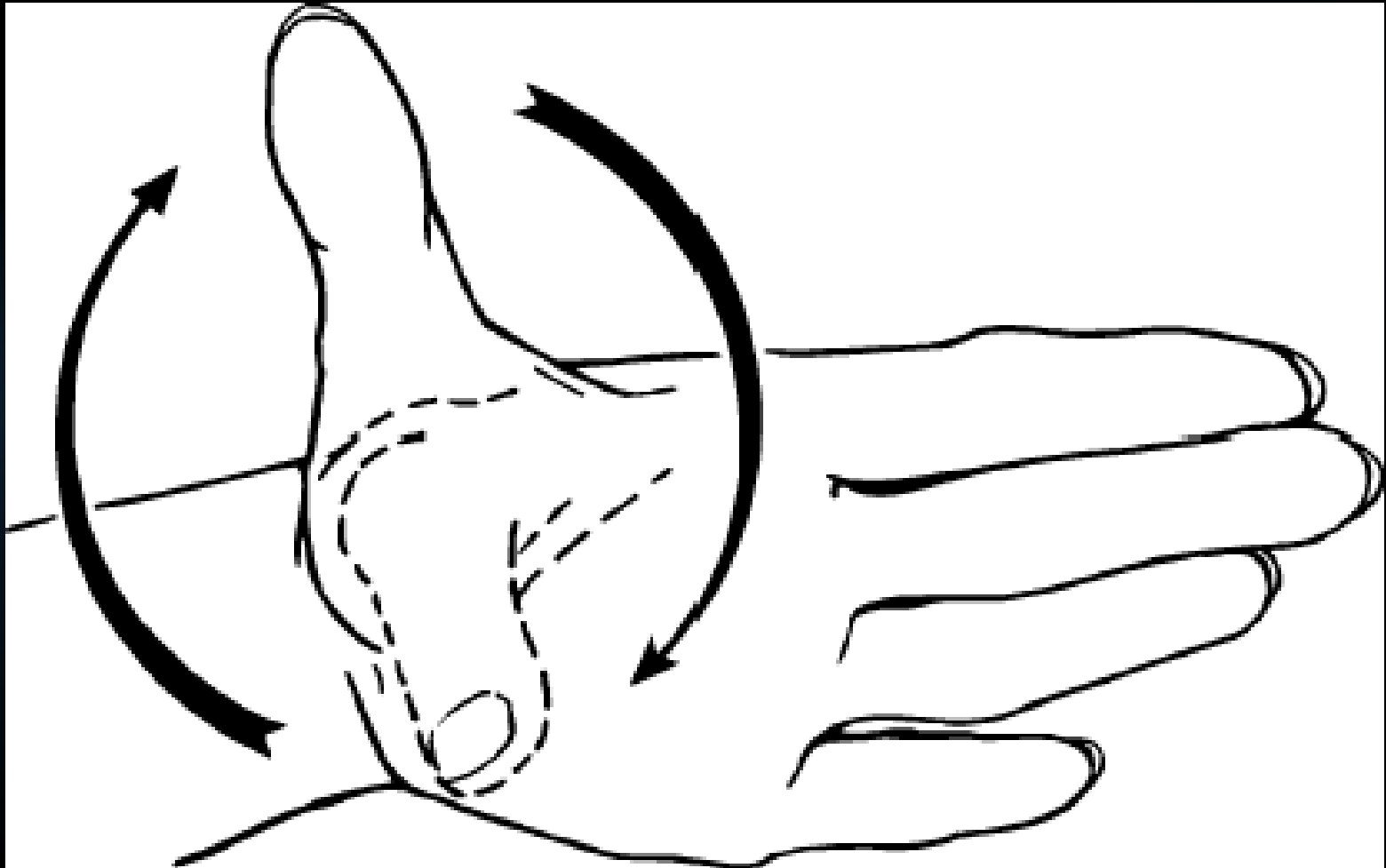


FIGURE 4: Concavoconvexity of trapezium, analogous to a saddle. **A, B** The TM articular surface of the trapezium is seen, with the thumb metacarpal removed. **A** Its concavity is seen from the side, as on an anteroposterior x-ray view. **B** The convexity of the trapezium is seen from the thumb metacarpal side. Reprinted from Edmunds JO. Traumatic dislocations and instability of the trapeziometacarpal joint of the thumb. *Hand Clinics* 2006;22:365–392, with permission from Elsevier.

Articulación

Trapezio metacarpiana



Ligamentos

- ▶ 7 Ligamentos
 - ▶ 2 Carpometacarpianos DORSALES
 - ▶ Dorsoradial
 - ▶ Posterior Oblicuo

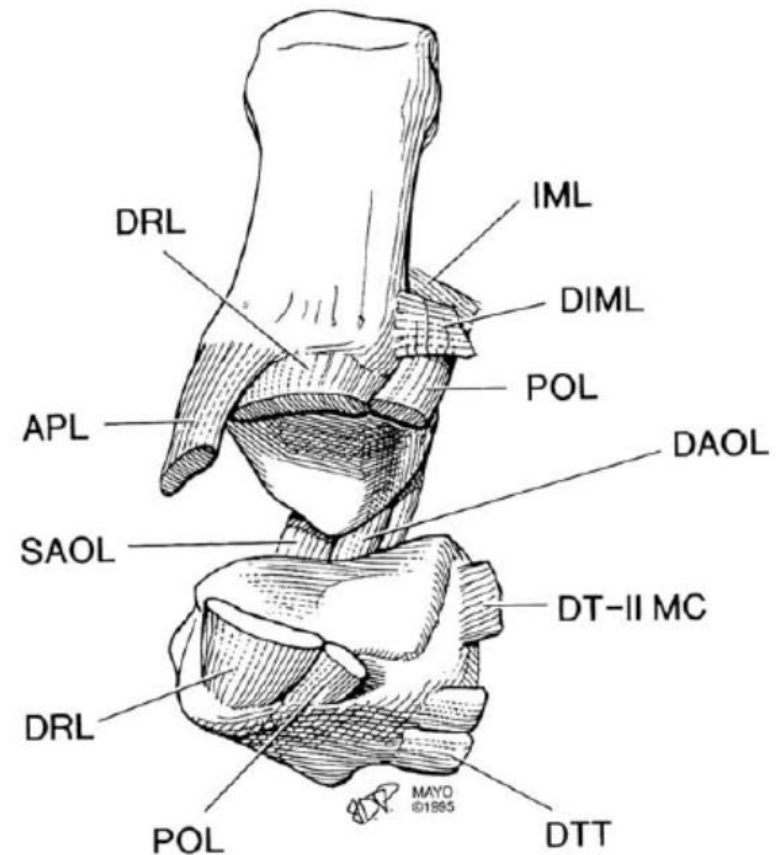


Fig. 10. Diagram of the trapezio-metacarpal joint showing the outlay of the dorsal and volar ligaments. Special attention must be given to preservation of this joint for adequate thumb stability. The most important ligaments for reconstruction and preservation are the dorsal radial ligament (DRL), posterior oblique ligament (POL), ulnar collateral ligament (not depicted), first intermetacarpal ligament (IML), and the anterior oblique ligament, deep and superficial heads (DAOL and SAOL). APL = abductor pollicis longus; DIML = dorsal intermetacarpal ligament; DT-II MC = dorsal trapezio-II metacarpal; DTT = dorsal trapeziotrapezoid.

Ligamentos

- ▶ 7 Ligamentos
 - ▶ 2 Carpometacarpianos DORSALES
 - ▶ **Dorsoradial**
 - ▶ Posterior Oblicuo

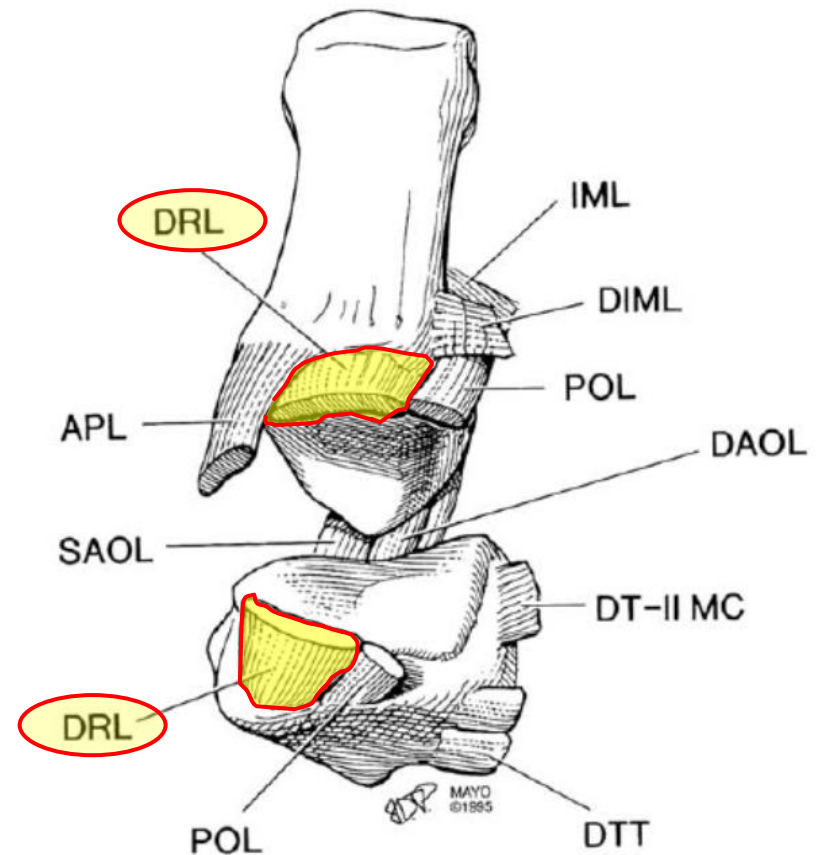
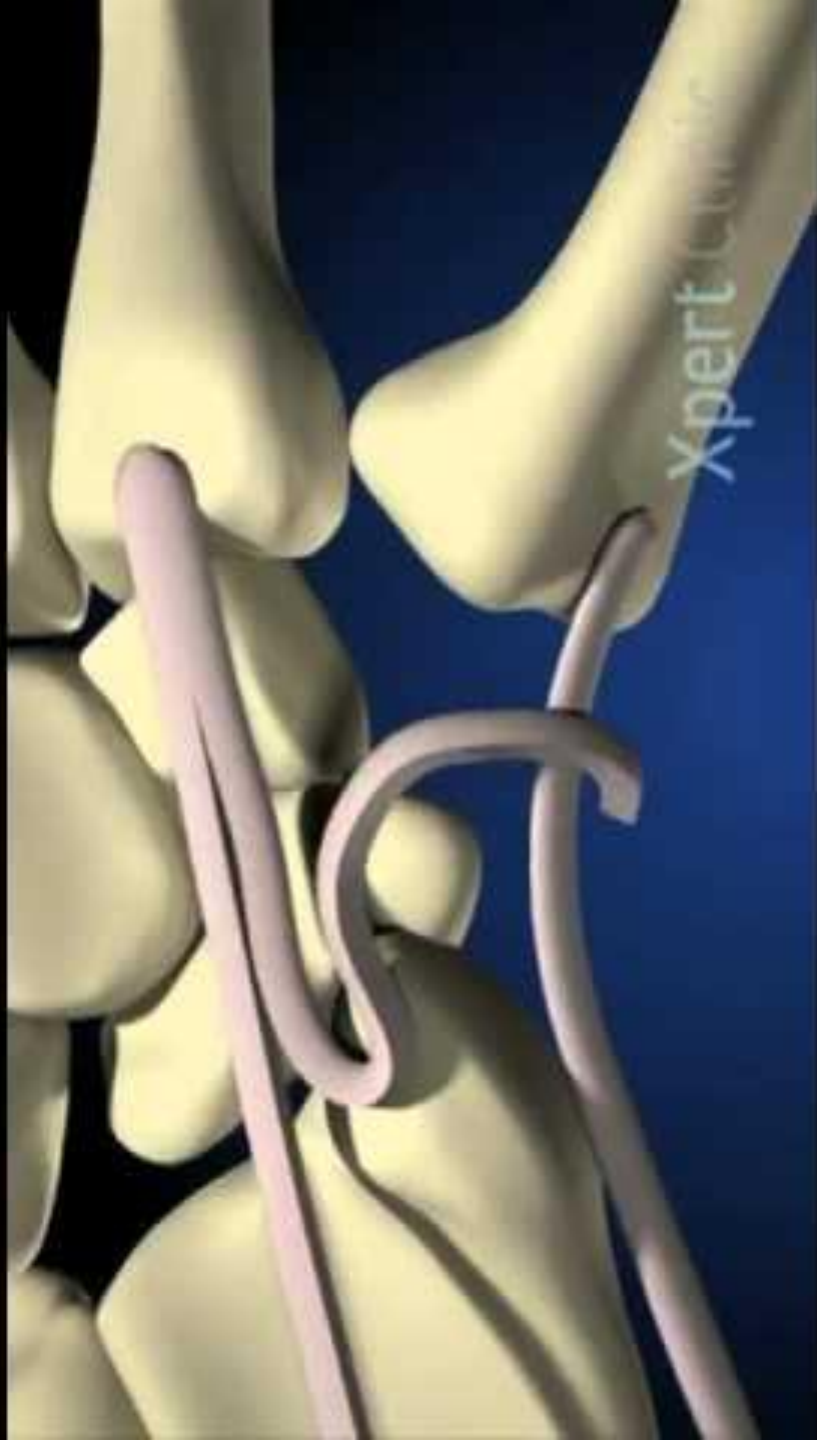


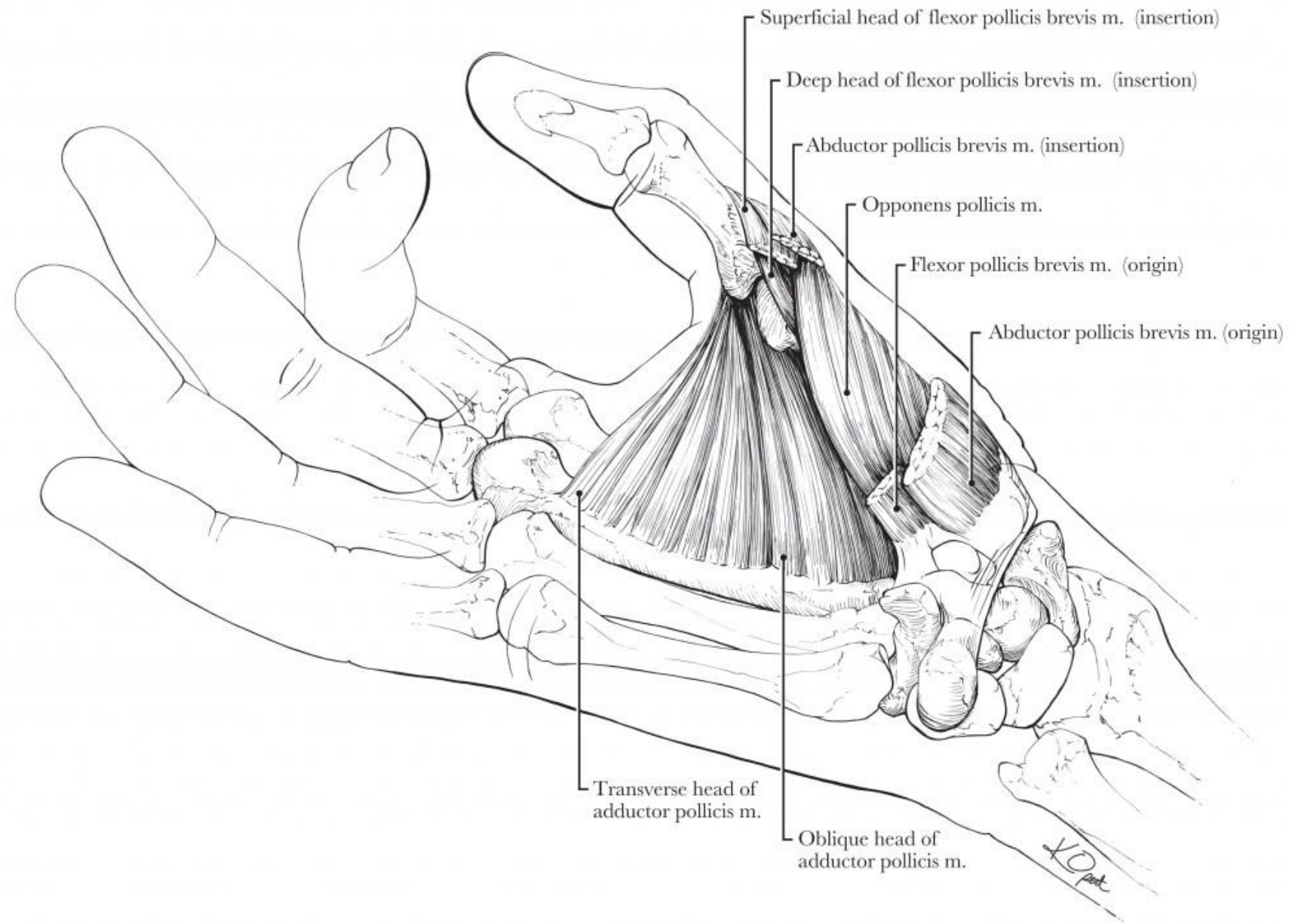
Fig. 10. Diagram of the trapezio-metacarpal joint showing the outlay of the dorsal and volar ligaments. Special attention must be given to preservation of this joint for adequate thumb stability. The most important ligaments for reconstruction and preservation are the dorsal radial ligament (DRL), posterior oblique ligament (POL), ulnar collateral ligament (not depicted), first intermetacarpal ligament (IML), and the anterior oblique ligament, deep and superficial heads (DAOL and SAOL). APL = abductor pollicis longus; DIML = dorsal intermetacarpal ligament; DT-II MC = dorsal trapezio-II metacarpal; DTT = dorsal trapeziotrapezoid.



a

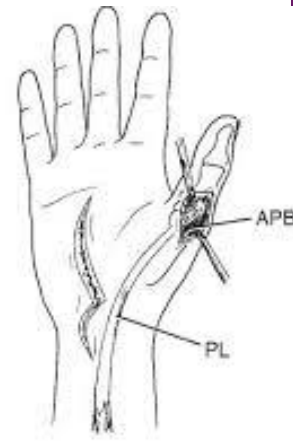
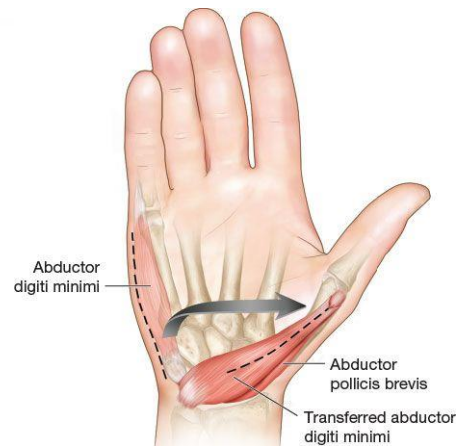
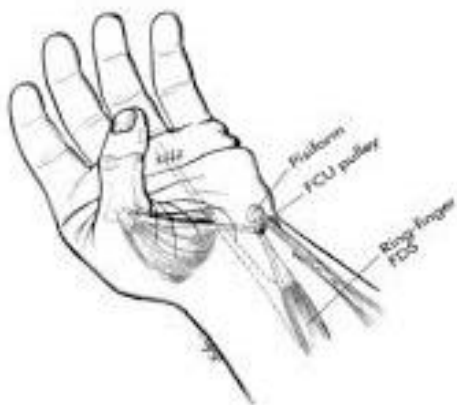
b

Muscles of Thumb Opposition



Oponentoplastia

- ▣ Flexor Superficial de los dedos (III o IV)
- ▣ Extensor Indicis Propius
- ▣ Palmaris Longus (Camitz)
- ▣ Abductor Digiti Minimi (Huber)



Poleas

- ▣ Bunnell: polea en pisiforme
- ▣ Distales al pisiforme hacen más flexión que abducción
- ▣ Proximales al pisiforme más abducción y menos flexión.
- ▣ PL mejor abducción, pobre flexión y además es débil

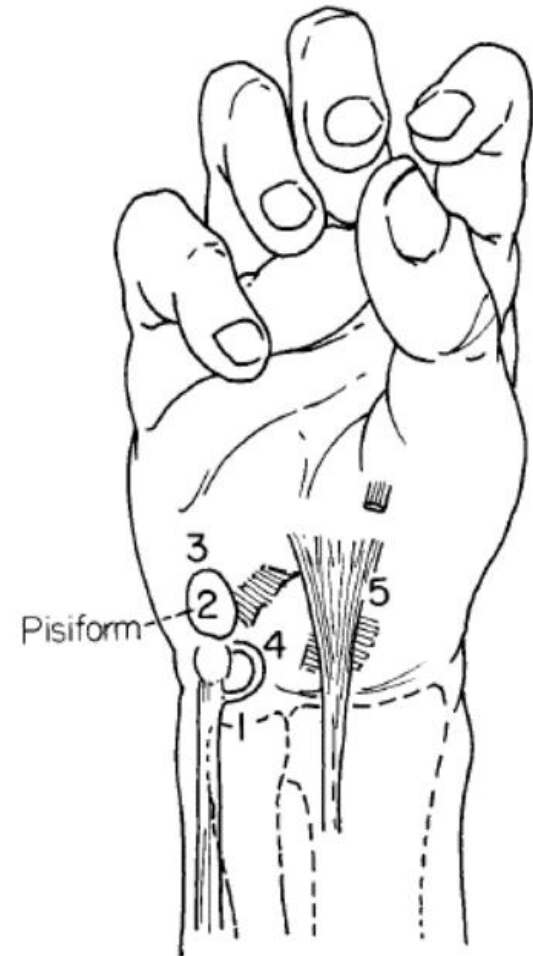
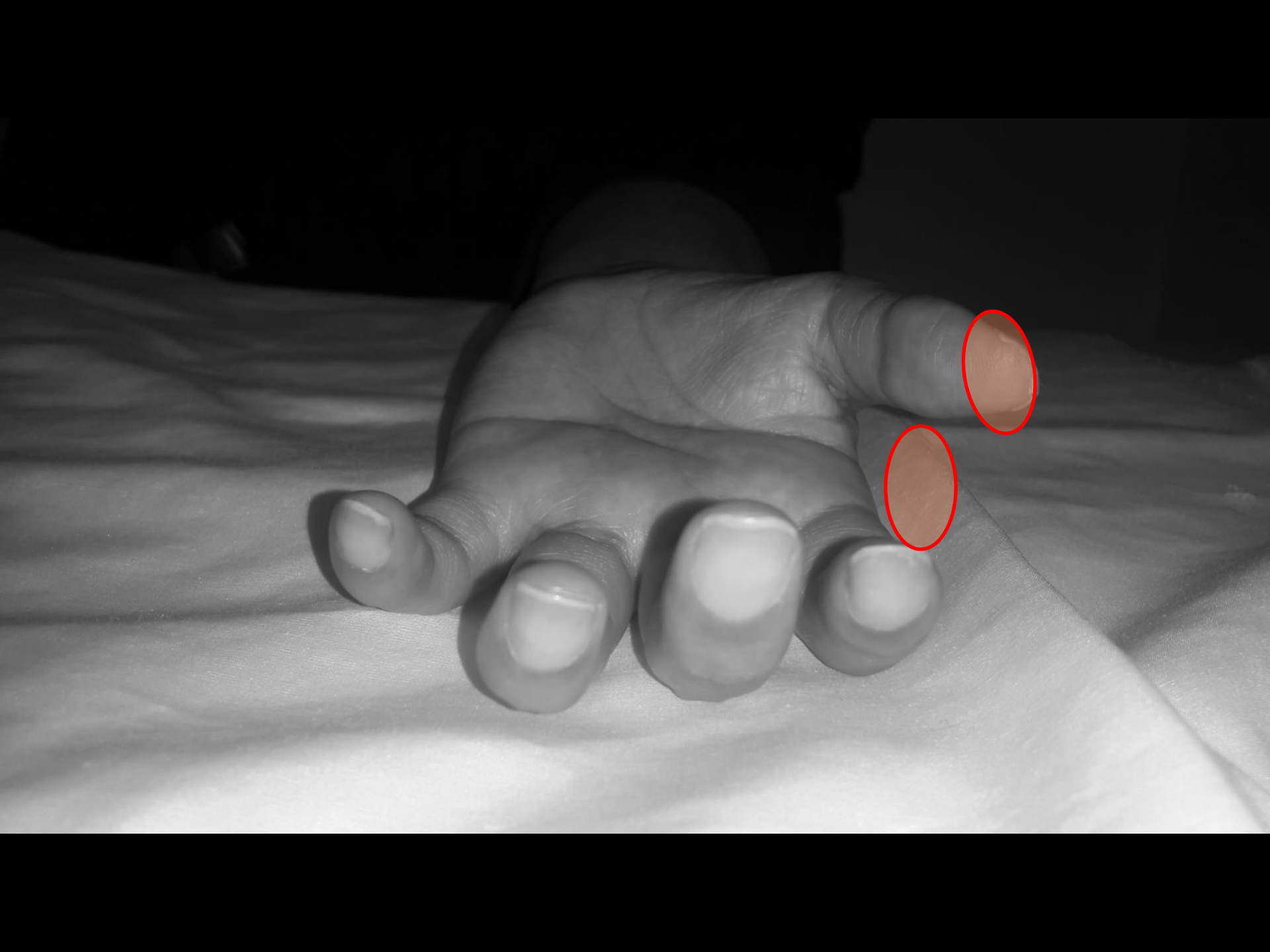
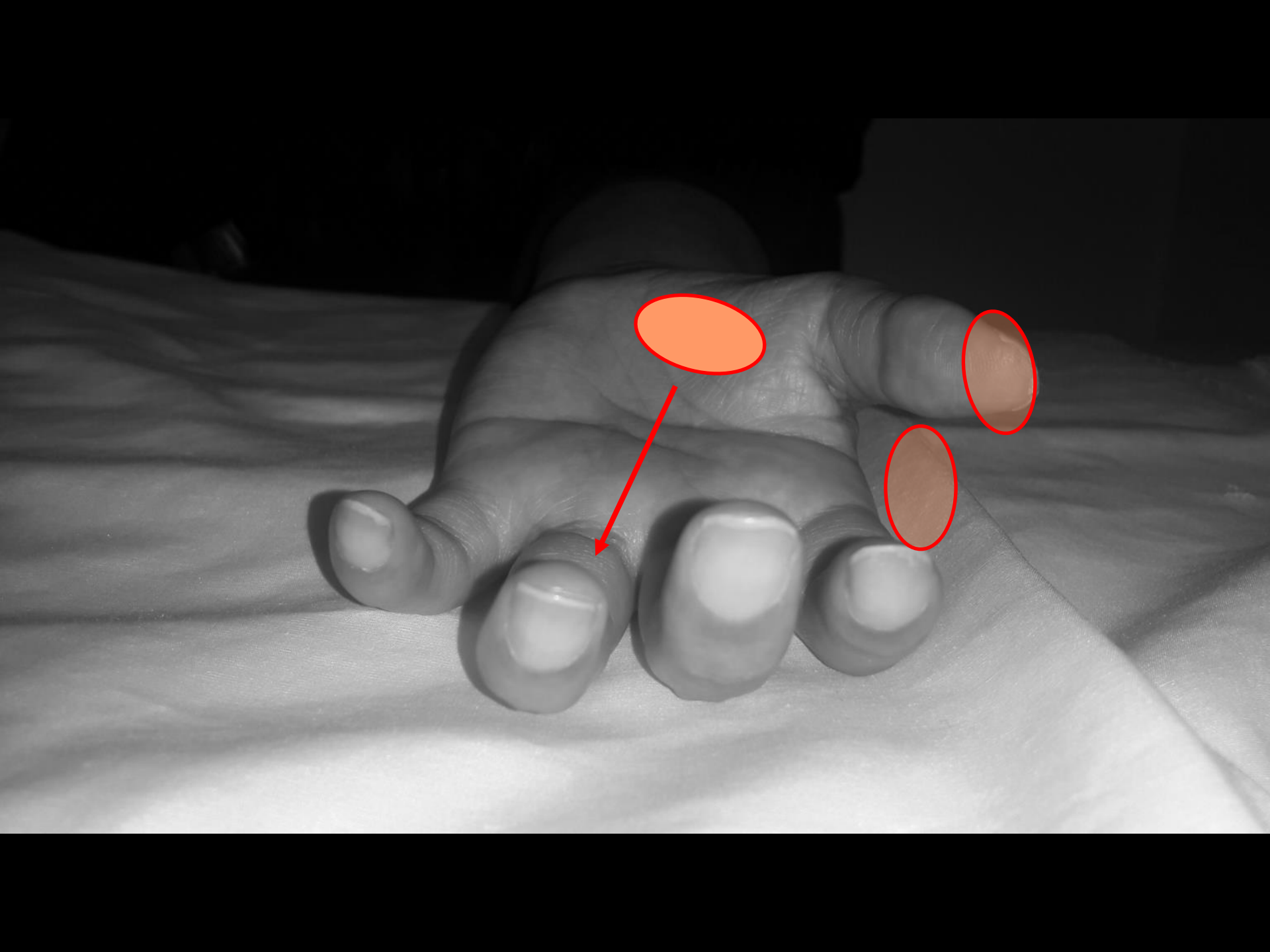
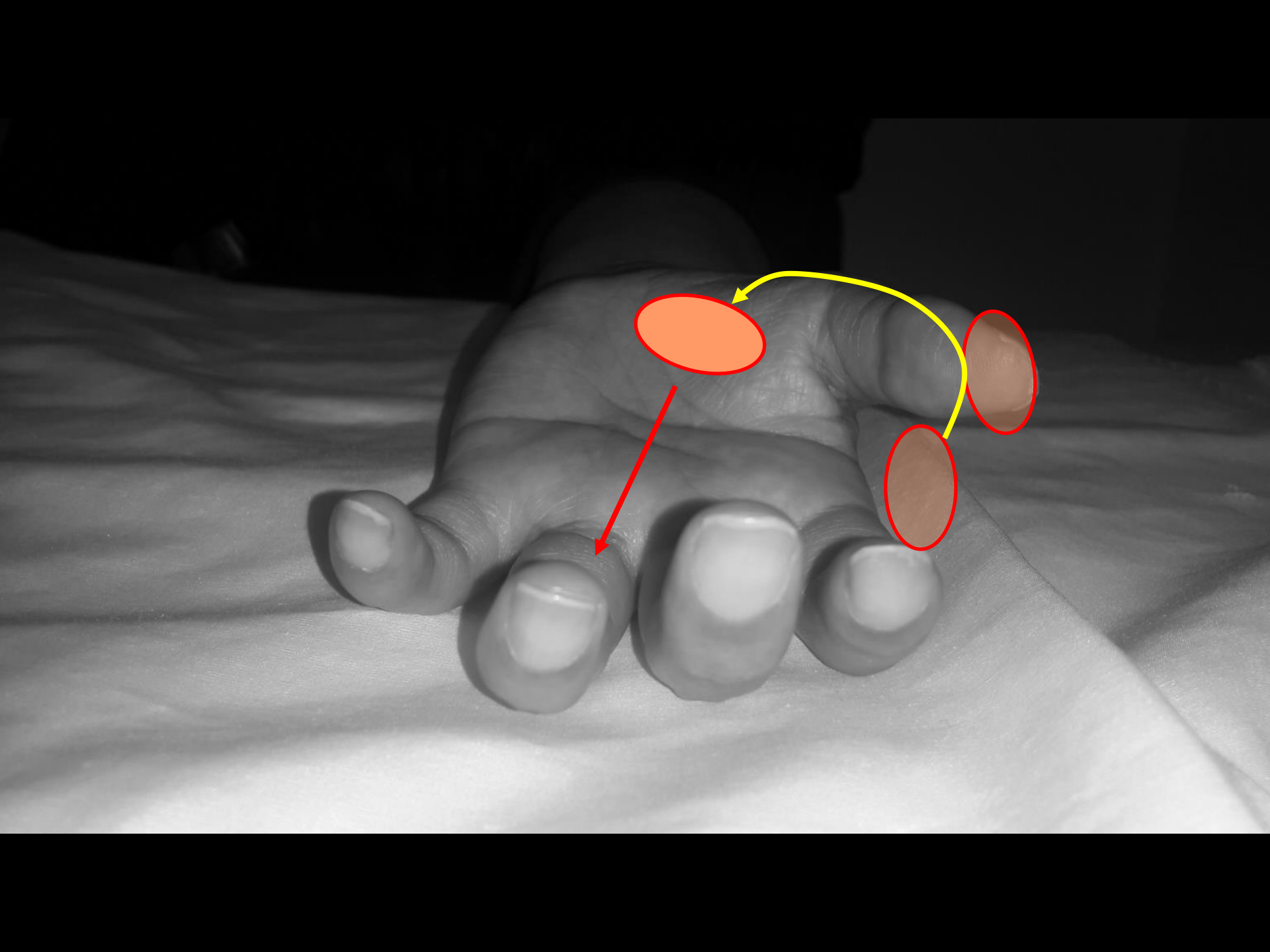
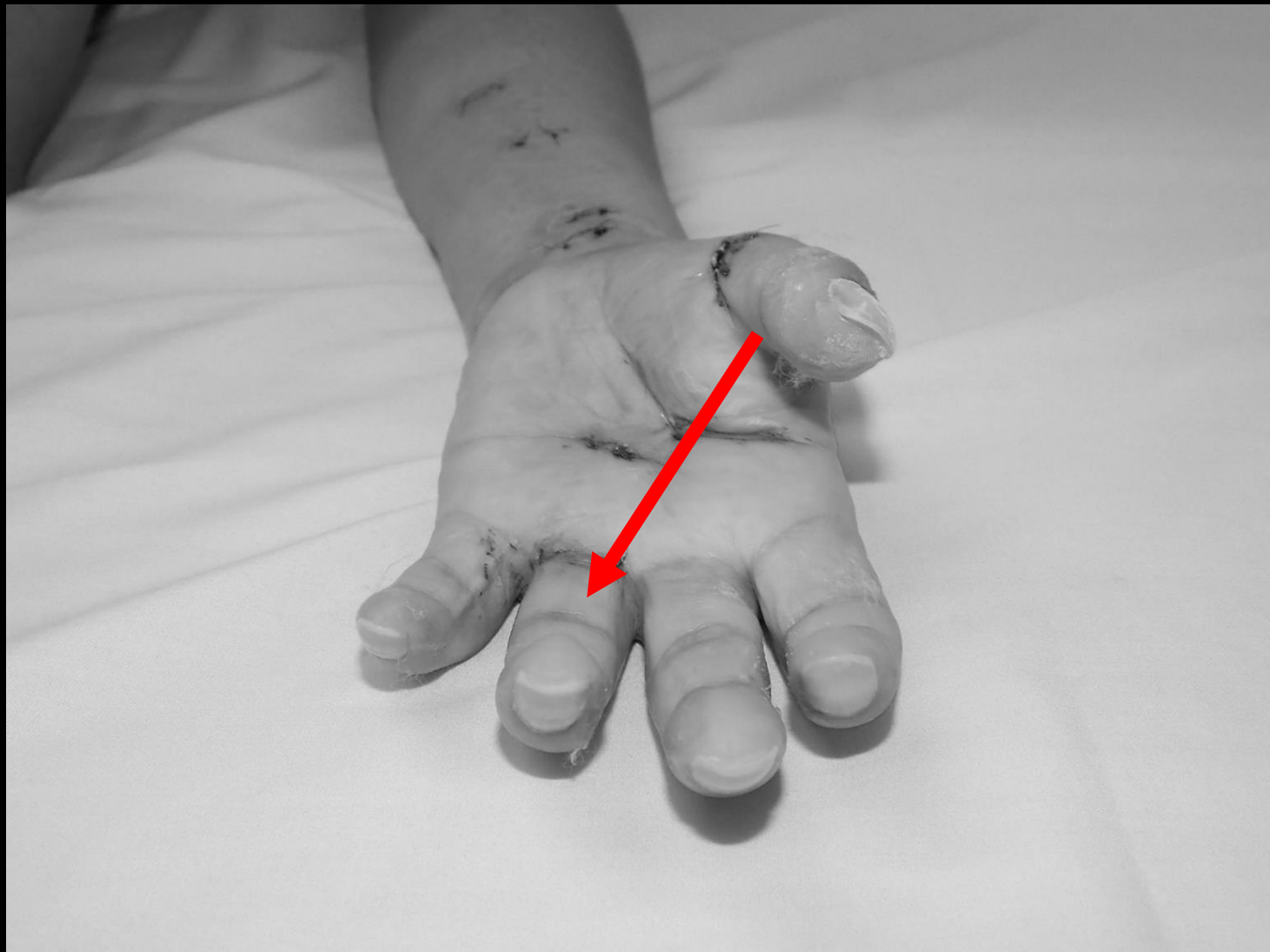


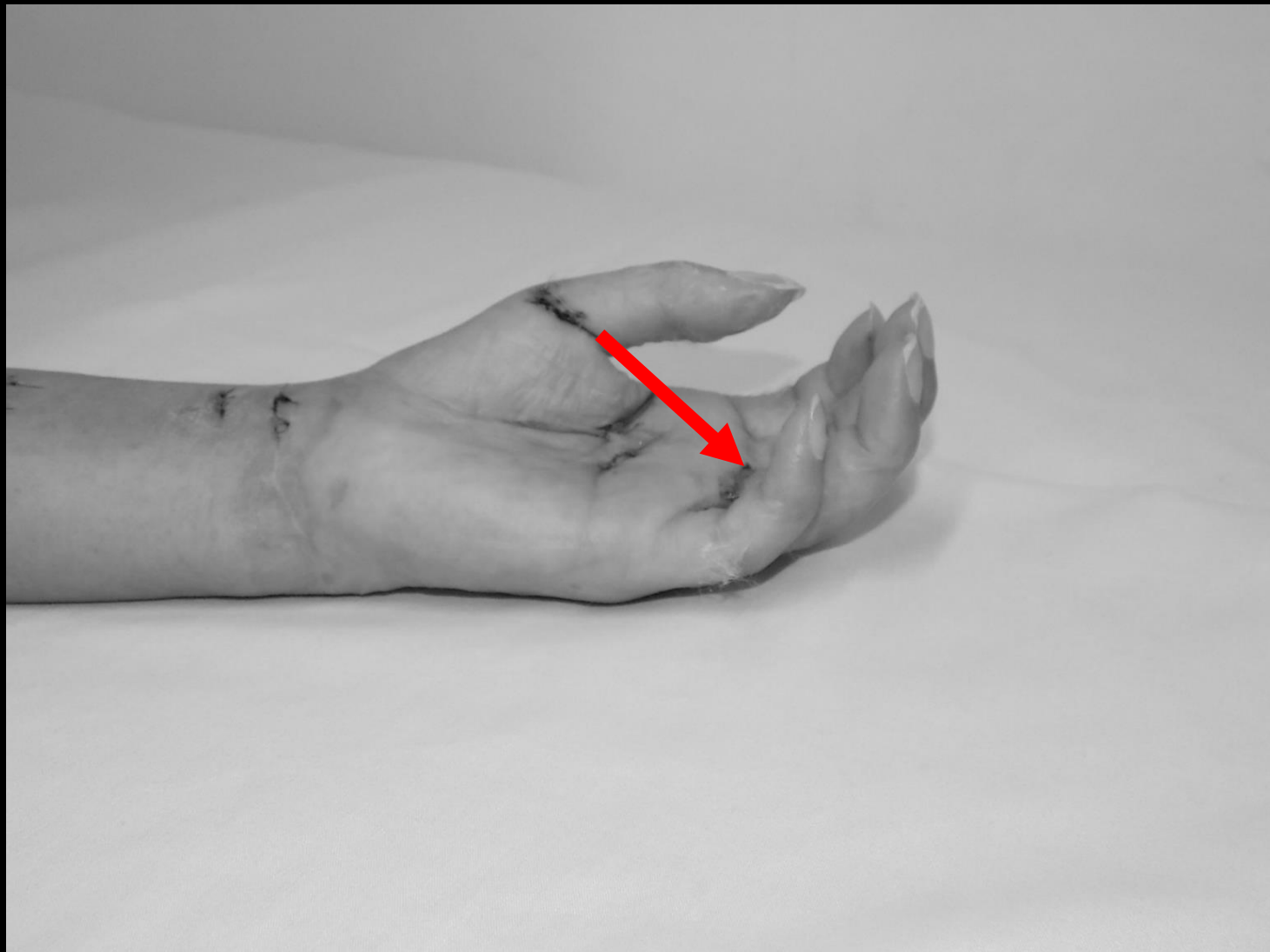
Fig. 3. Pulley placement for tendon transfers: 1, proximal to pisiform (ECRL, ECU); 2, rotated on pisiform (ADQ); 3, distal to pisiform (EIP); 4, tendon loop of FCU; and 5, carpal tunnel of palmaris longus fascia.

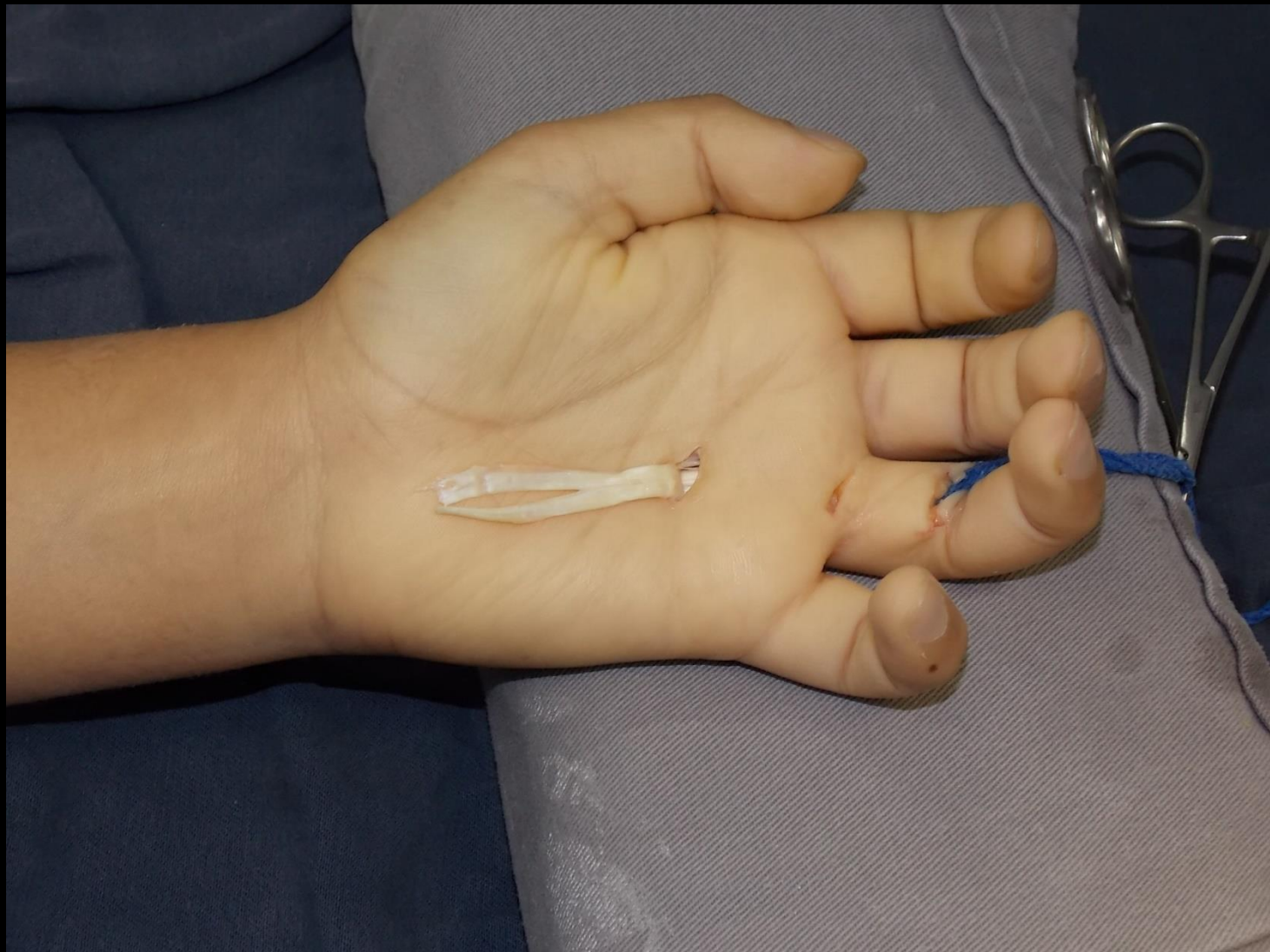






























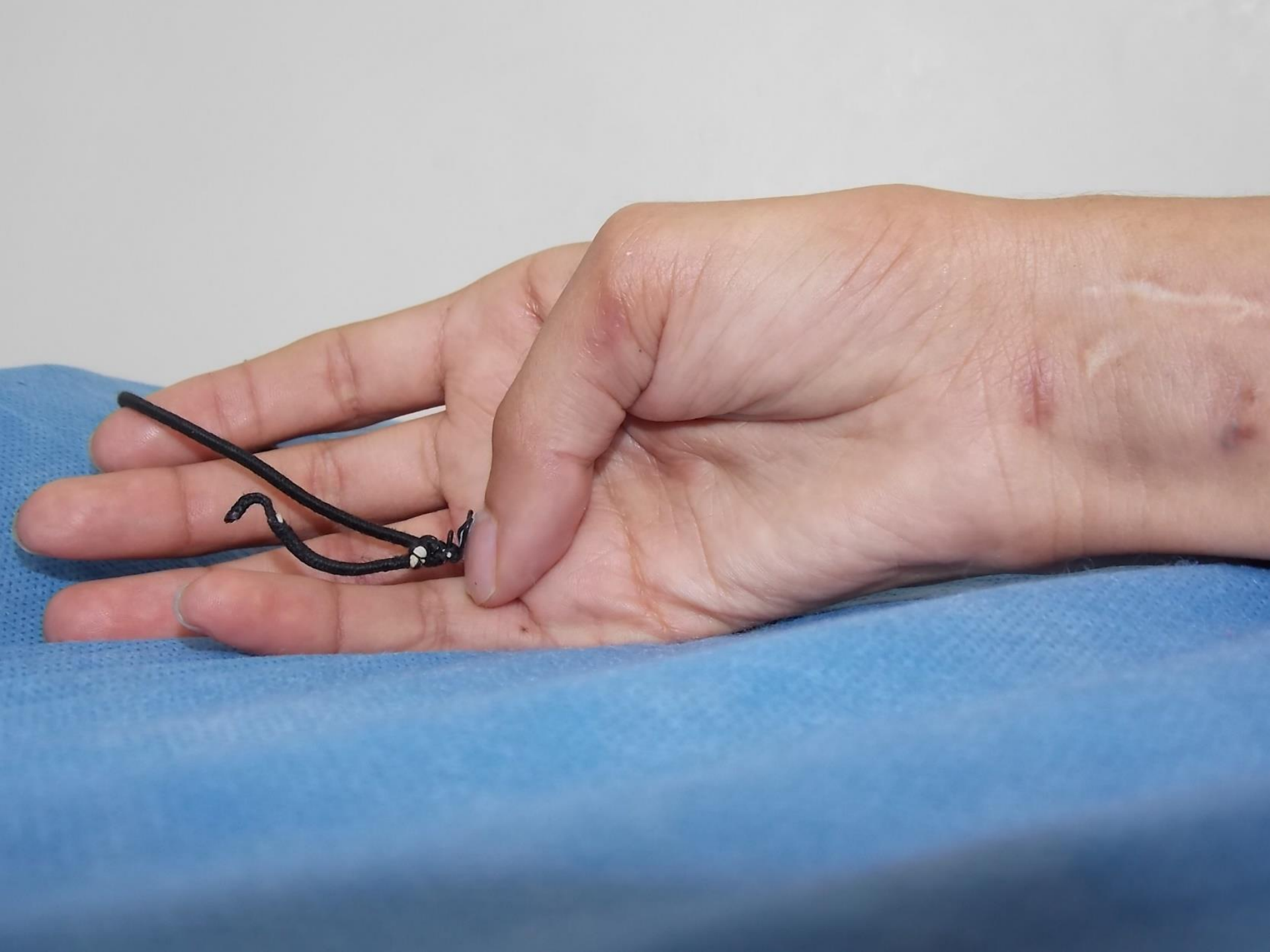




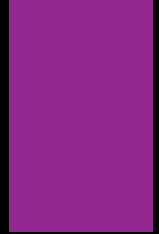








Primera Comisura









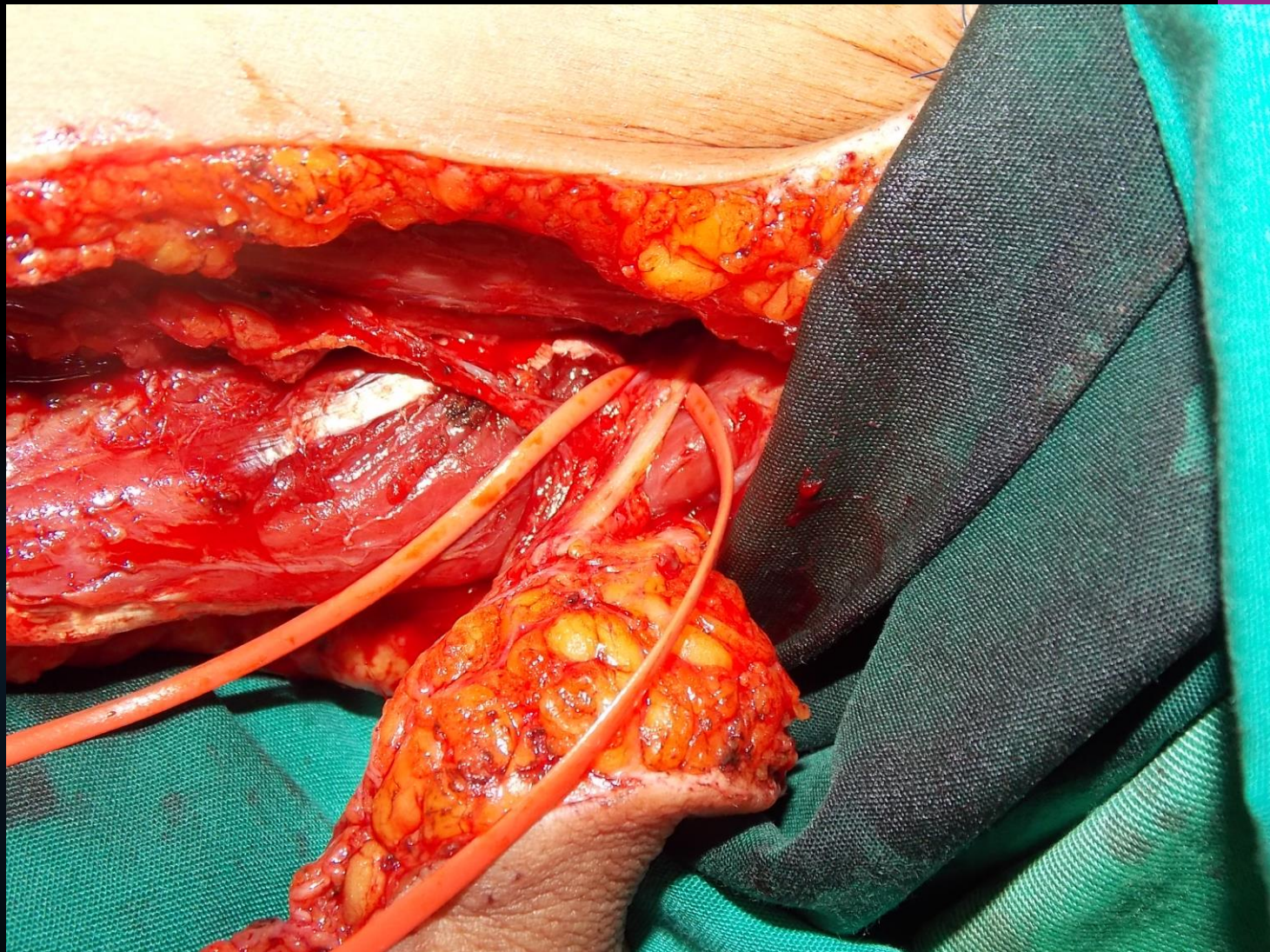


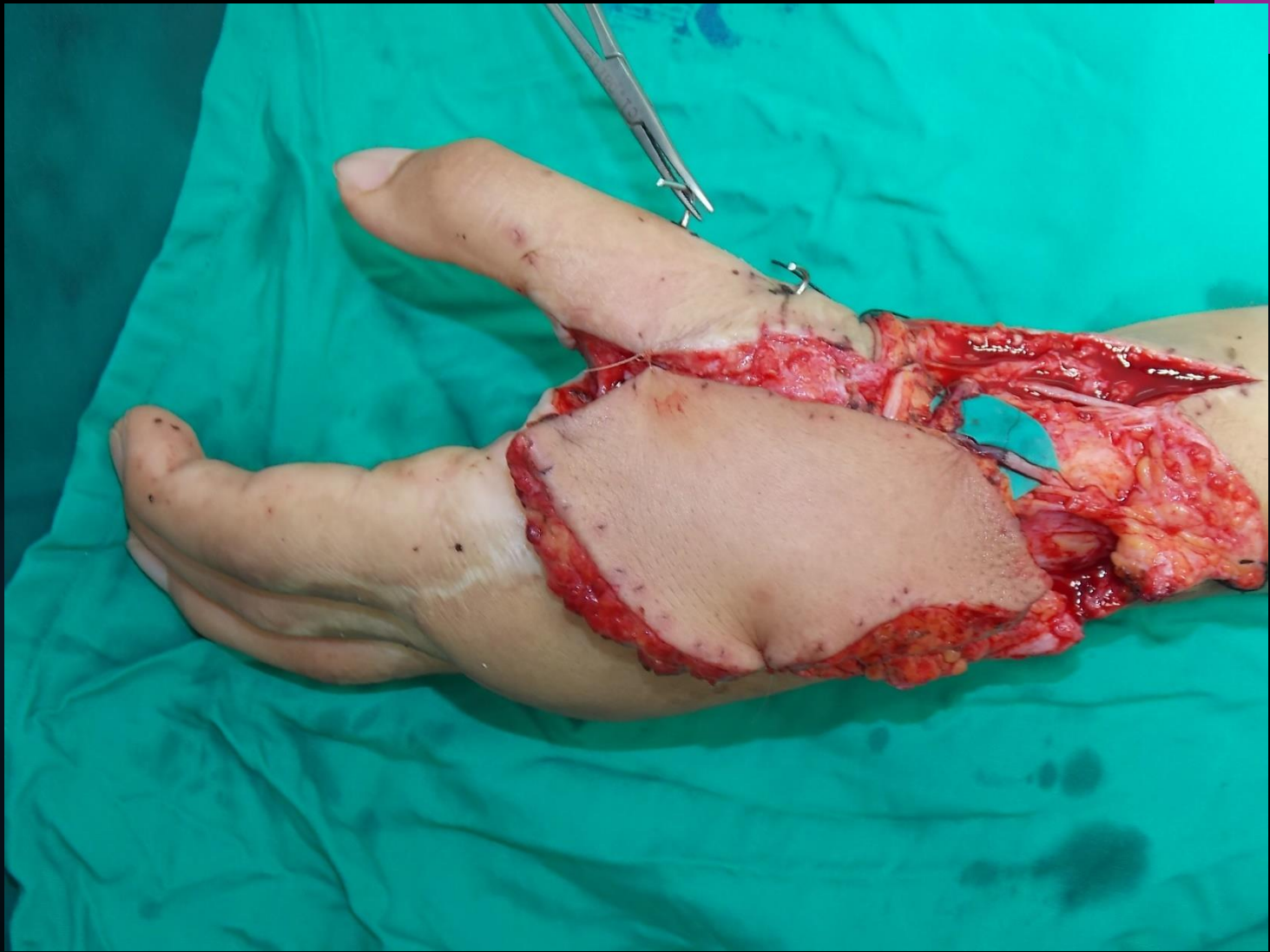


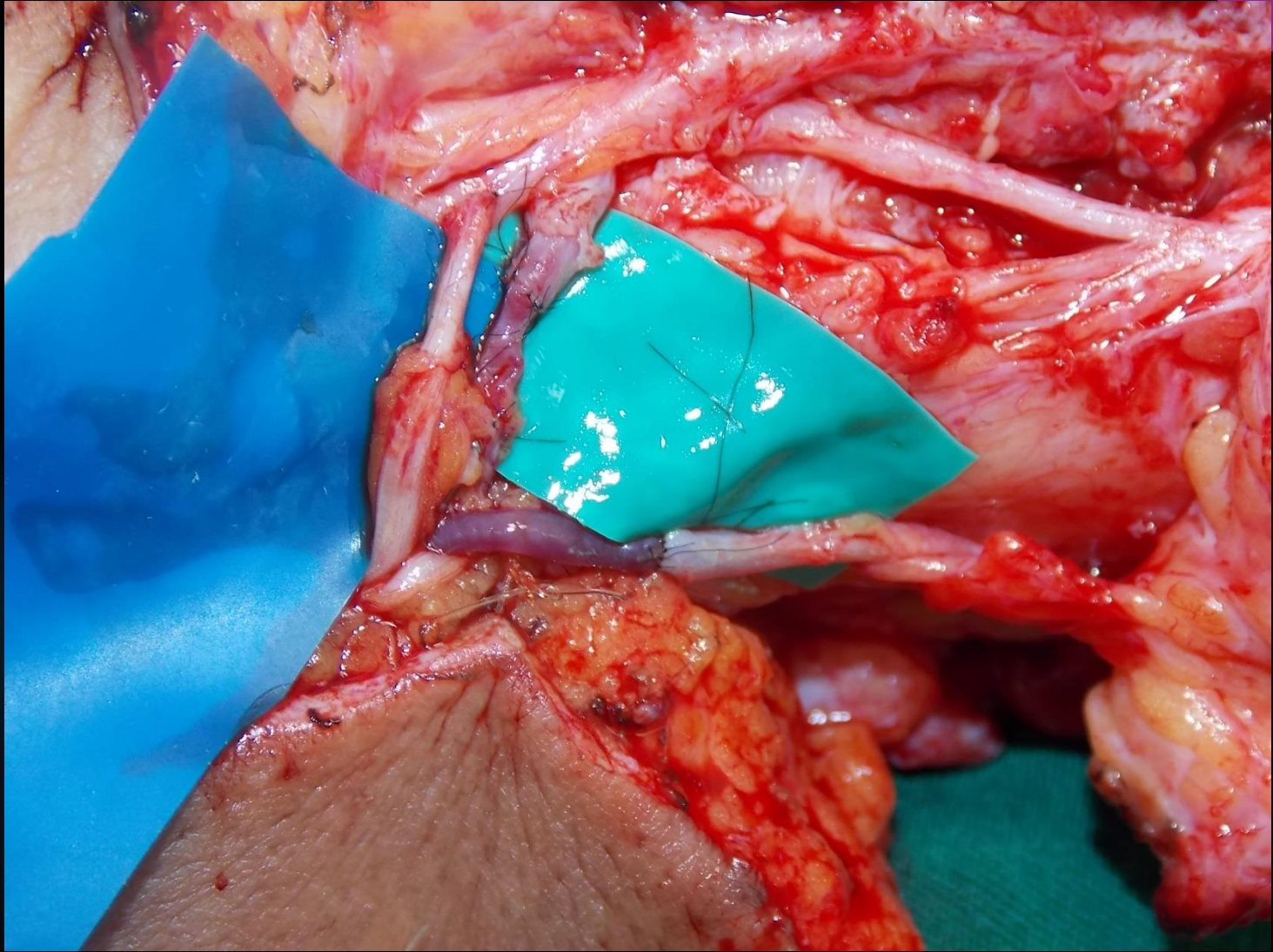












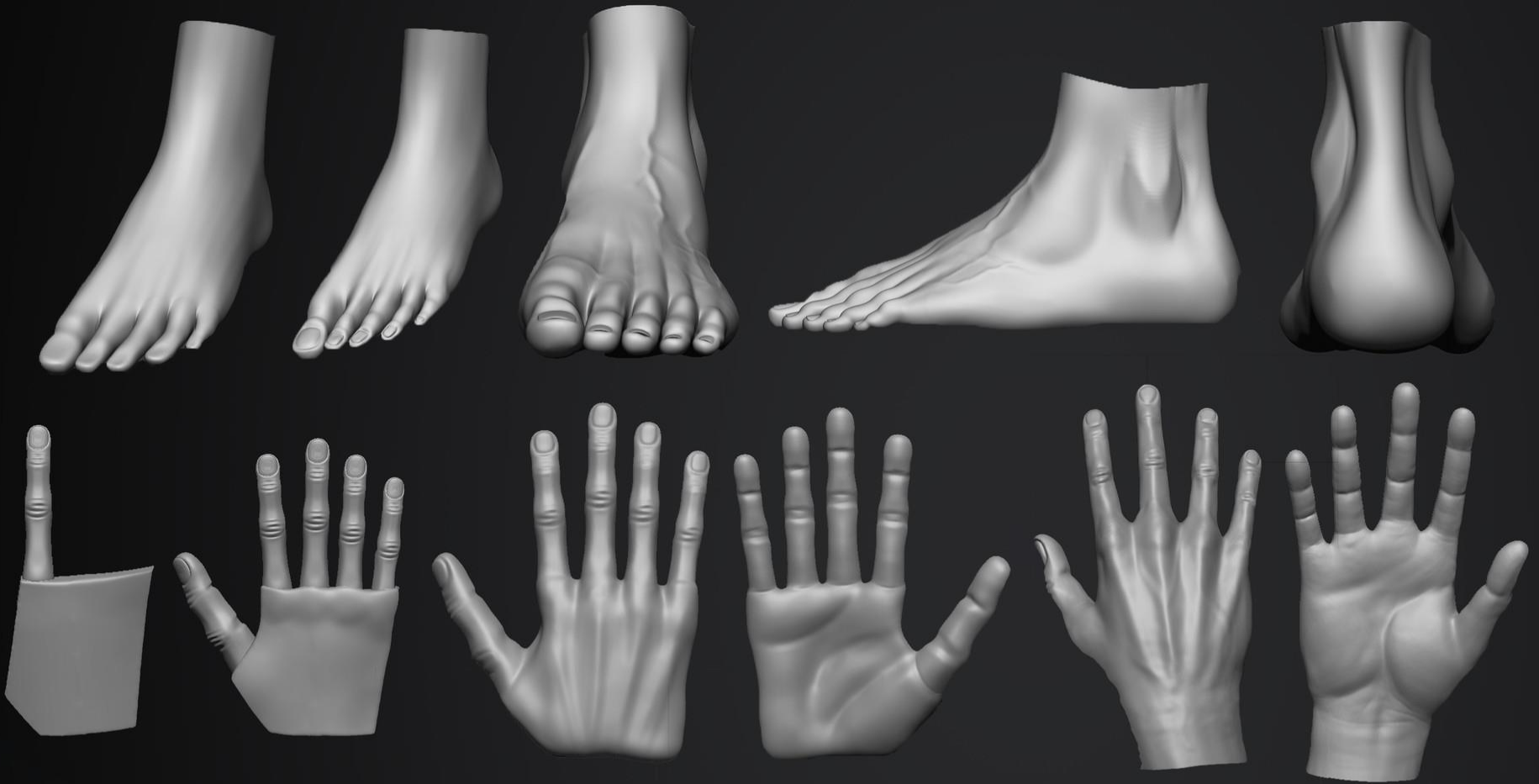












Hand and Foot Anatomy Studies

Mike Askari

Dedos del pie a la mano



John Cobbet

☐ Abril 1968, Primera transferencia de hallux a pulgar en humano

FREE DIGITAL TRANSFER

Report of a Case of Transfer of a Great Toe to Replace an Amputated Thumb

J. R. COBBETT, LONDON, ENGLAND

From the Queen Victoria Hospital, East Grinstead

later there was obvious skin necrosis over the vein graft, and yet a further operation was undertaken, at which a bipedicle abdominal flap was used to fill the defect. This healed satisfactorily and the patient was eventually discharged from hospital five weeks after operation.

Further progress was delayed by acute back strain and an enforced period of bed rest at home. On recovery from this he was readmitted and three months after the first operation

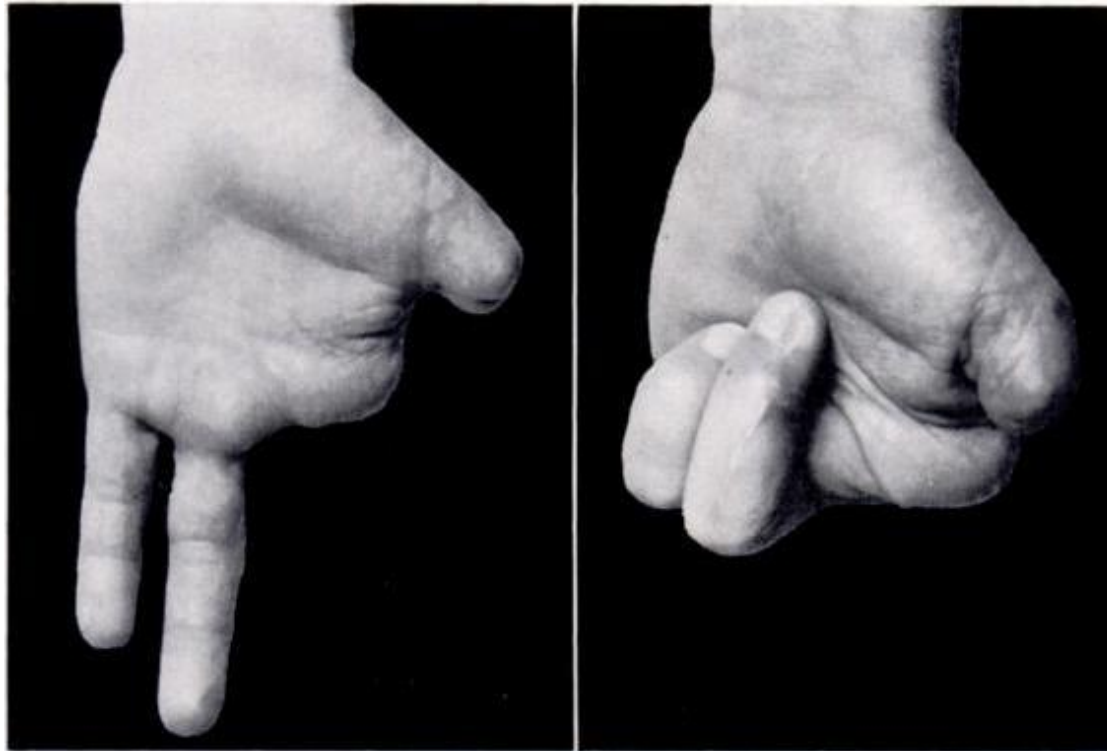


FIG. 1
The appearance of the hand before operation.

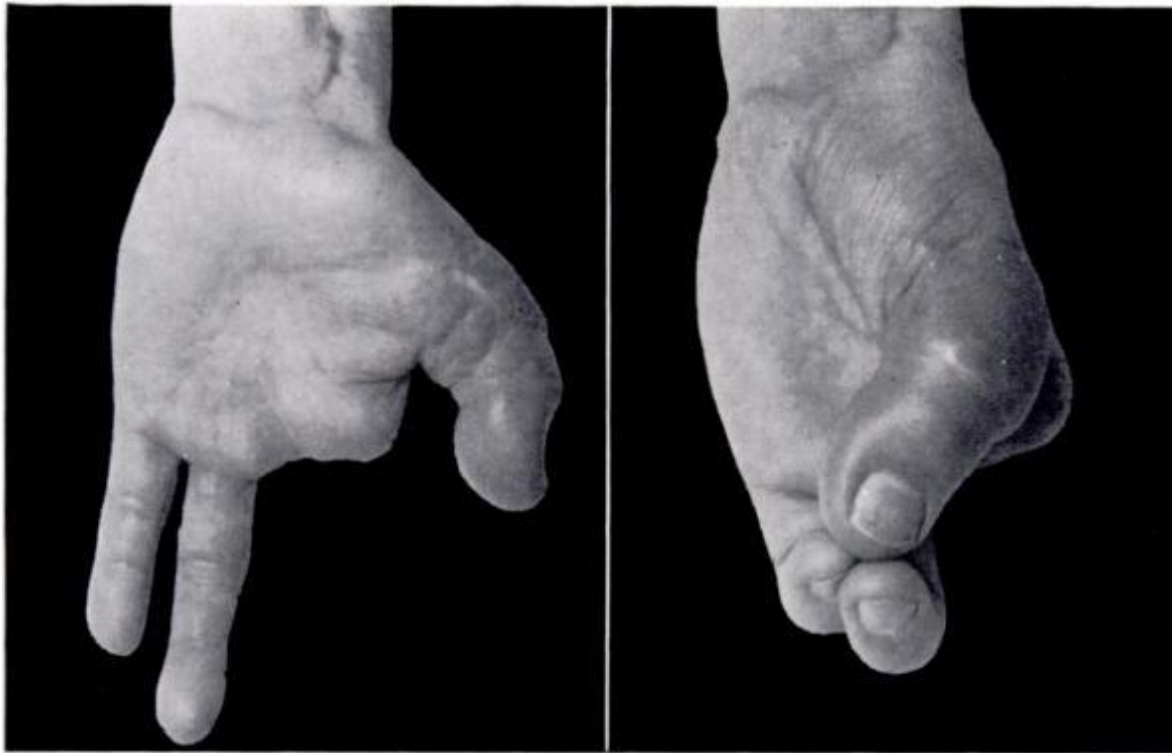


FIG. 2

FIG. 3

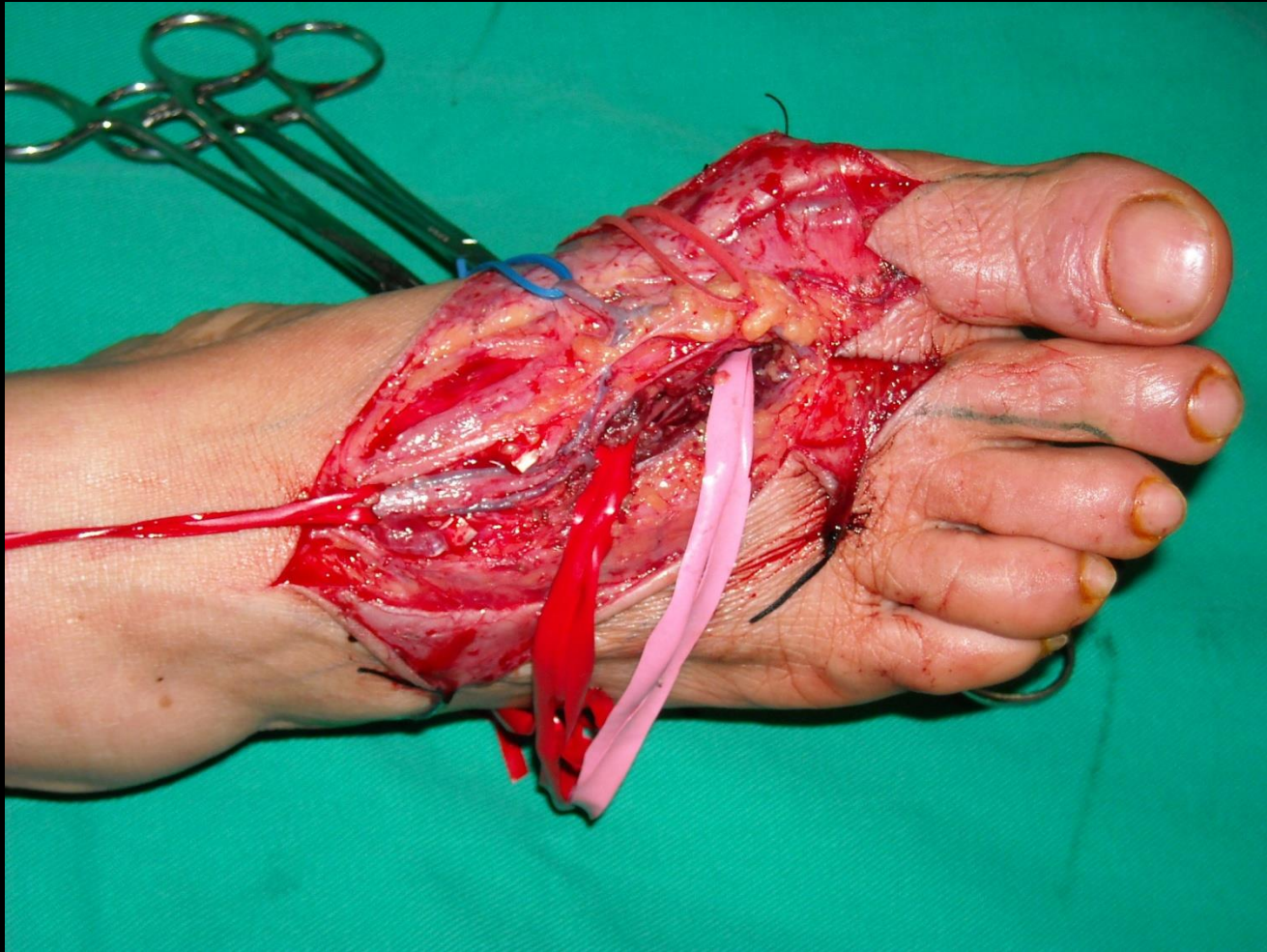
Figure 2—The hand after reconstruction of the thumb by free transfer of the left great toe. Figure 3—To show useful opposition of the transplanted digit.

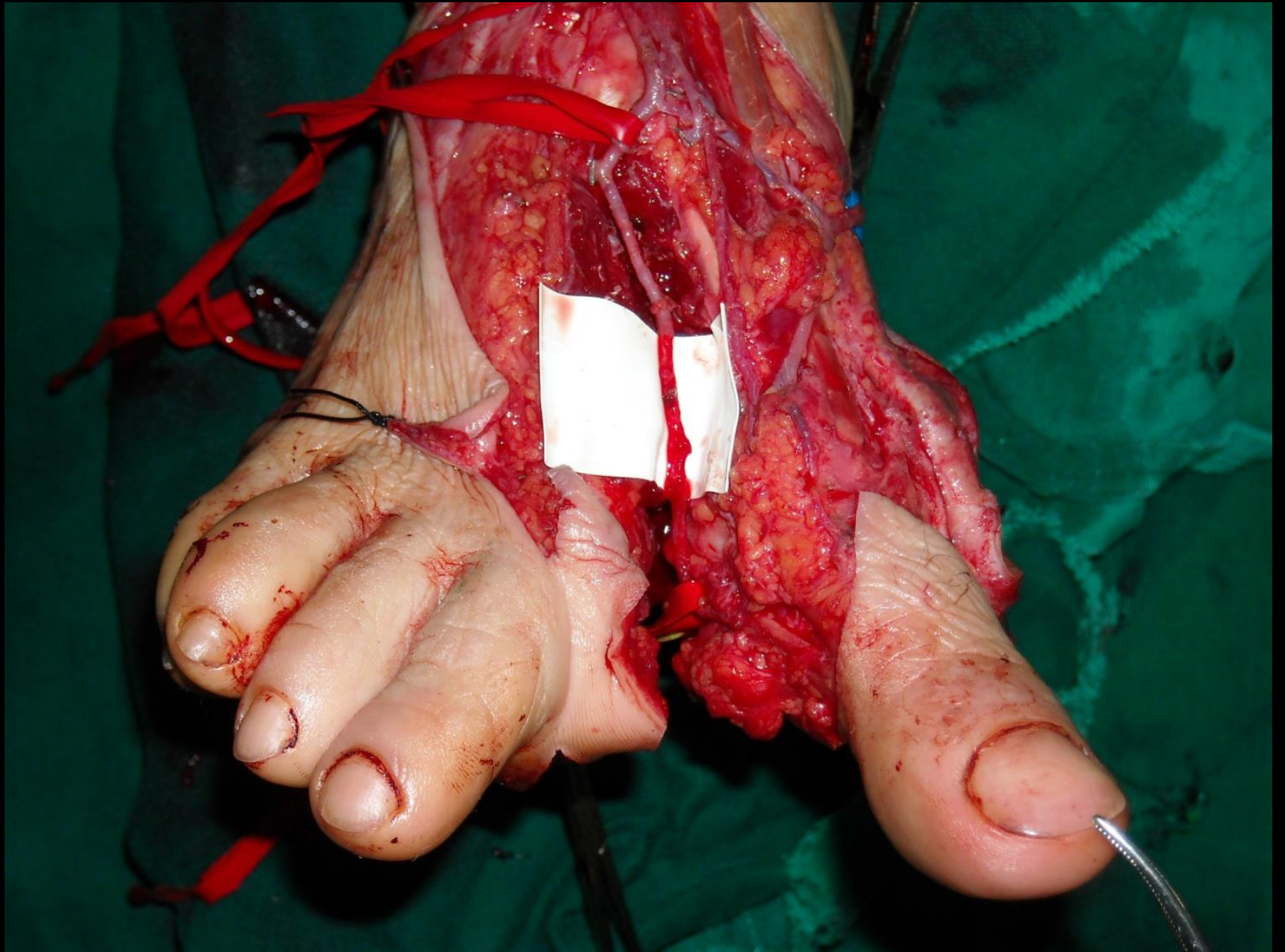
part of the abdominal flap was thinned, the extensor tendon was sutured and the digital nerves were repaired under magnification. Six weeks later the remaining part of the flap was thinned and a flexor tendon graft inserted. After a course of physiotherapy he went back to his old job, six months after the transplant operation.

At eight months from the time of the operation the new thumb (Fig. 2) was warm and pink, with growing nail and digital hairs. Sensation of a protective nature was present throughout





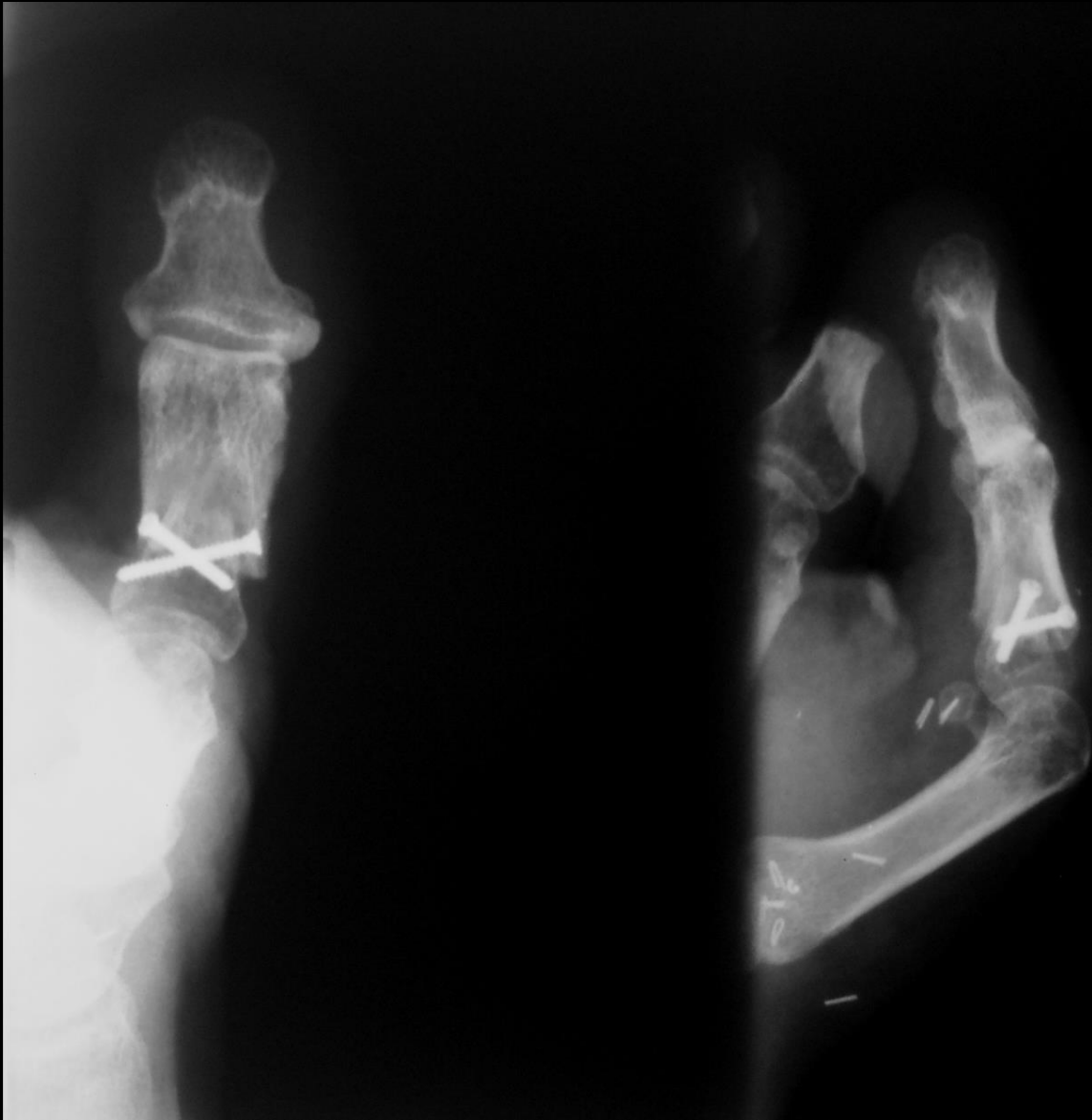




A. Beltrán, M.D.



















42569-220515-38A-0.97Gy

5/5/22



10 mm





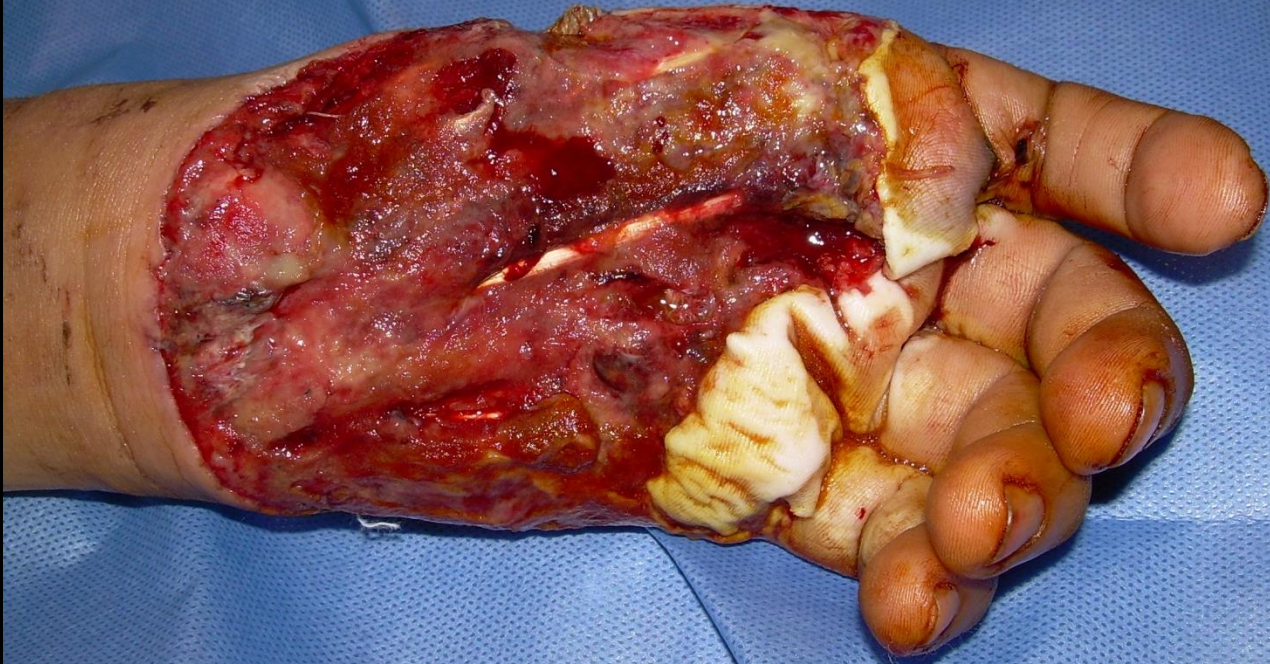








A. Beltrán, M.D.













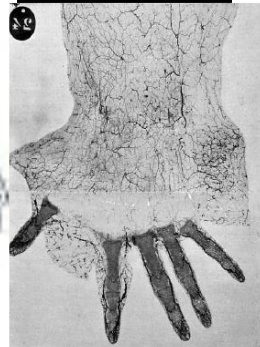
Revoluciones Anatómicas



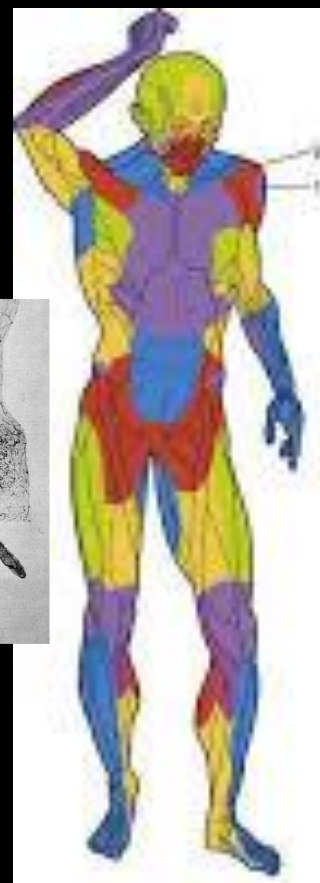
Andrea Vesalio
1543



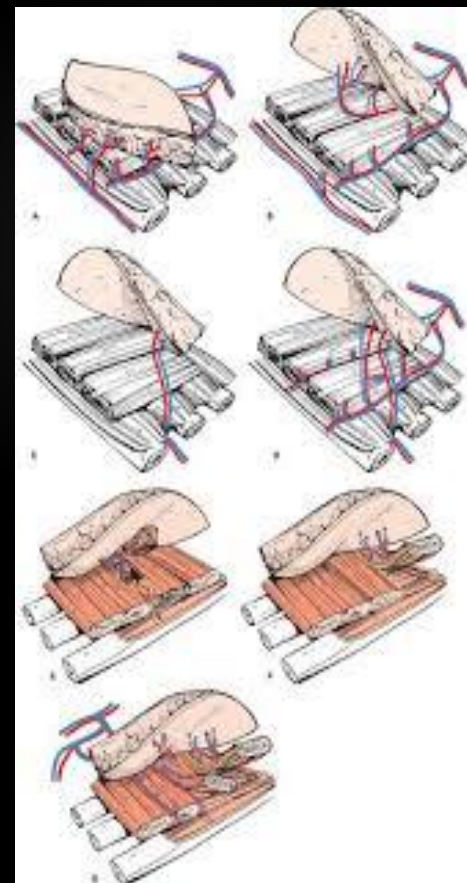
Carl Manchot
1889



Michel
Salmon
1936



G. Ian Taylor
1975

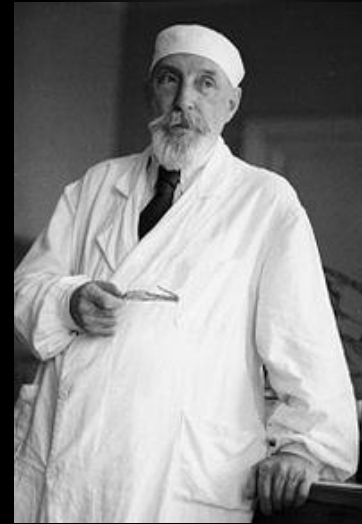


Hideo Koshima
1989





Sir Harold Gillies



Vladimir Petrovic Iliatov

- ▶ 1916
- ▶ Colgajos tubulizados



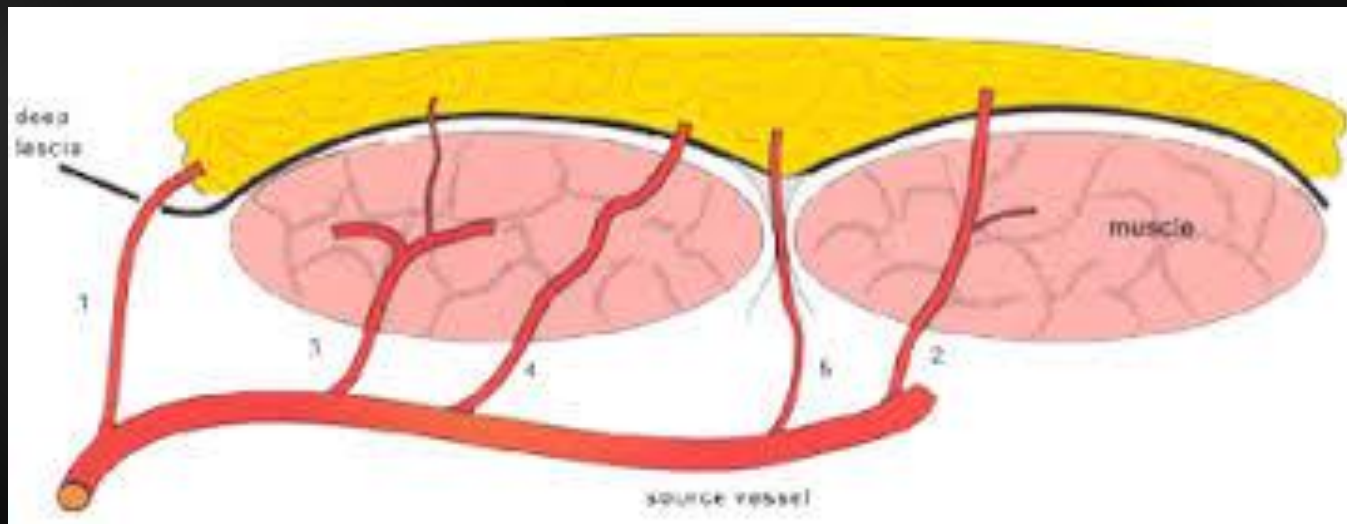
Un hombre con una mano no funcional es equivalente a un hombre sin mano

Sterling Bunnell



Perforantes cutáneas

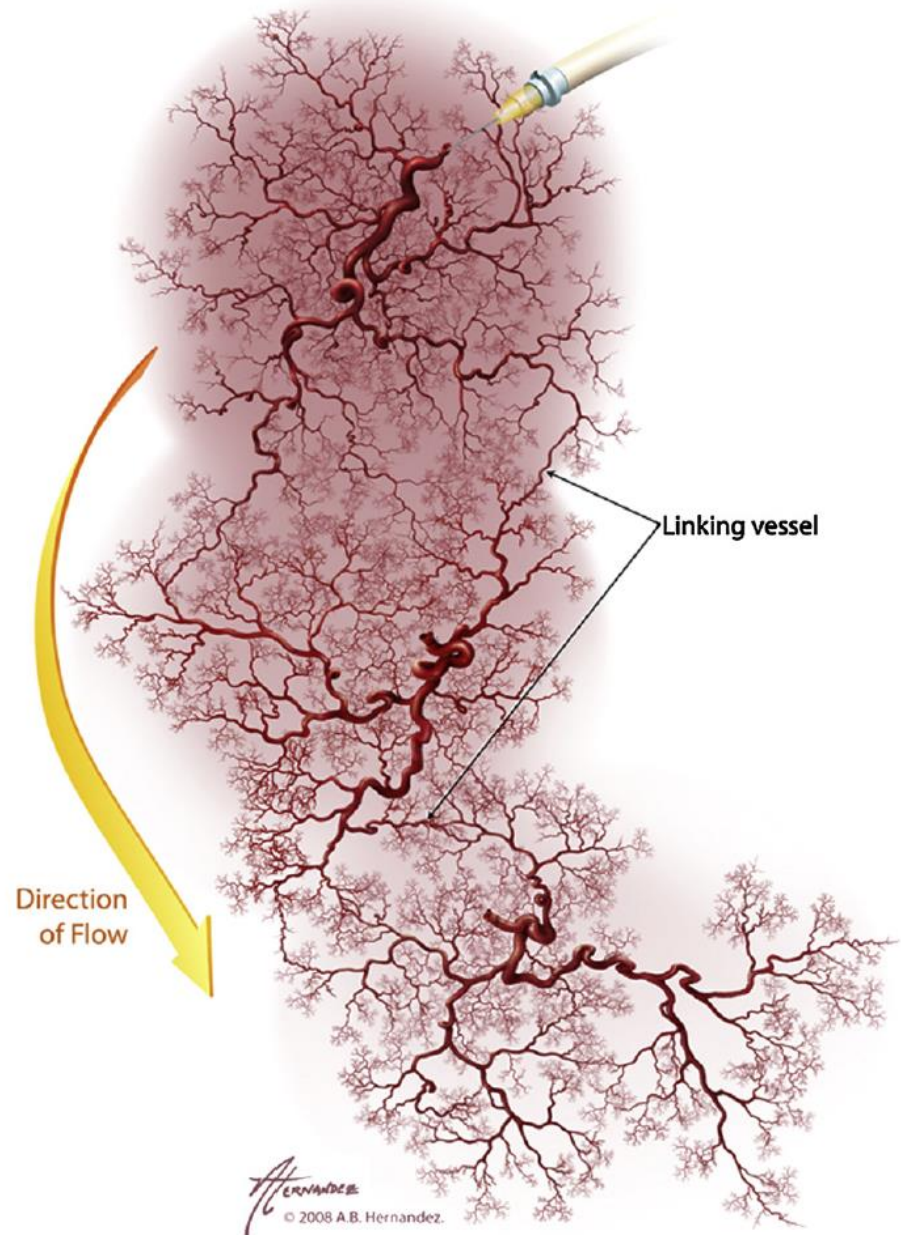
- ▶ Cualquier vaso que traspase la fascia profunda para nutrir la piel
- ▶ Proceden de vasos segmentarios paralelos al hueso



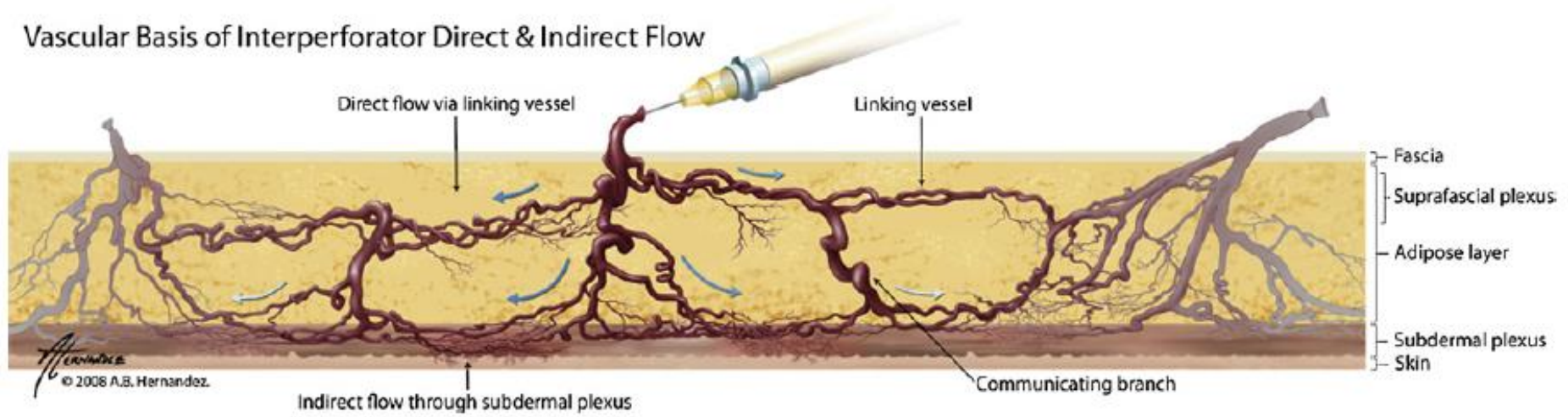
Perforasomas

- ▶ Territorio perfundido por una perforante
- ▶ Comunicaciones directas e indirectas con perforasomas adyacentes
- ▶ Colonización por vasos de choque

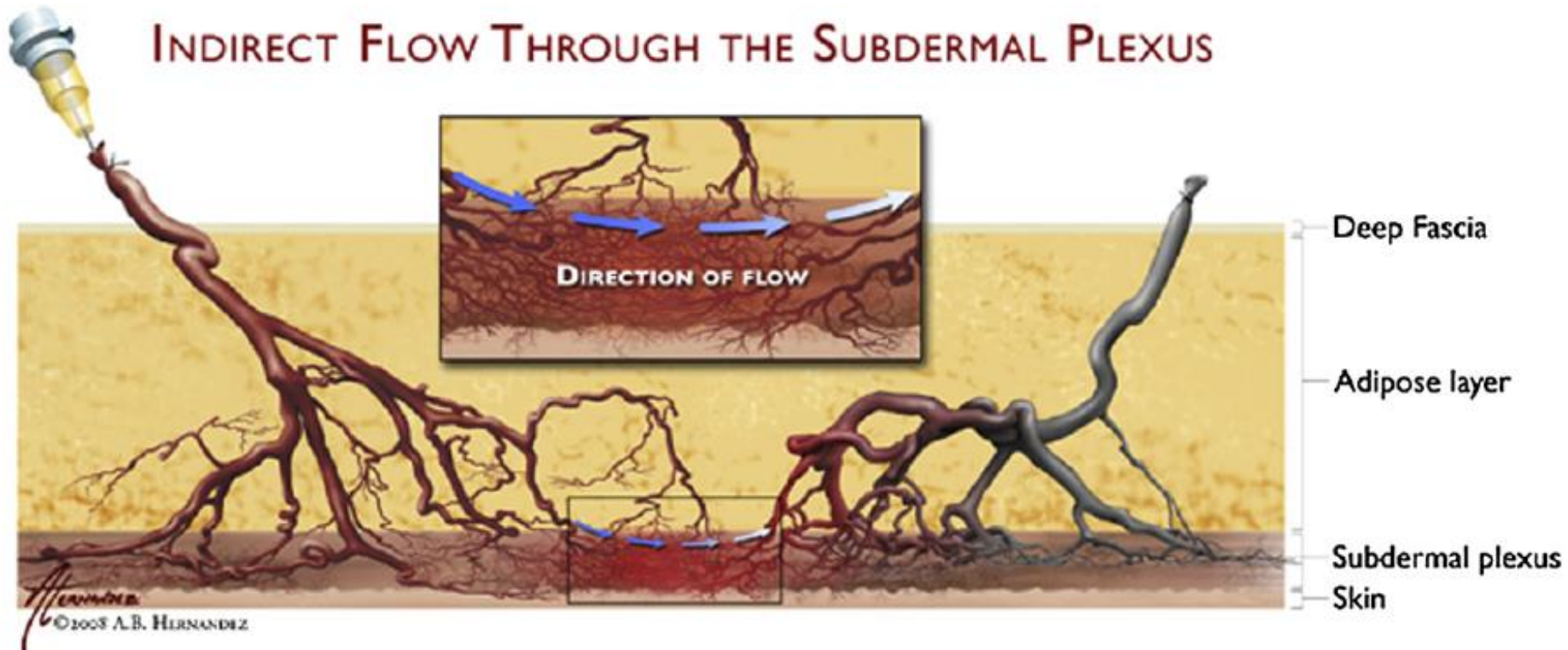
PERFUSION IN MULTIPLE PERFORASOMES VIA LINKING VESSELS



Vascular Basis of Interperforator Direct & Indirect Flow



INDIRECT FLOW THROUGH THE SUBDERMAL PLEXUS



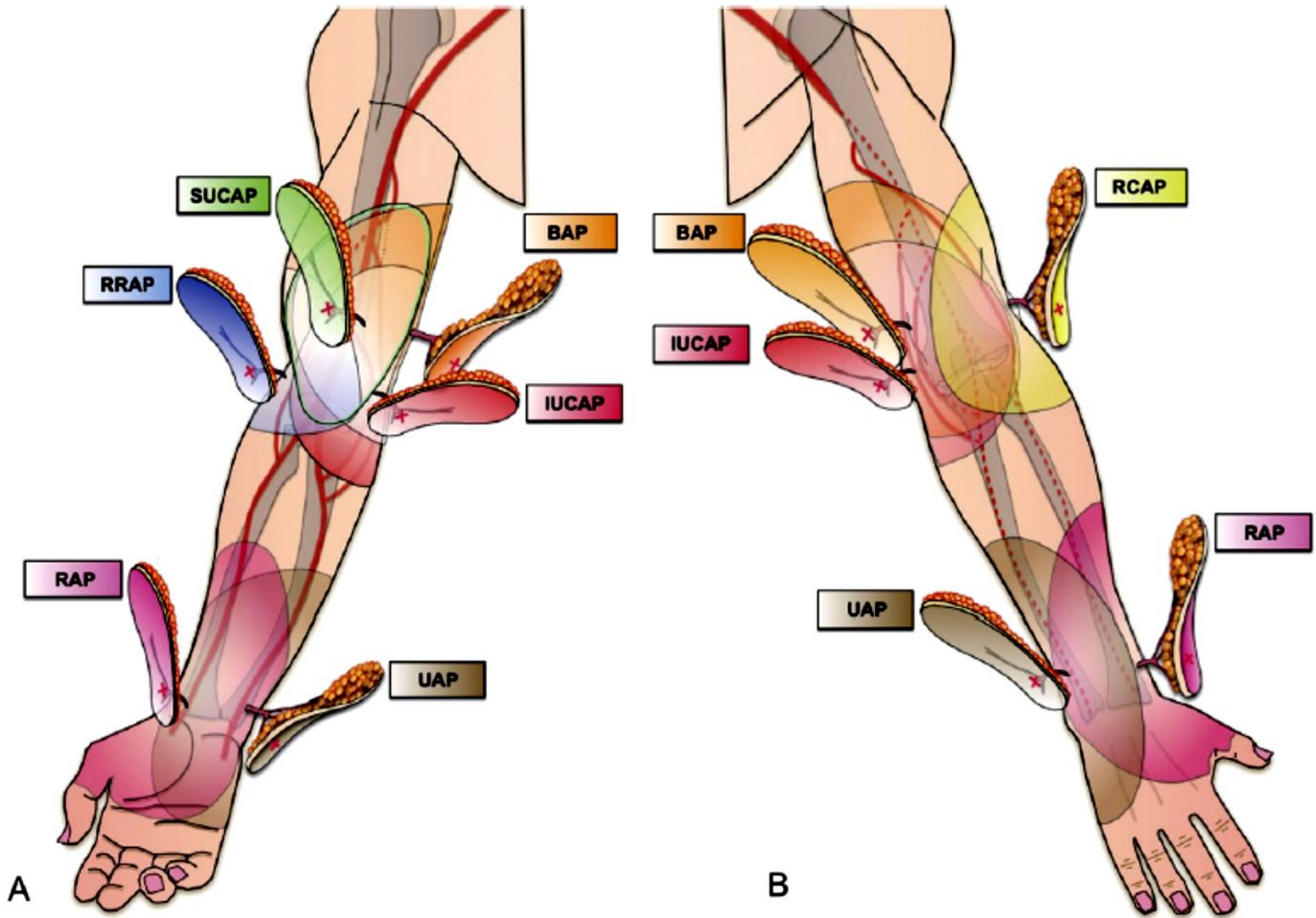


FIGURE 6: The arc of rotation of perforator-based propeller flaps. **A** Anterior view. **B** Posterior view.

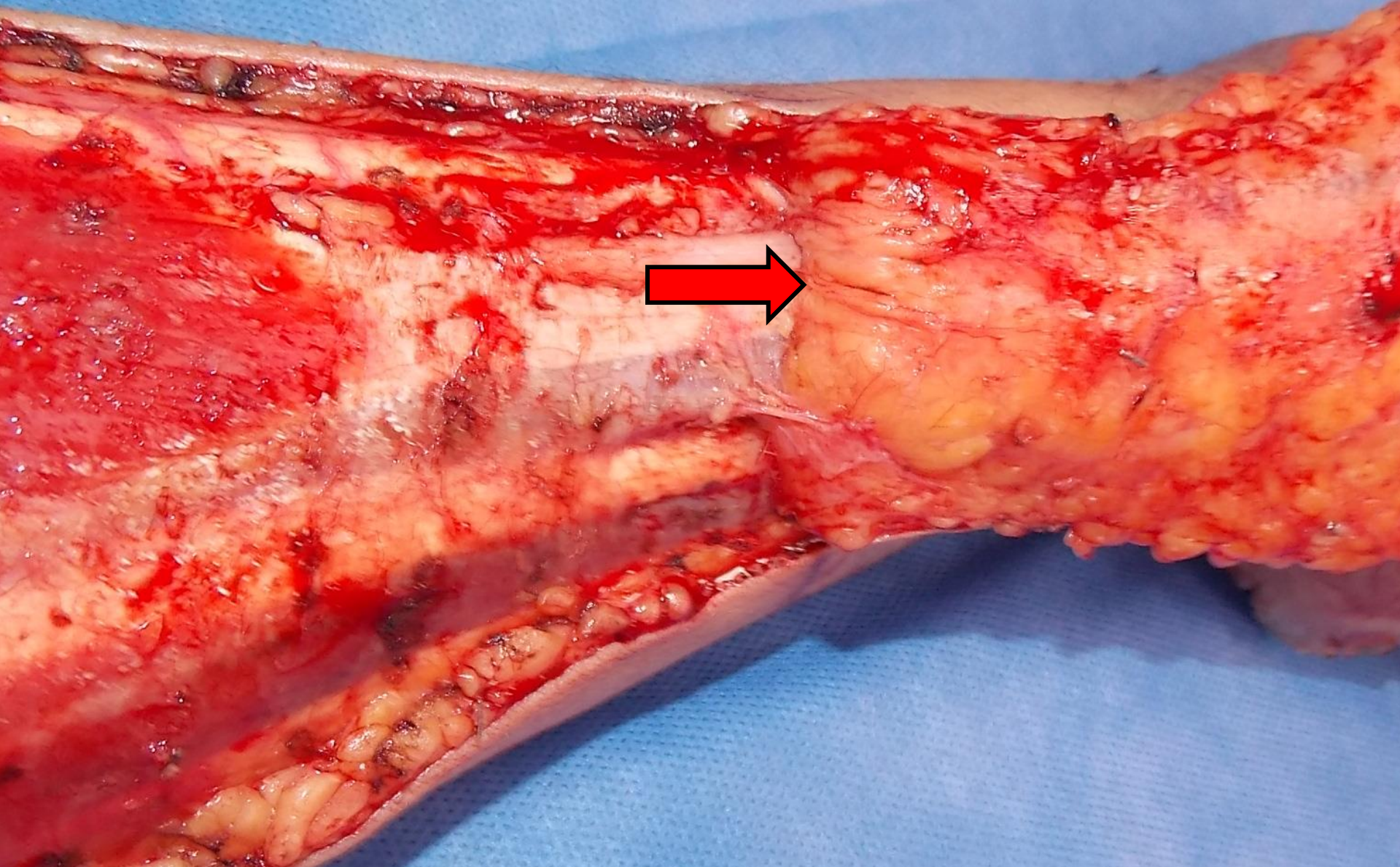


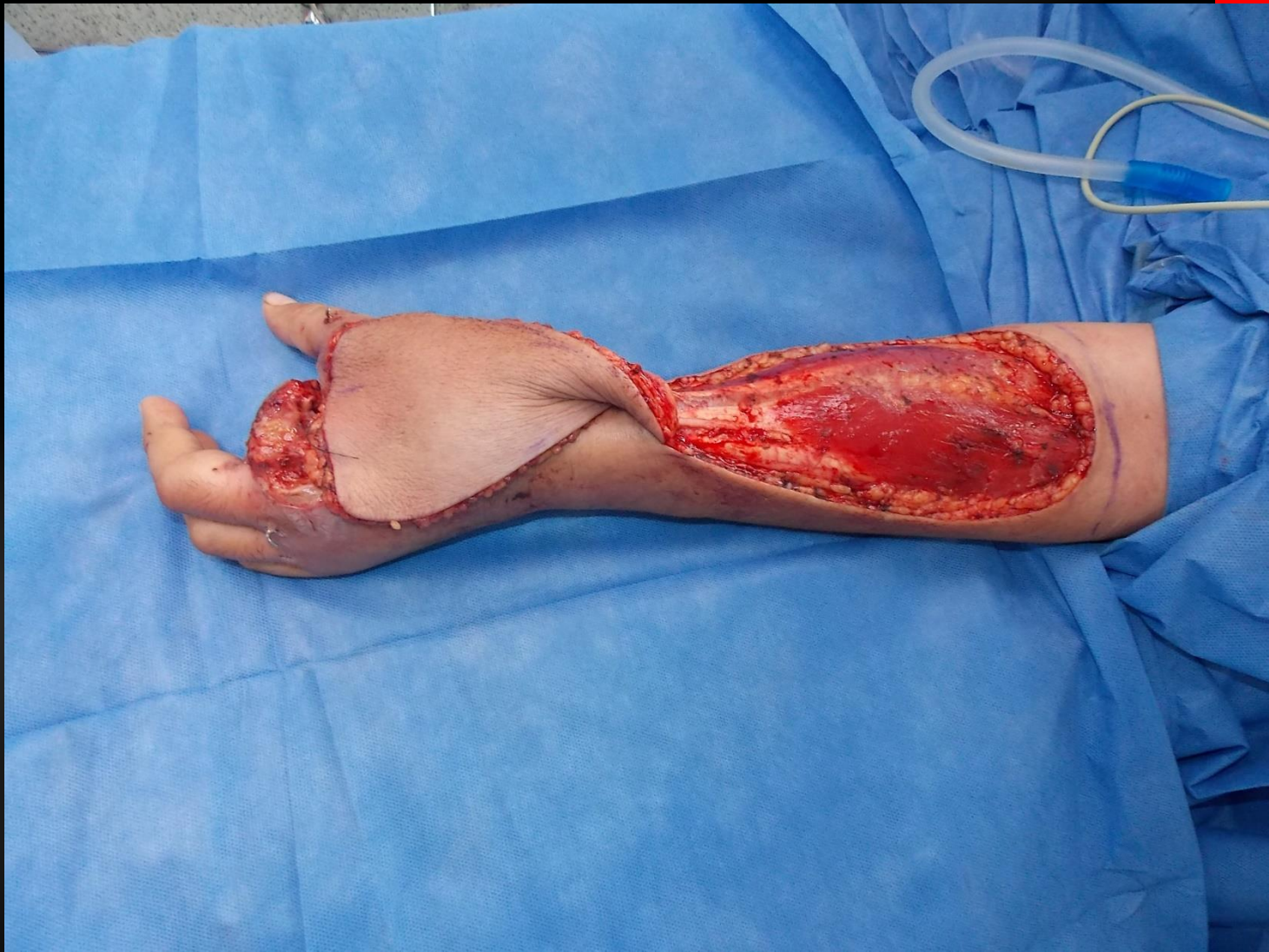


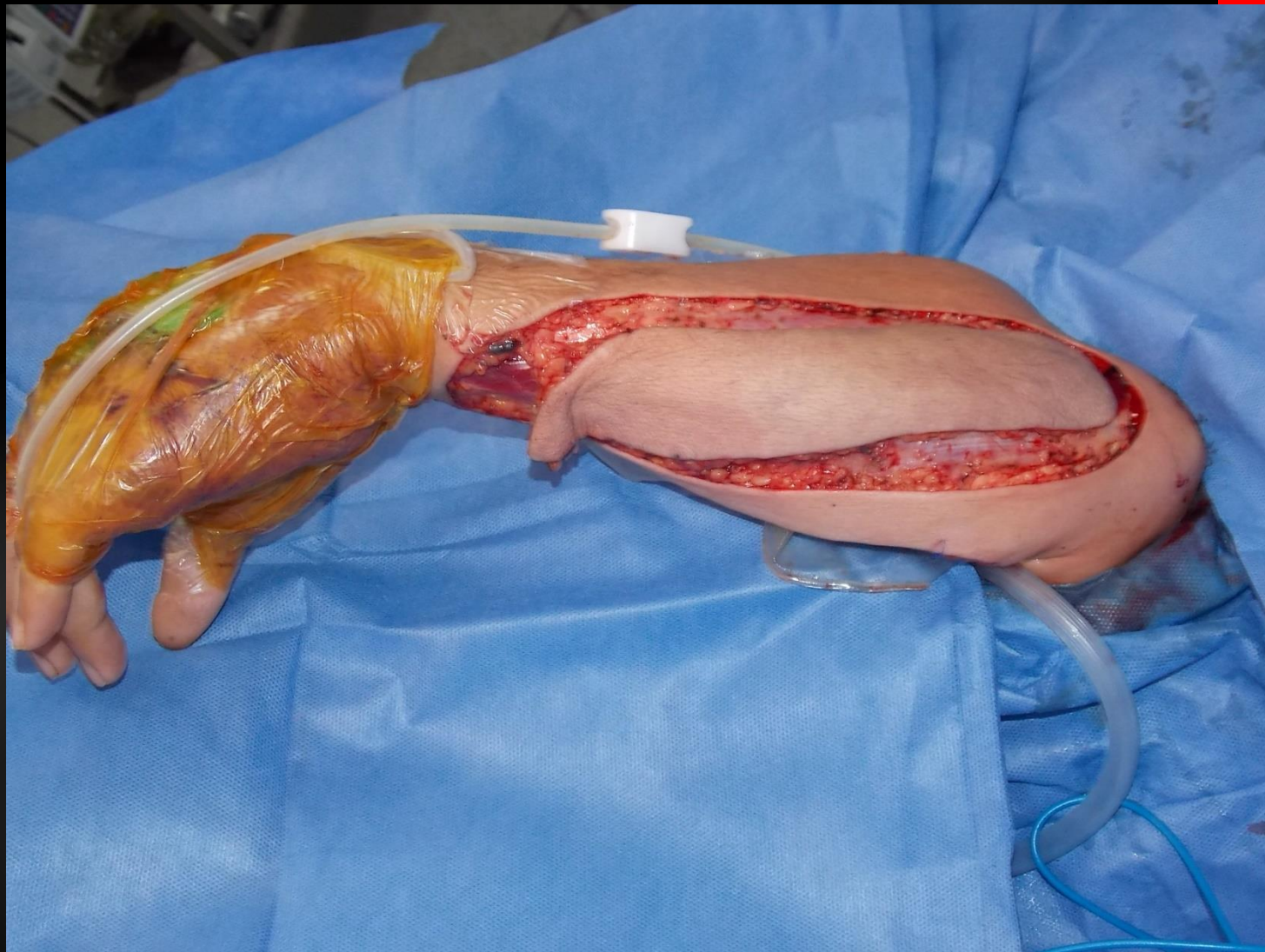


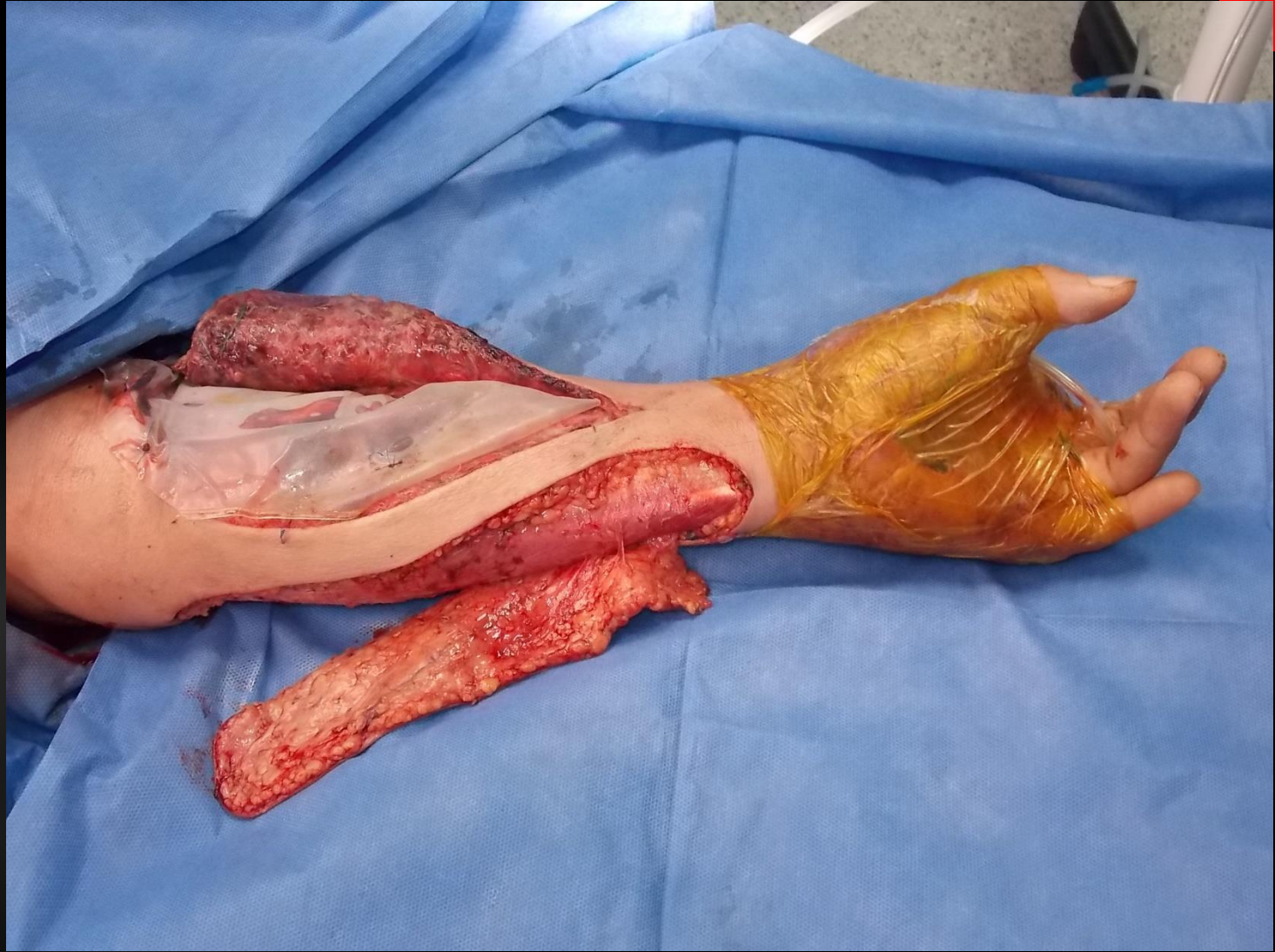


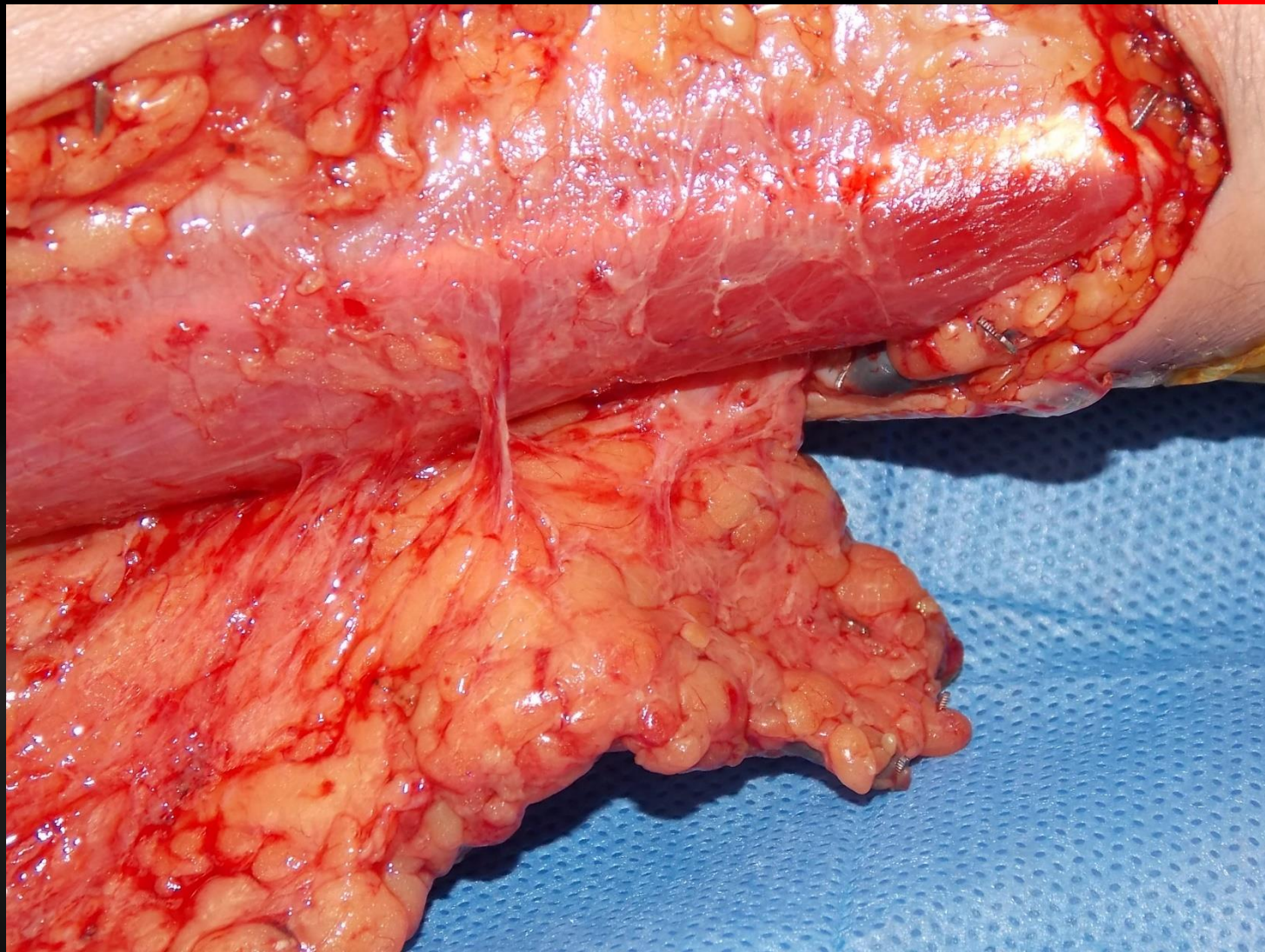


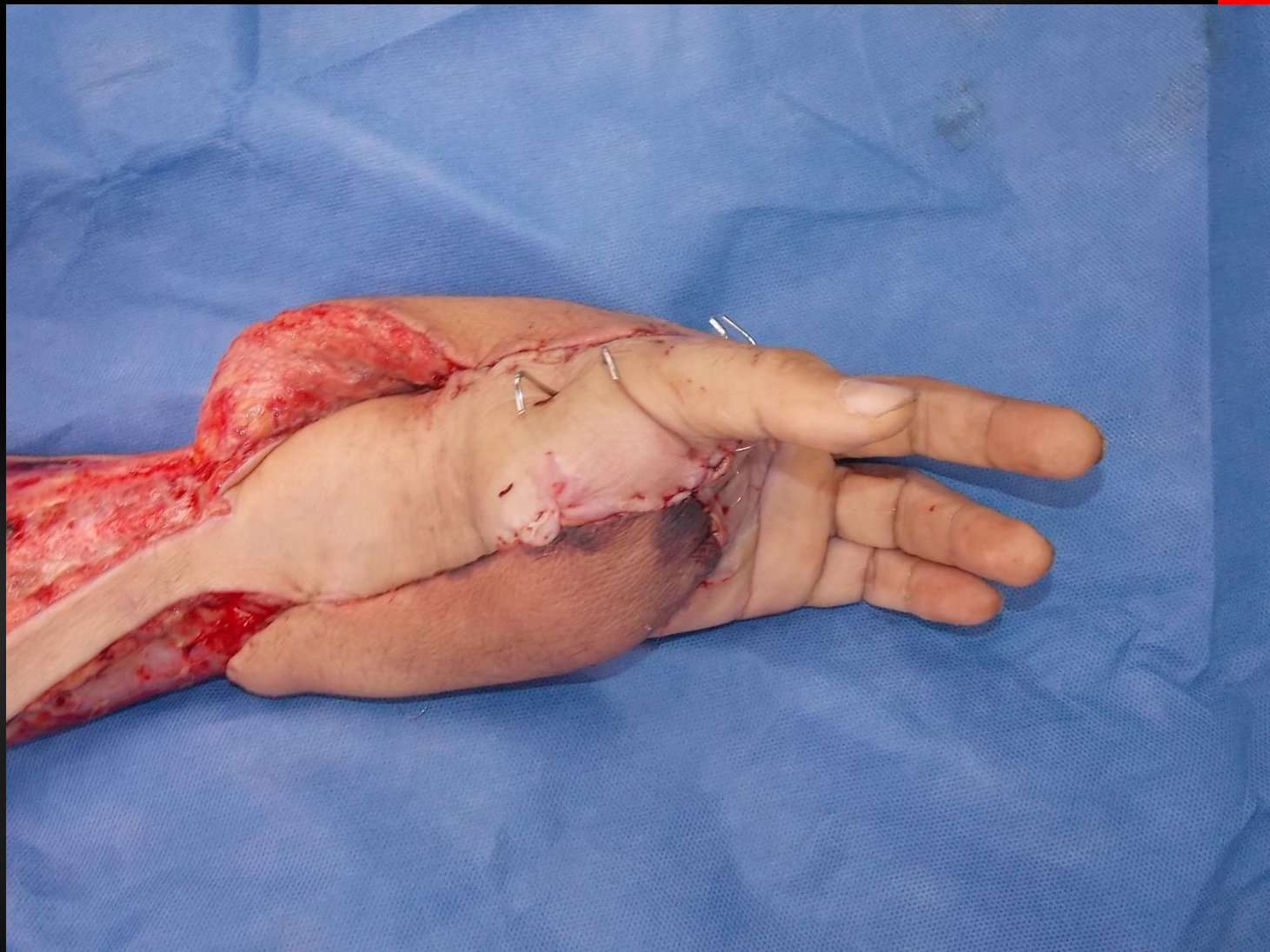














The Lateral Proximal Phalanx Flap for Contractures and Soft Tissue Defects in the Proximal Interphalangeal Joint: An Anatomical and Clinical Study

HAND

1-7

© American Association for Hand Surgery 2016

DOI: 10.1177/1558944716646781

hand.sagepub.com

Aldo G. Beltrán^{1,2,3} and Camilo J. Romero^{4,5}

Abstract

Background: The management of contractures and soft tissue defects in the proximal interphalangeal (PIP) finger joint remains a challenge. We report a transposition flap from the lateral skin of the proximal phalanx that is based on perforating branches of the digital arteries and can be used safely for both palmar and dorsal cover defects. **Methods:** We first completed an anatomic study, dissecting 20 fingers in fresh cadavers with arterial injections and made the new flap in patients with dorsal or palmar defects in PIP joints. **Results:** In cadavers, we can reveal 4 constant branches from each digital artery in the proximal phalanx, with the more distal just in the PIP joint constituting the flap pedicle. Between February 2010 and February 2015, we designed 33 flaps in 29 patients, 7 for dorsal and 26 for palmar defects, with no instances of flap necrosis and 4 distal epidermolysis. The patients were between 4 and 69 years with no major complications, and all of the skin defects in the PIP joint were resolved satisfactorily without any relevant sequelae at the donor site. **Conclusions:** This flap procedure is an easy, reliable, versatile, and safe technique, and could be an important tool for the management of difficult skin defects and contractures at the PIP joint level.

Keywords: flap, proximal interphalangeal joint, proximal phalanx, perforator, contracture, digital artery, joint coverage



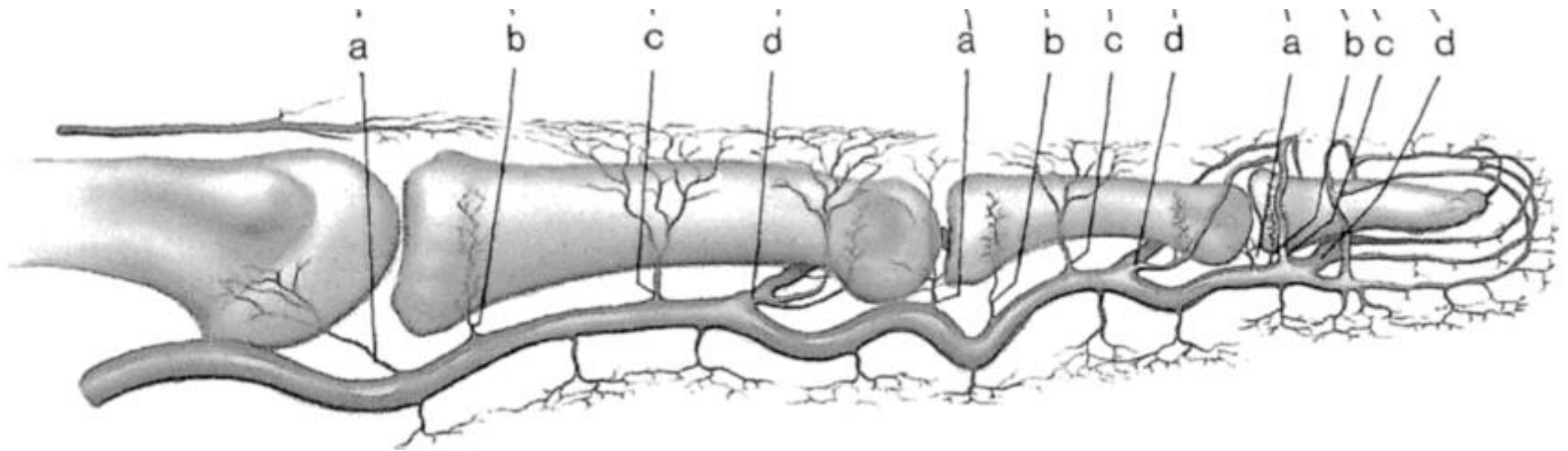


Fig. 3. The dorsal branches of the paired digital vessels in each phalanx are more consistently 4, and show a regular repetitive distribution: a, condylar vessel; b, metaphyseal vessel; c, dorsal skin vessel; d, transverse palmar arch.

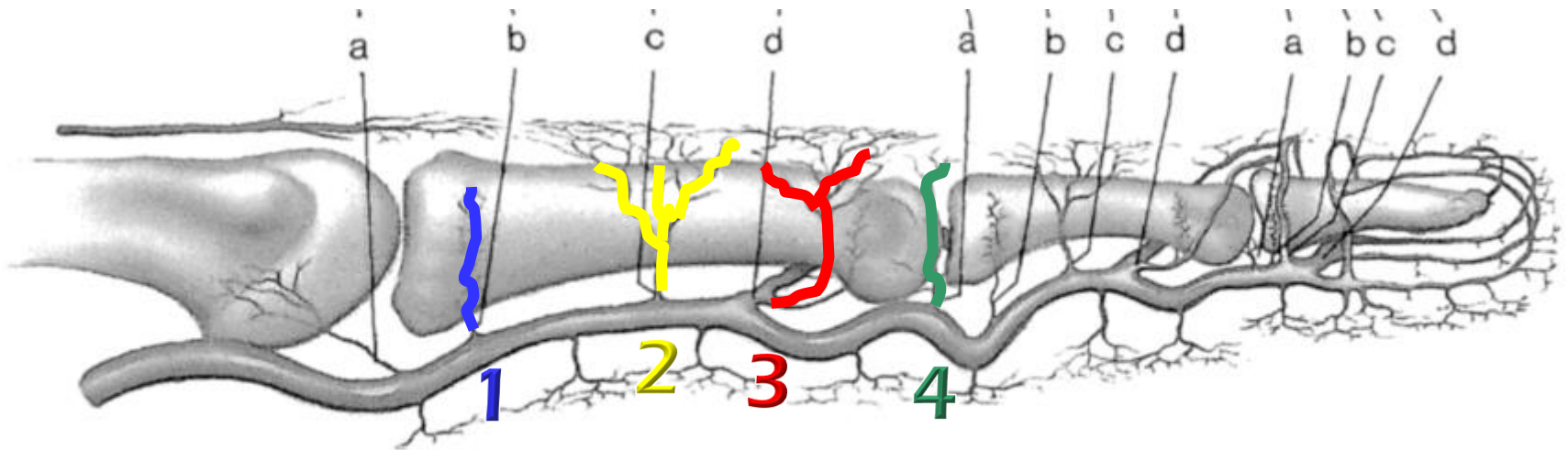


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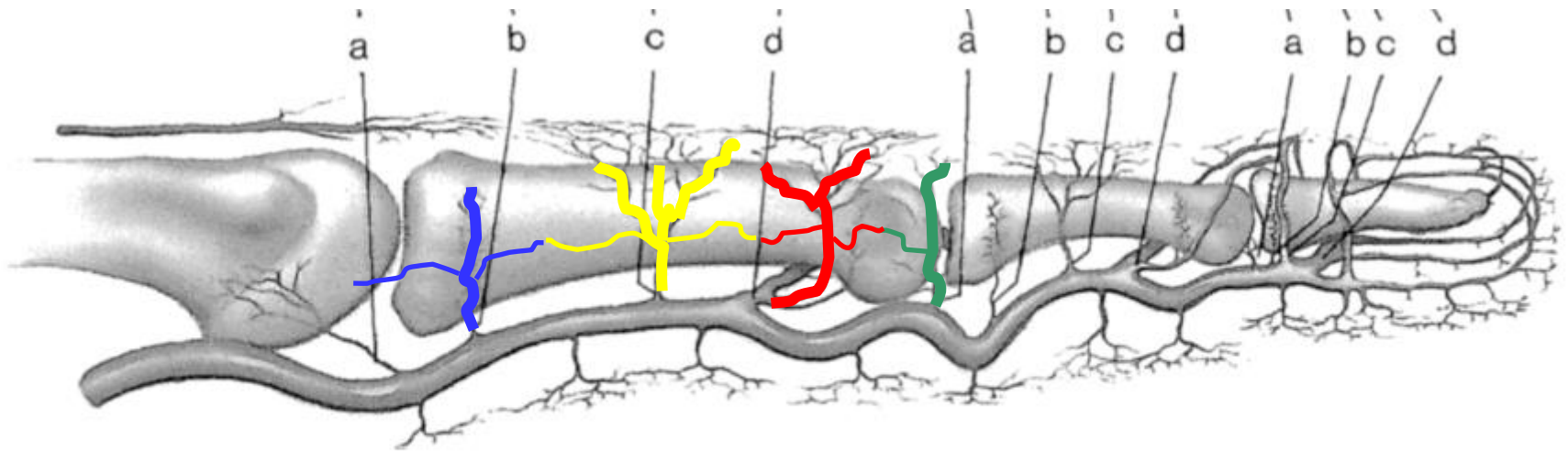


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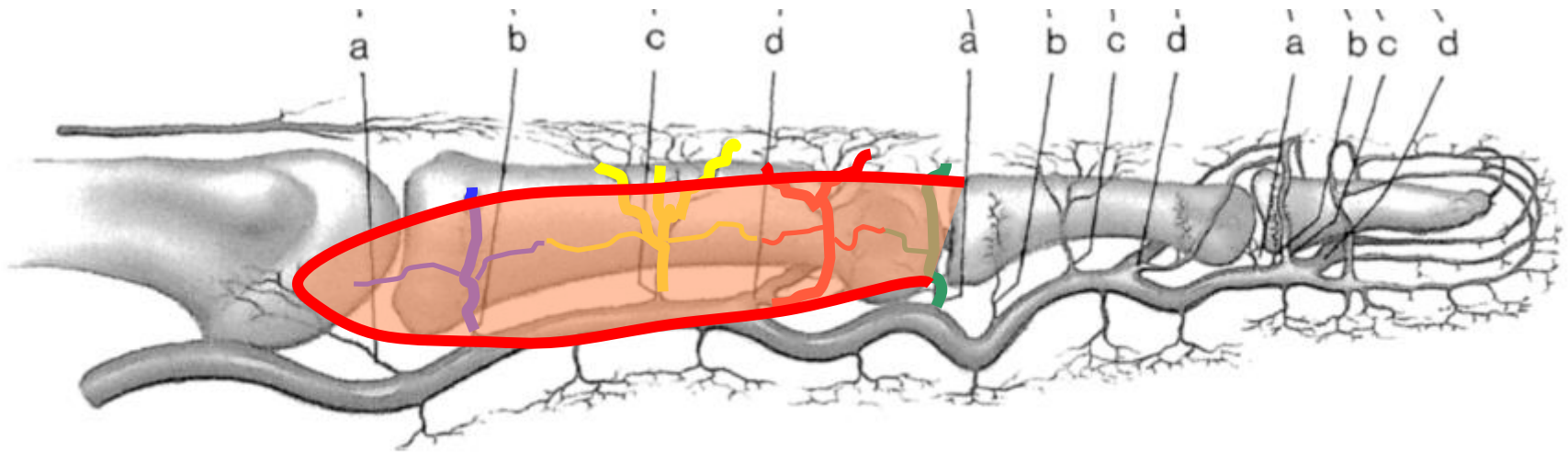
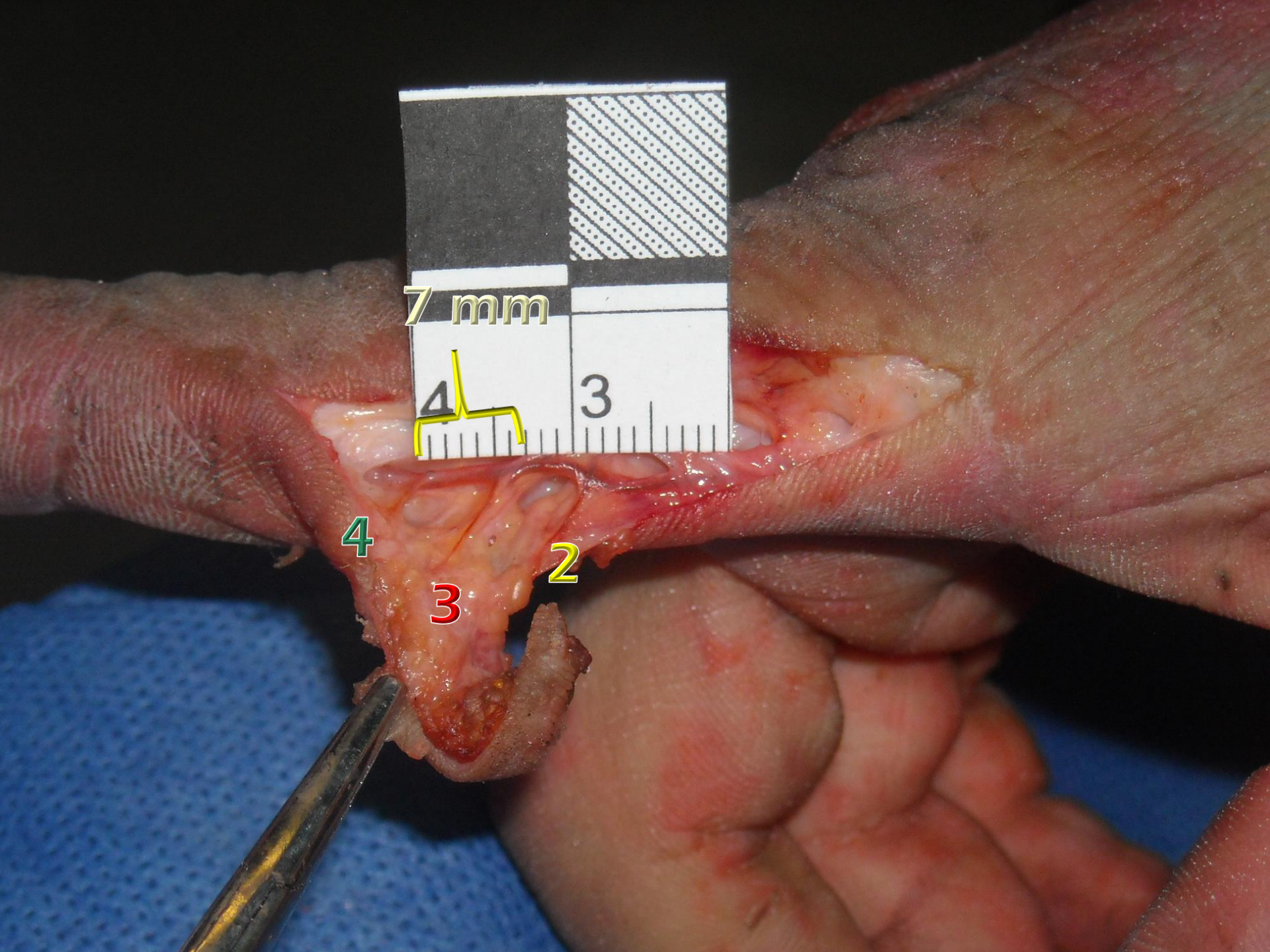


Fig. 3. The dorsal branches of the paired digital vessels in each phalanx are more consistently 4, and show a regular repetitive distribution: a, condylar vessel; b, metaphyseal vessel; c, dorsal skin vessel; d, transverse palmar arch.





7 mm

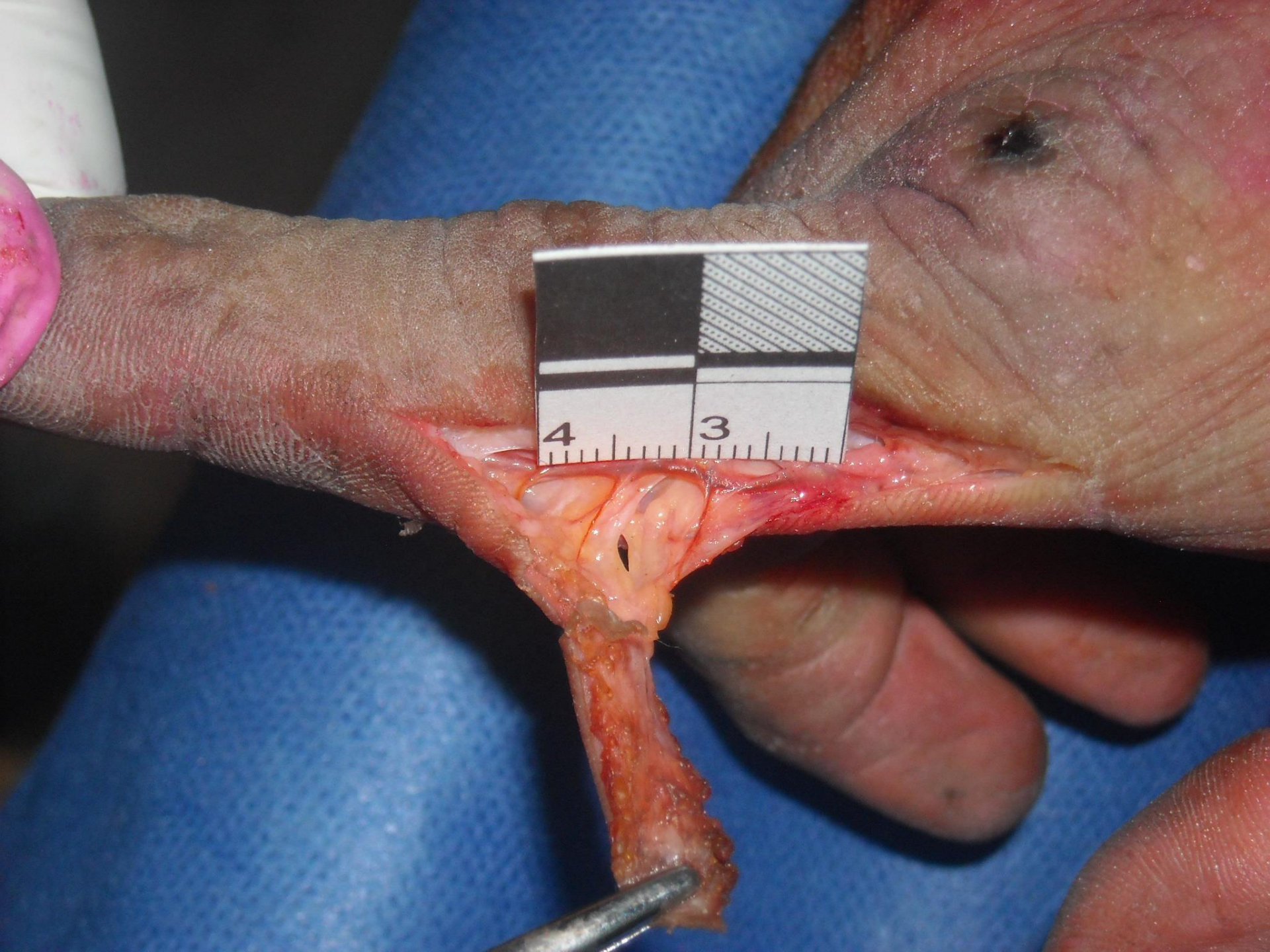
4

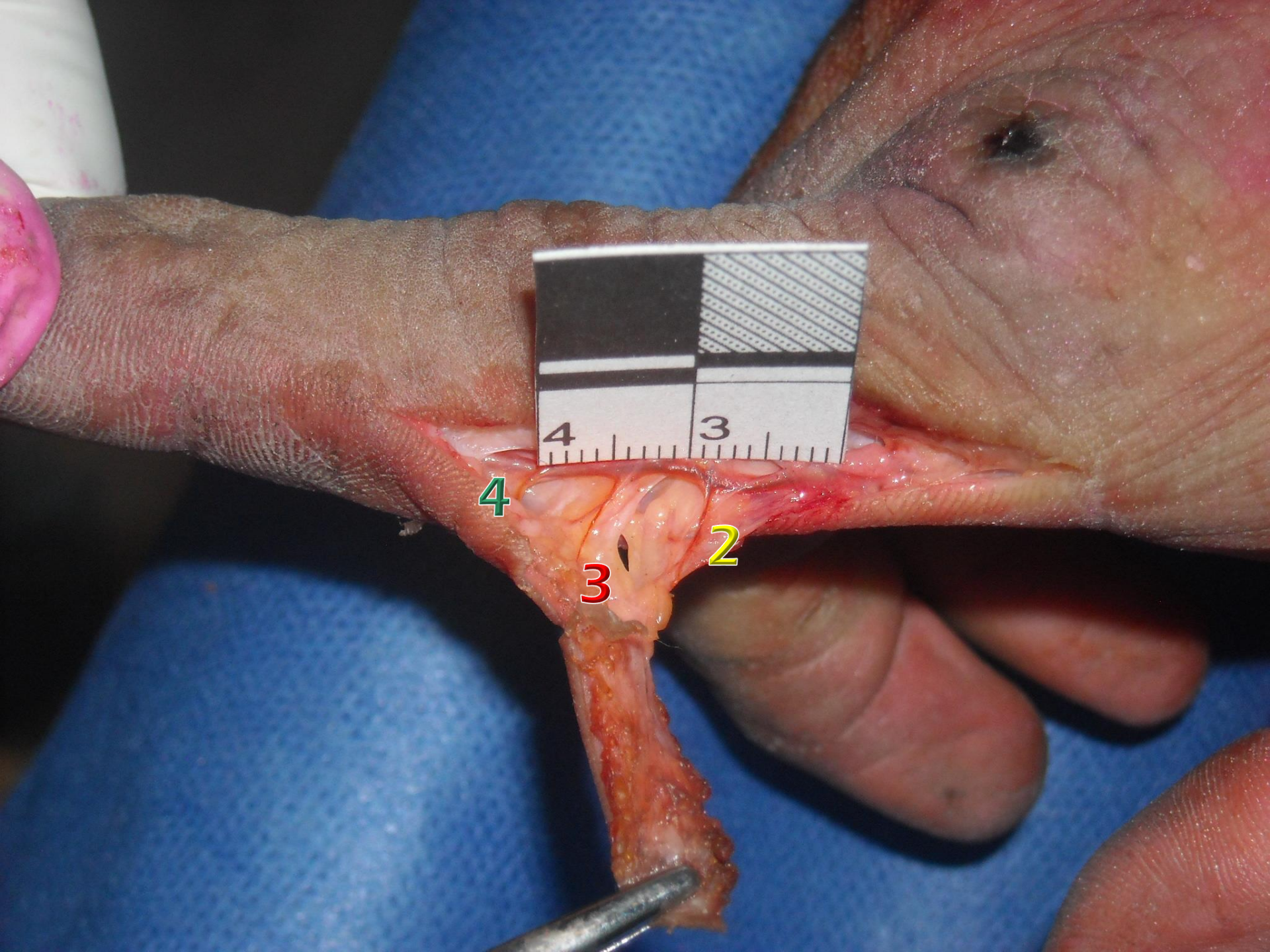
3

4

3

2





4

3

4

3

2



Defecto PALMAR



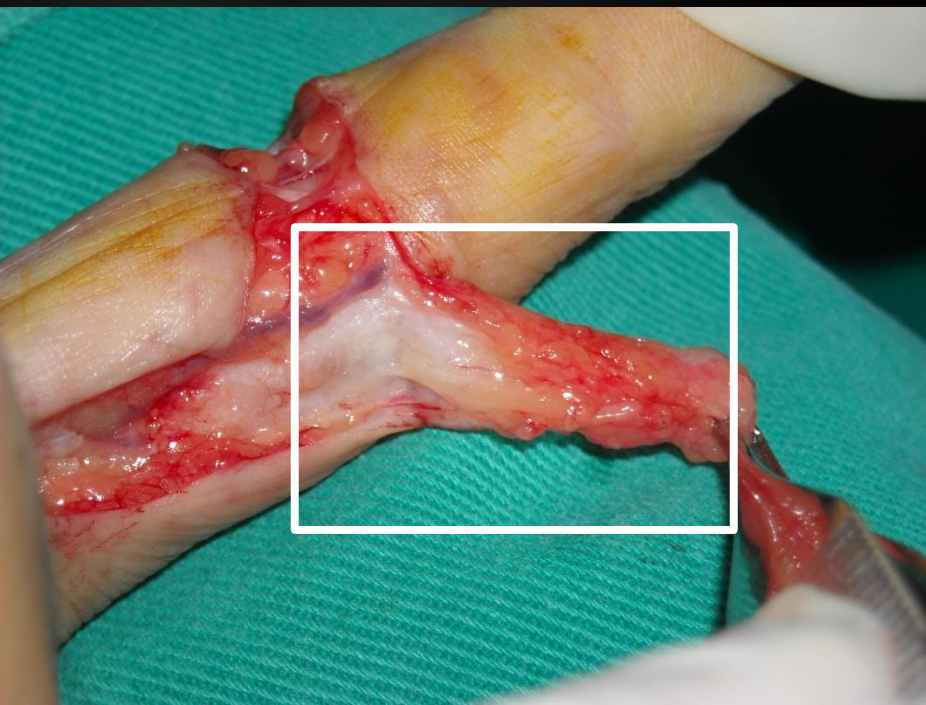
Colgajo # 16

- ☐ Hombre 36 años – Secuelas quemadura eléctrica
- ☐ II dedo, Mano derecha
- ☐ Lado cubital











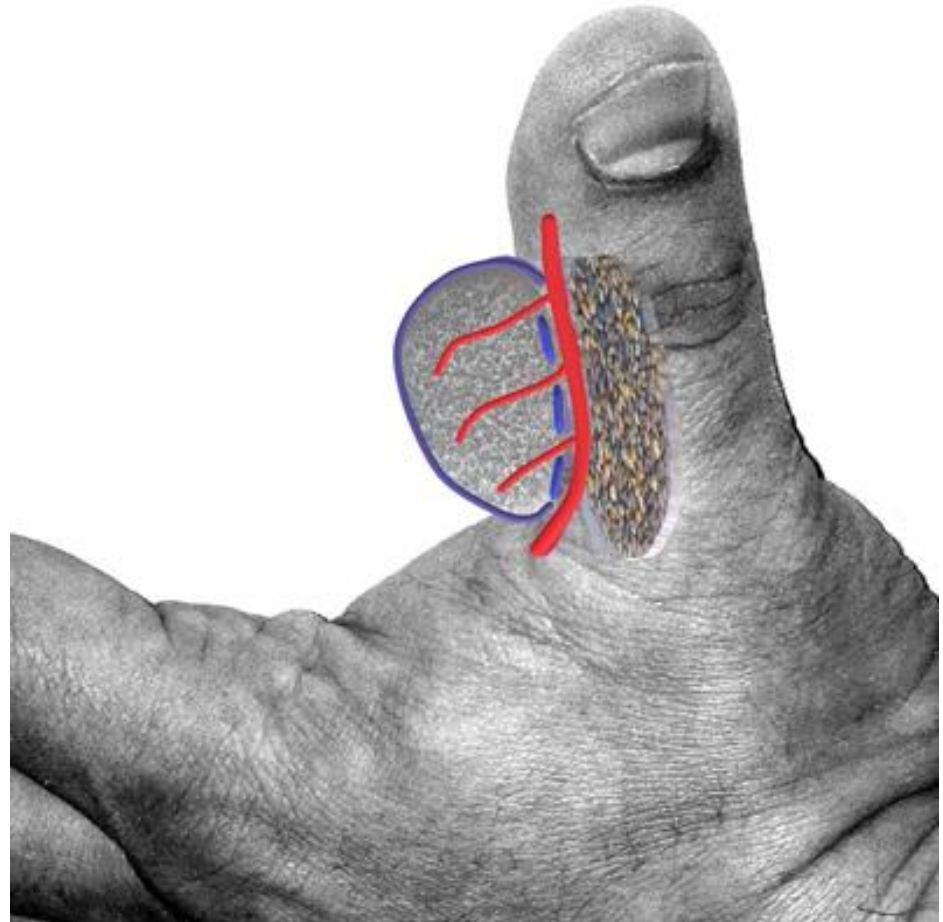




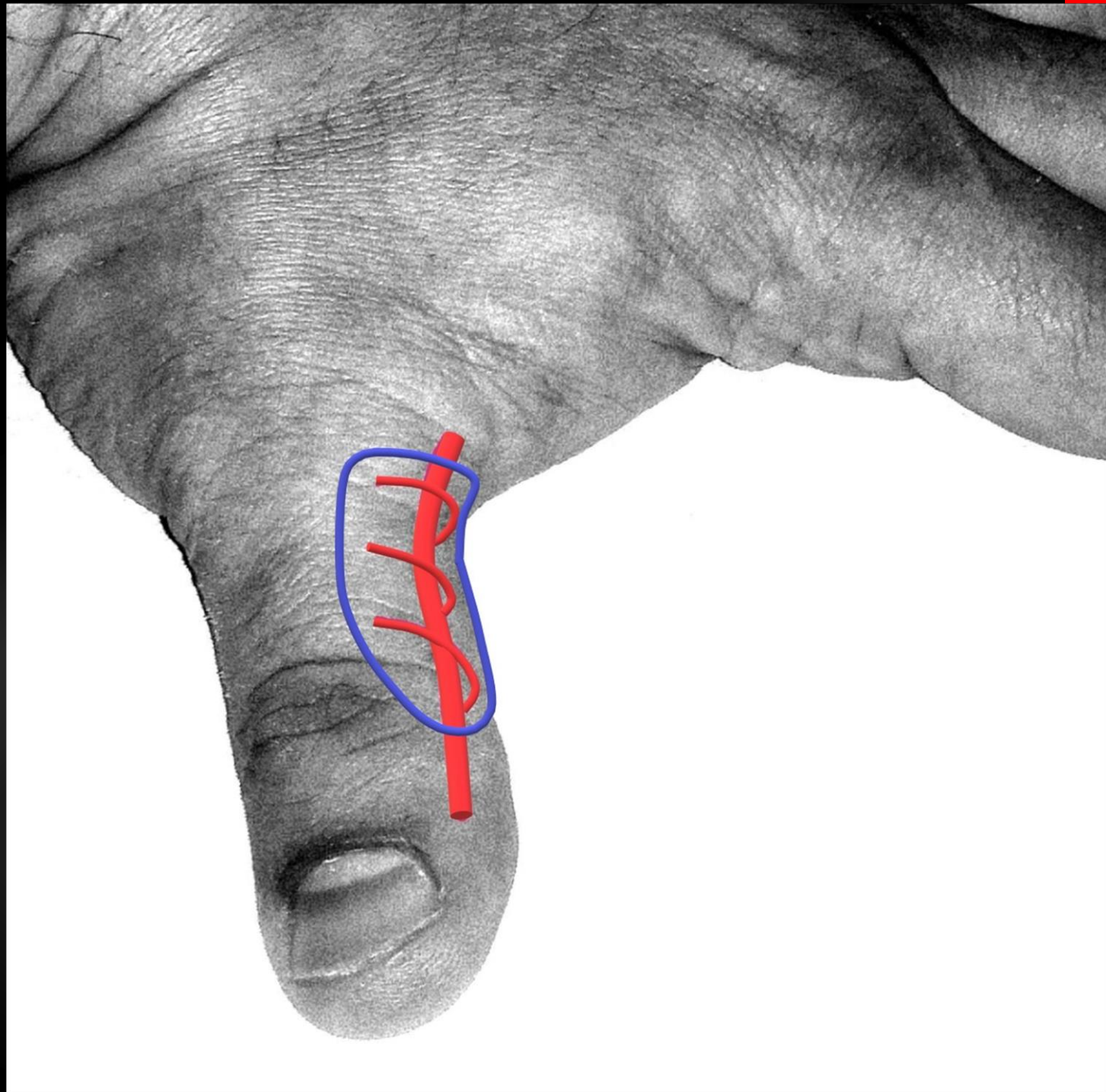


Colgajo Perforantes Arteria Colateral Ulnar del Pulgar

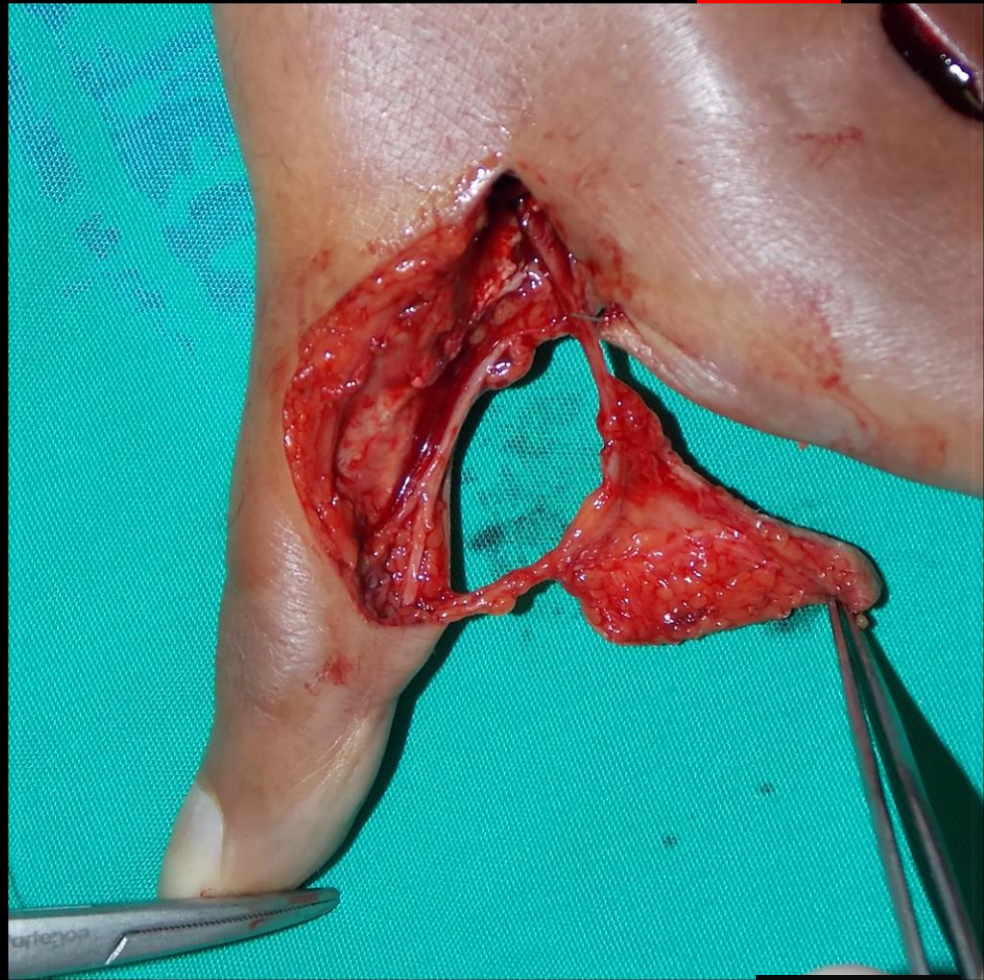
2019, Beltran et als.



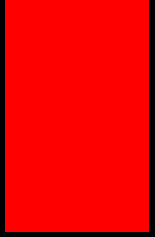


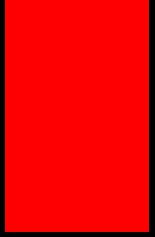


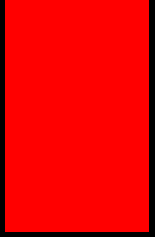


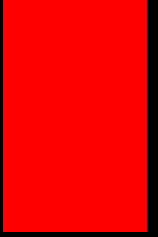




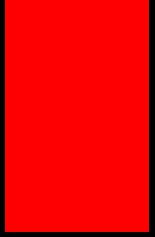










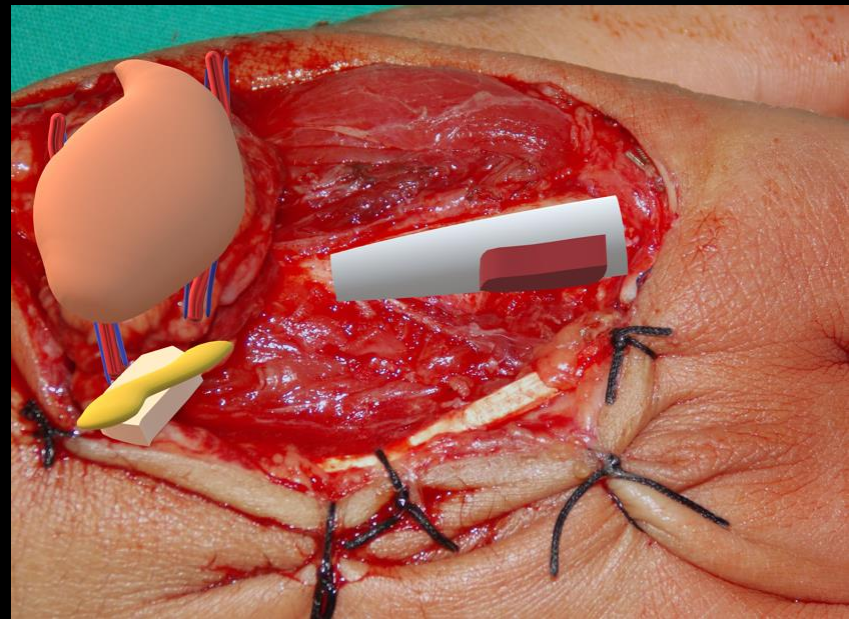






Reconstrucción 3 D

- ▶ Segmentos de tejido
- ▶ Bloques
- ▶ Perfusión
- ▶ Transiciones entre tejidos

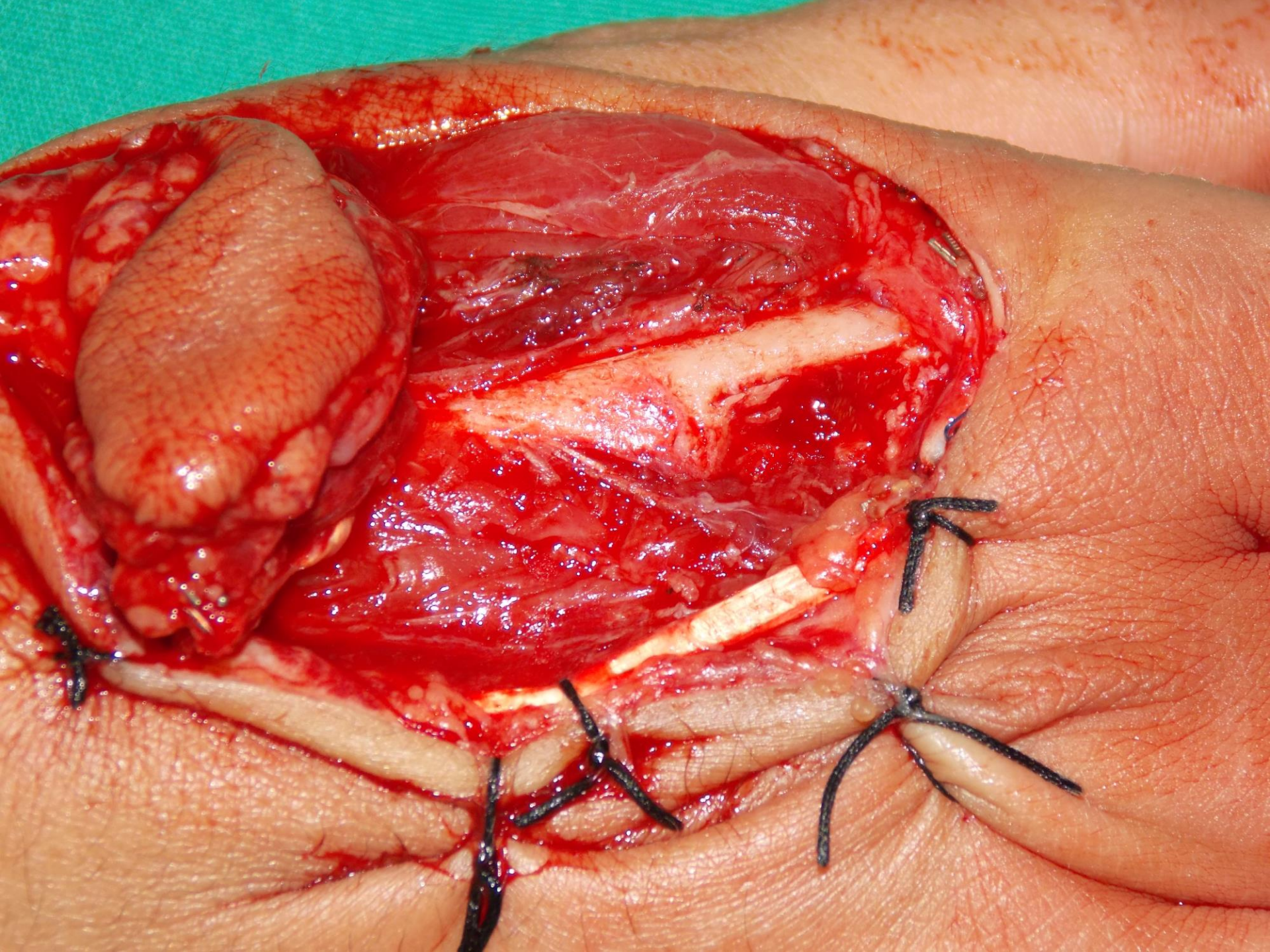


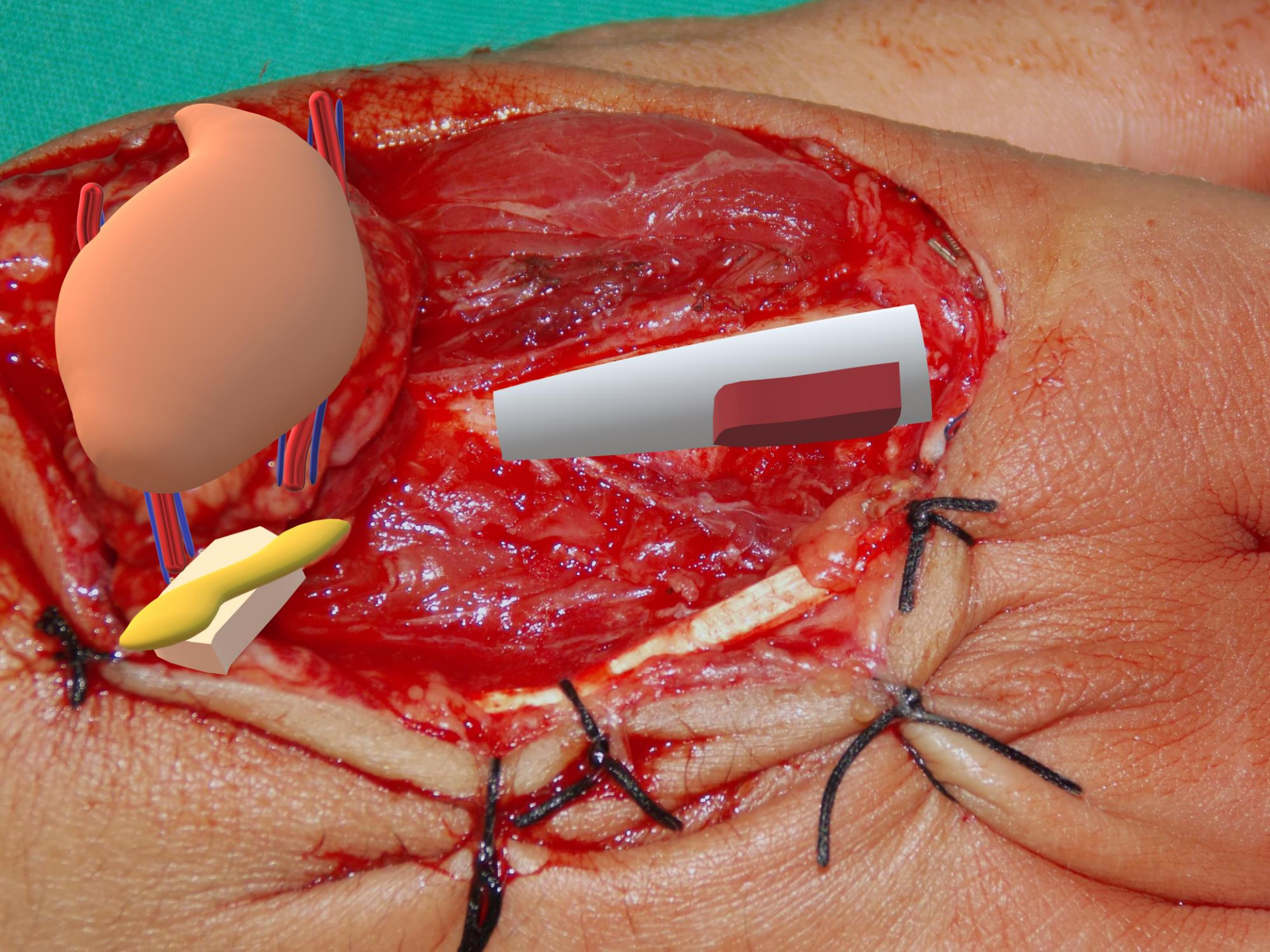


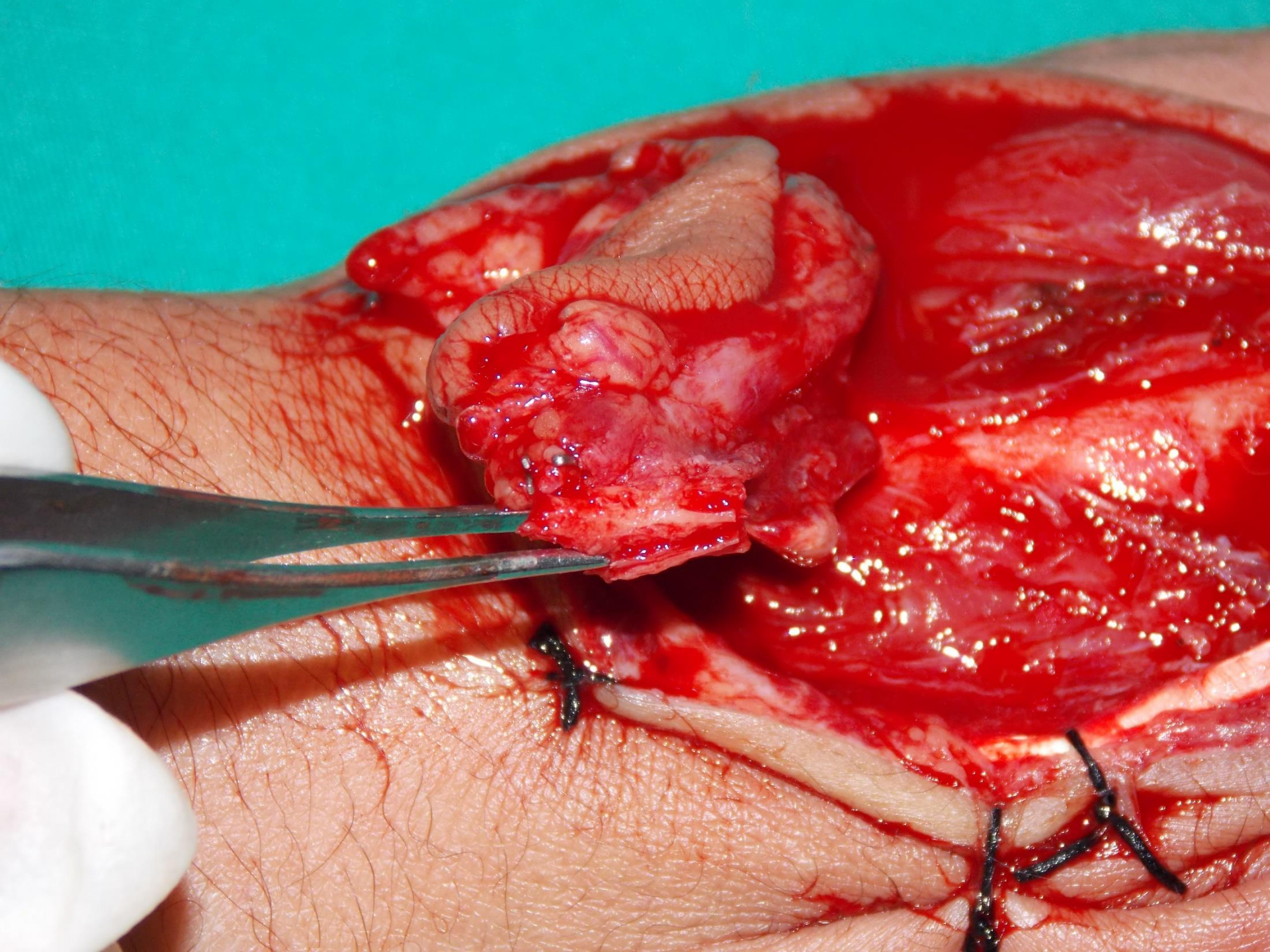


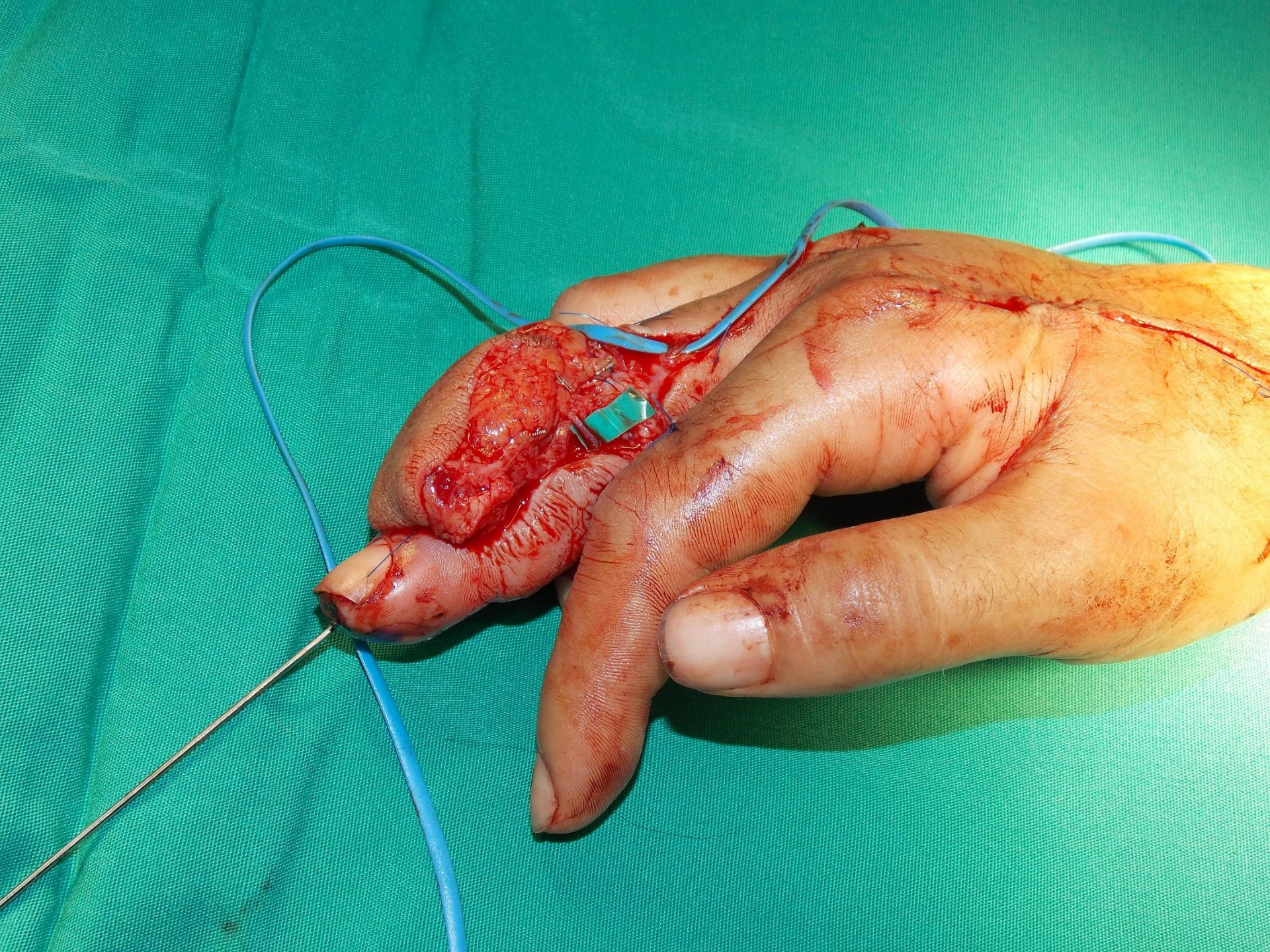


































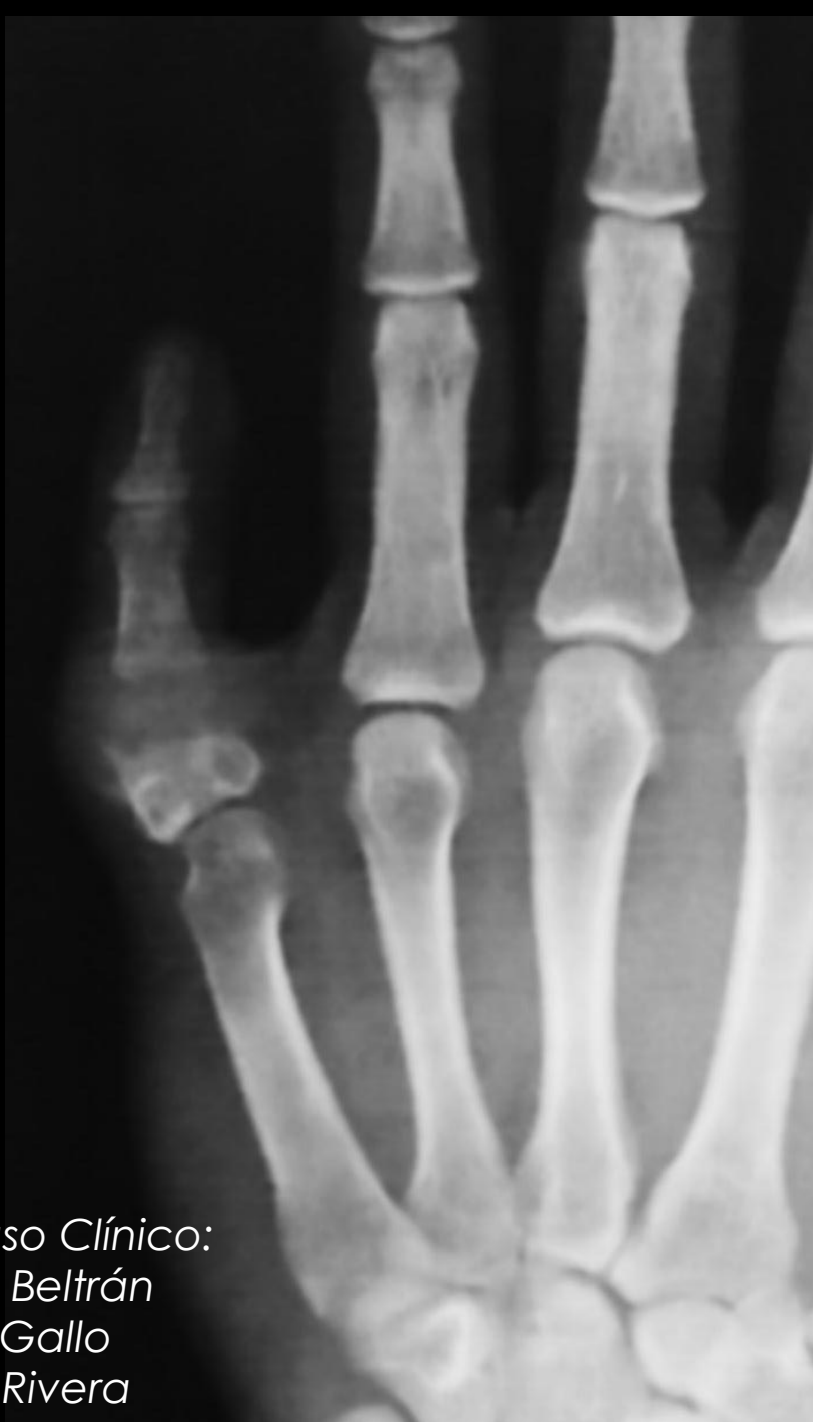




Caso Clínico:
A. Beltrán
O. Gallo
M. Rivera



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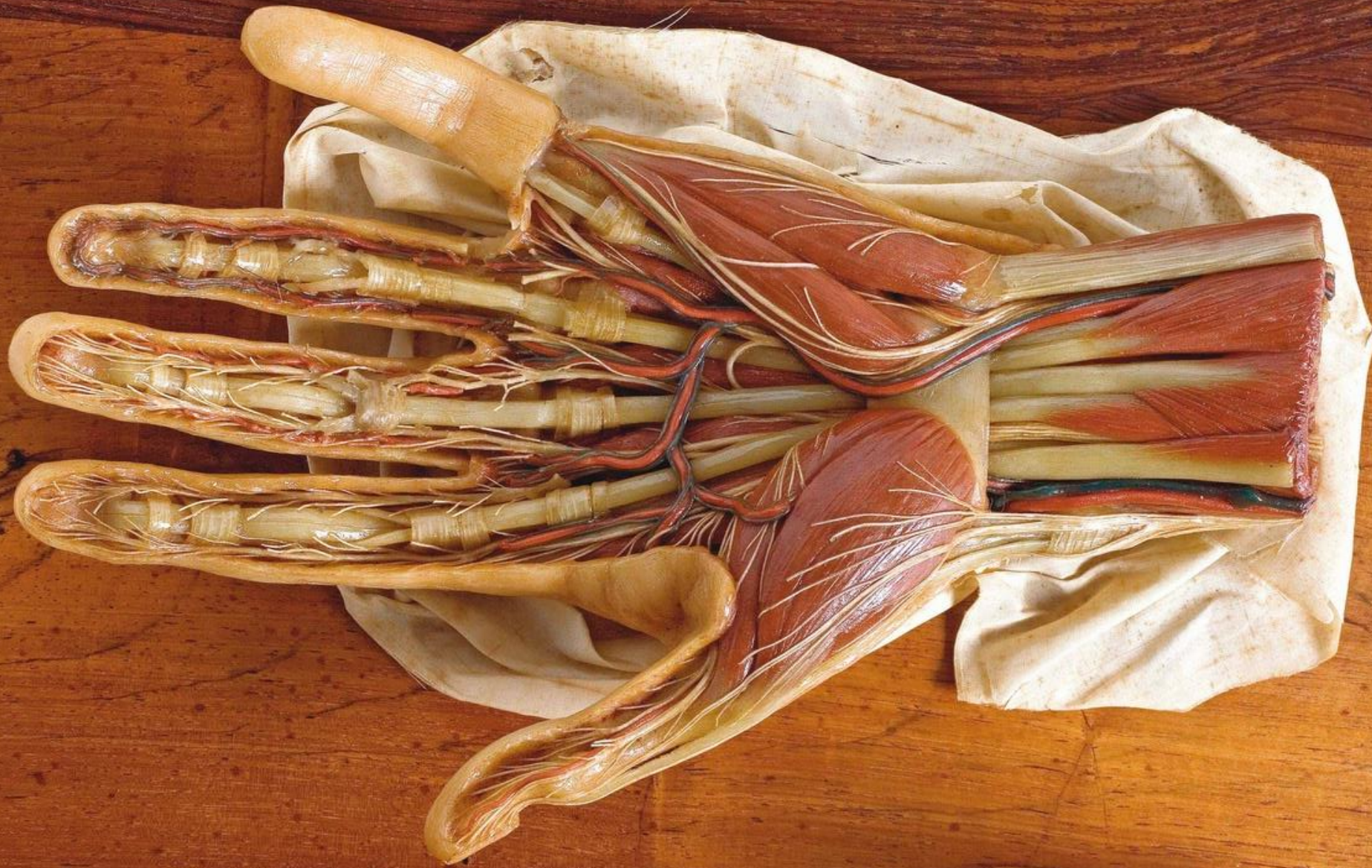
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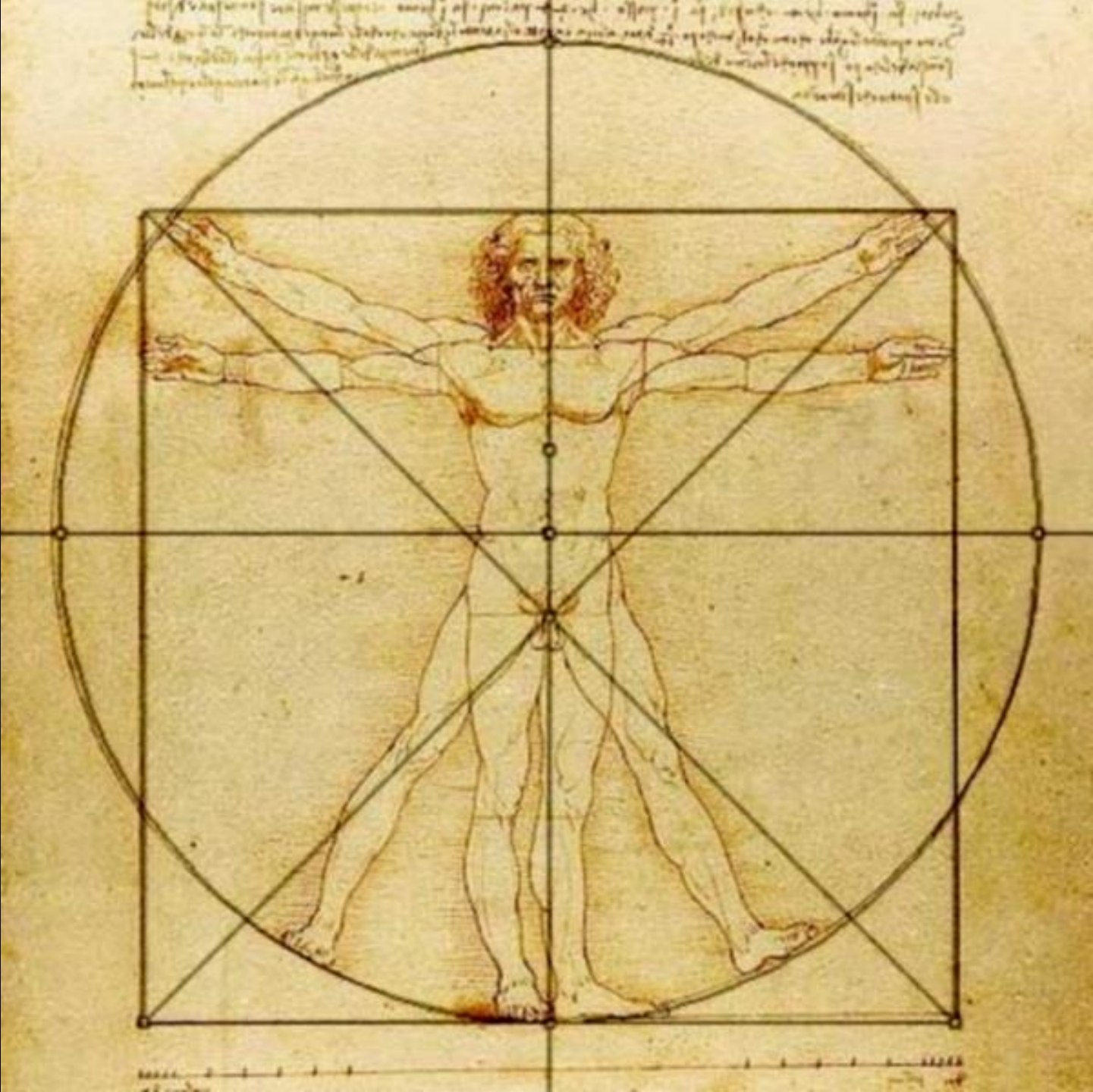
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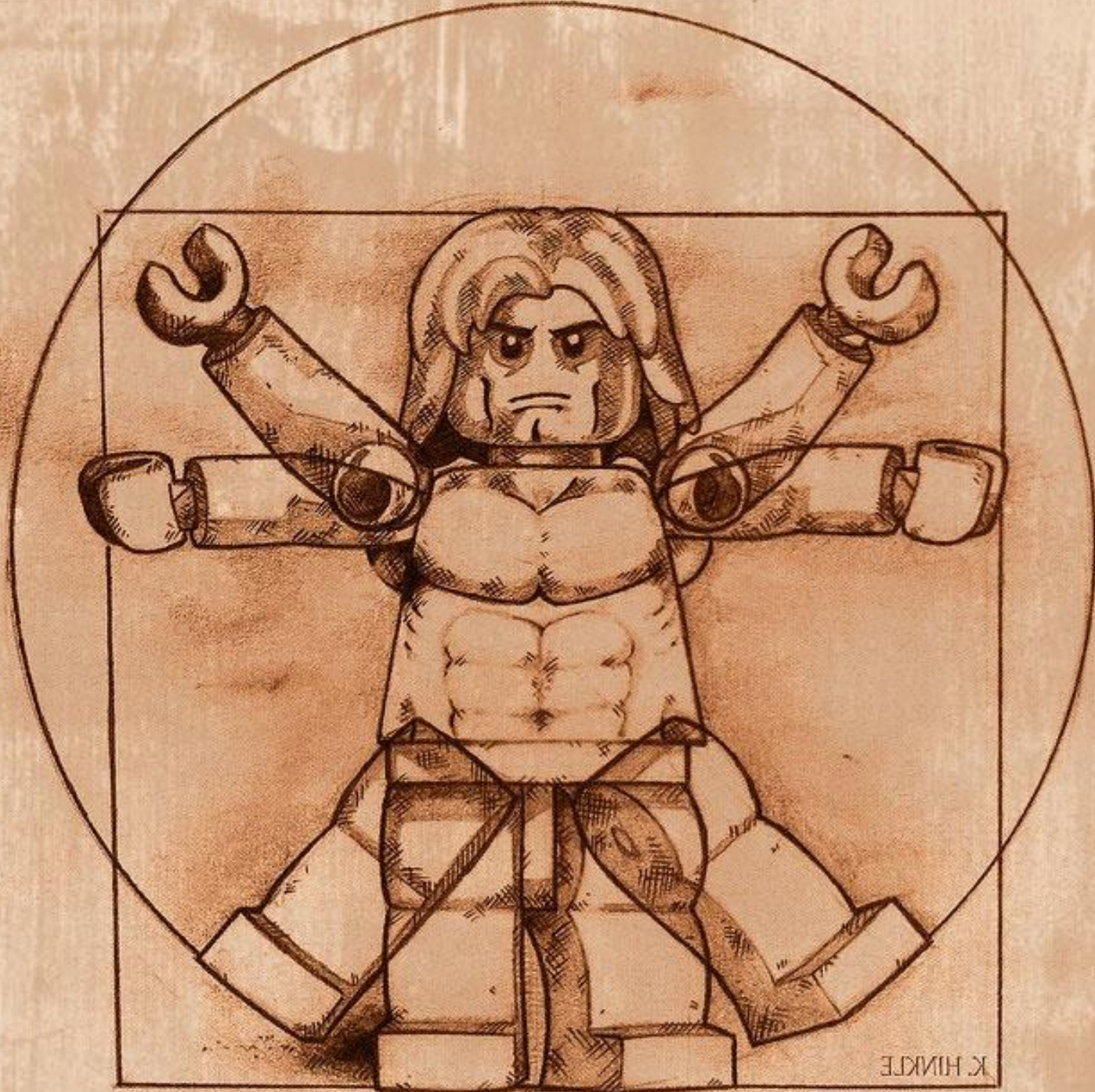


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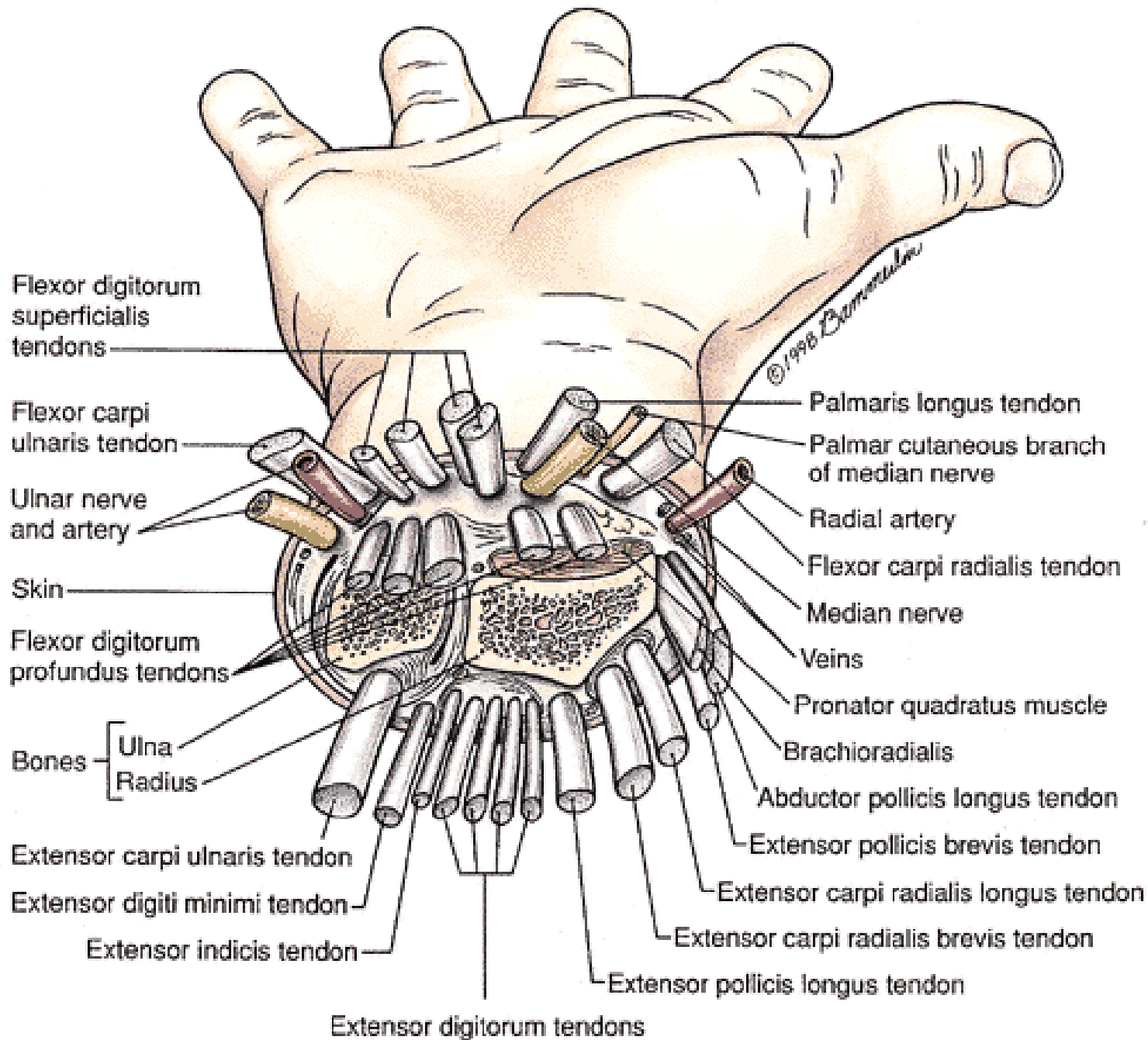
Museo "La Specola", Florencia – Italia





K. HINKLE





CHUCK JONES-



That 's all Folks