

Brachial Plexus Injury

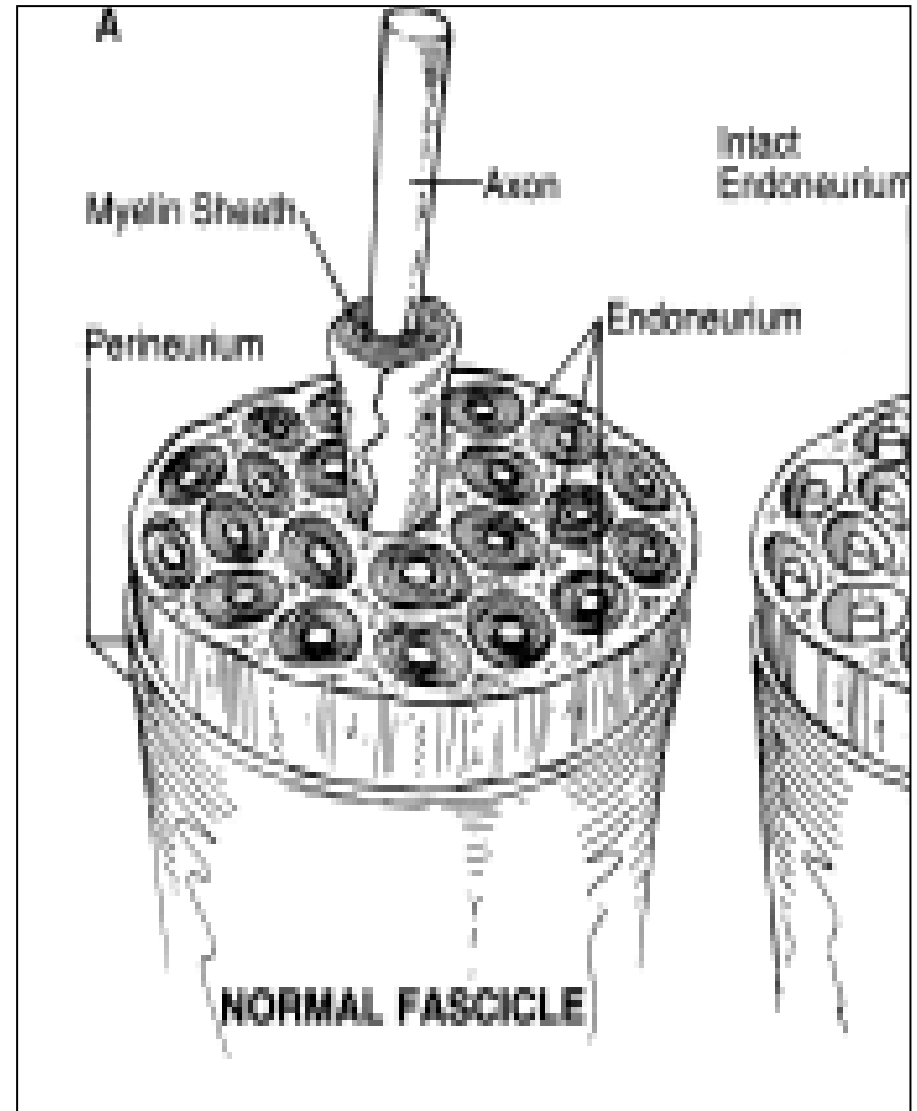
Andrew Blount MD



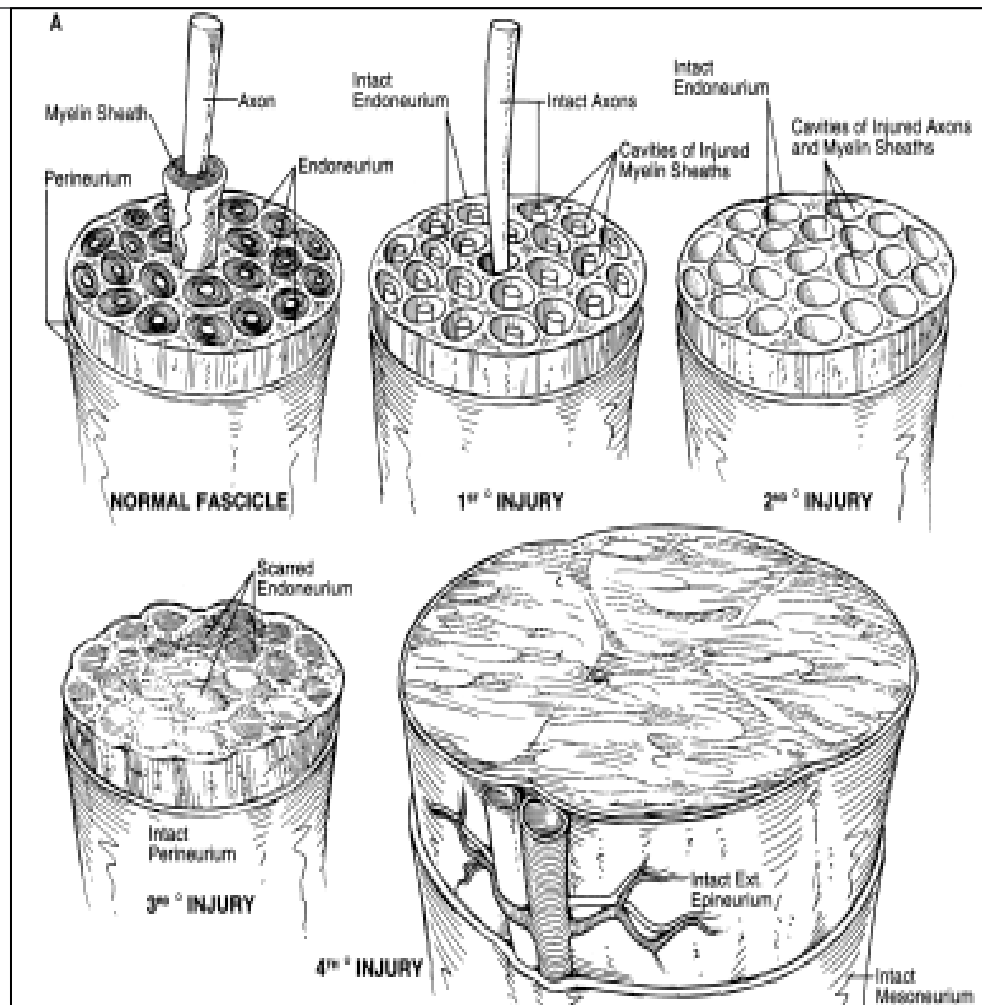
Dignity Health Medical Group

What are peripheral nerves?

- Wiring for our body
- All muscles, all sensation
- Nerves = axons + covering
 - Motor
 - Sensory
 - Autonomic (pain and temperature)

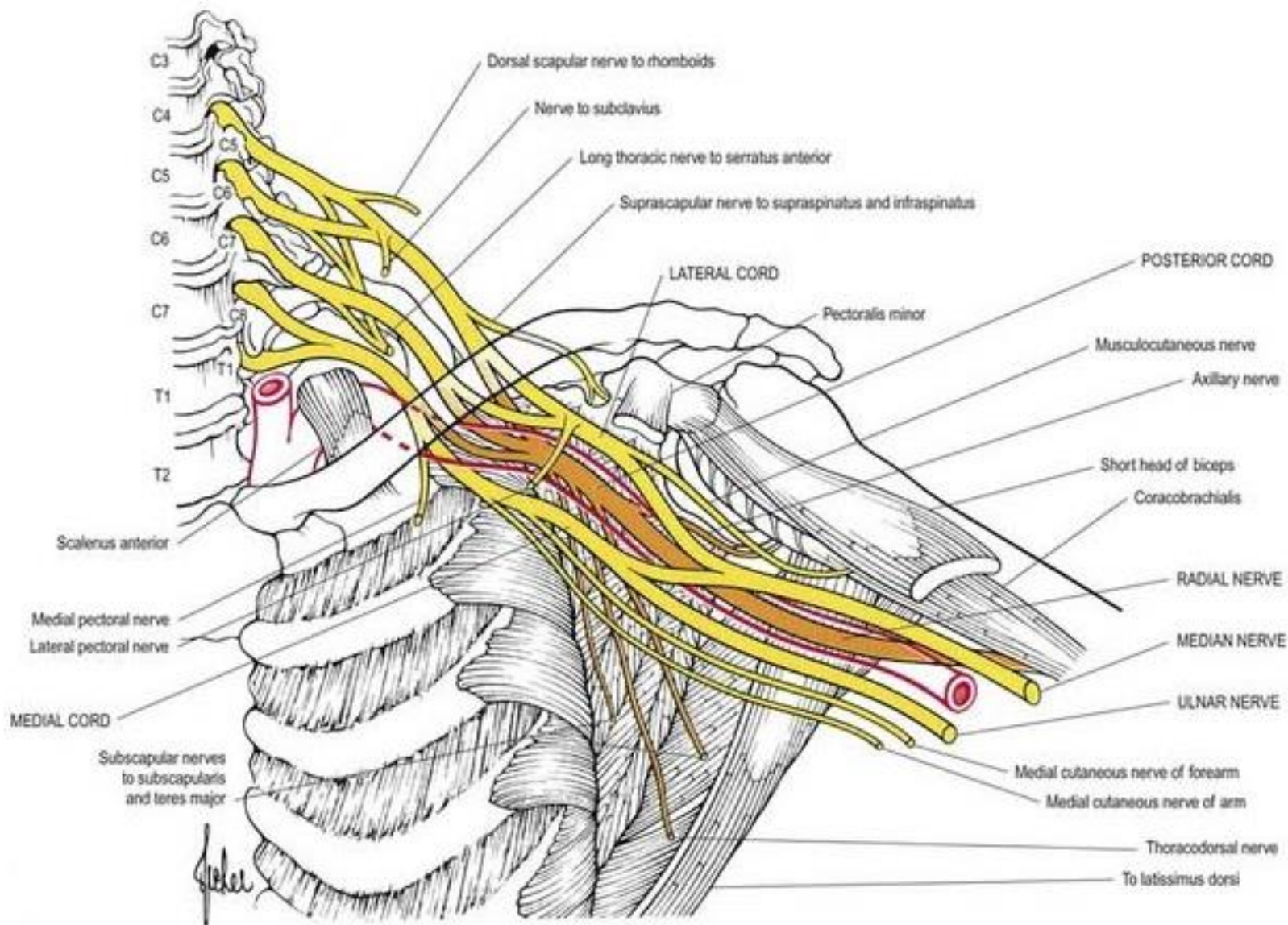


Classifying Nerve Injury



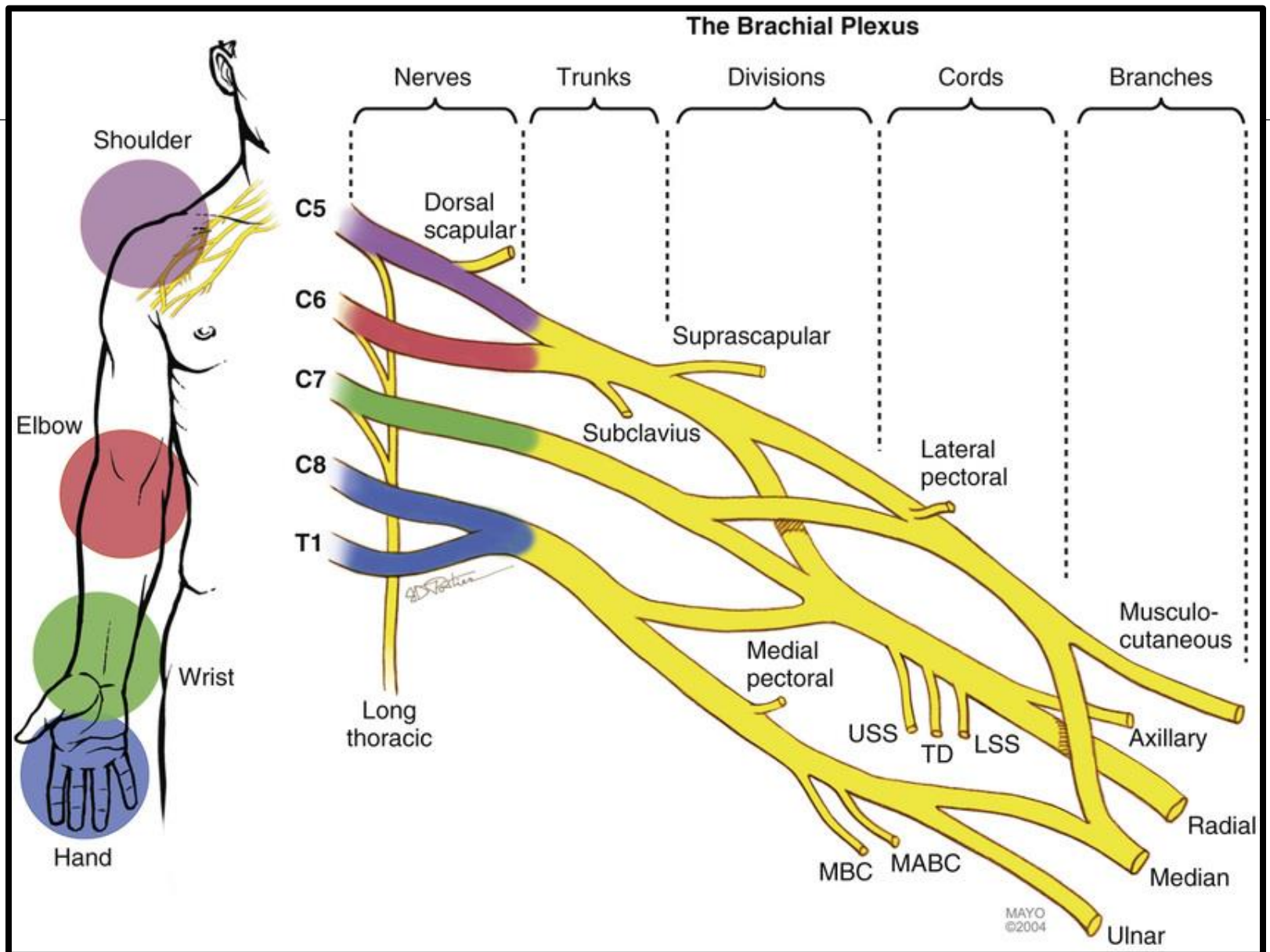
Peripheral Nerves in Plastic Surgery

- Nerve Repair
- Neuroma Resection
- Nerve Graft
- Nerve Decompression
- **Nerve Transfers for Brachial Plexus Injury**

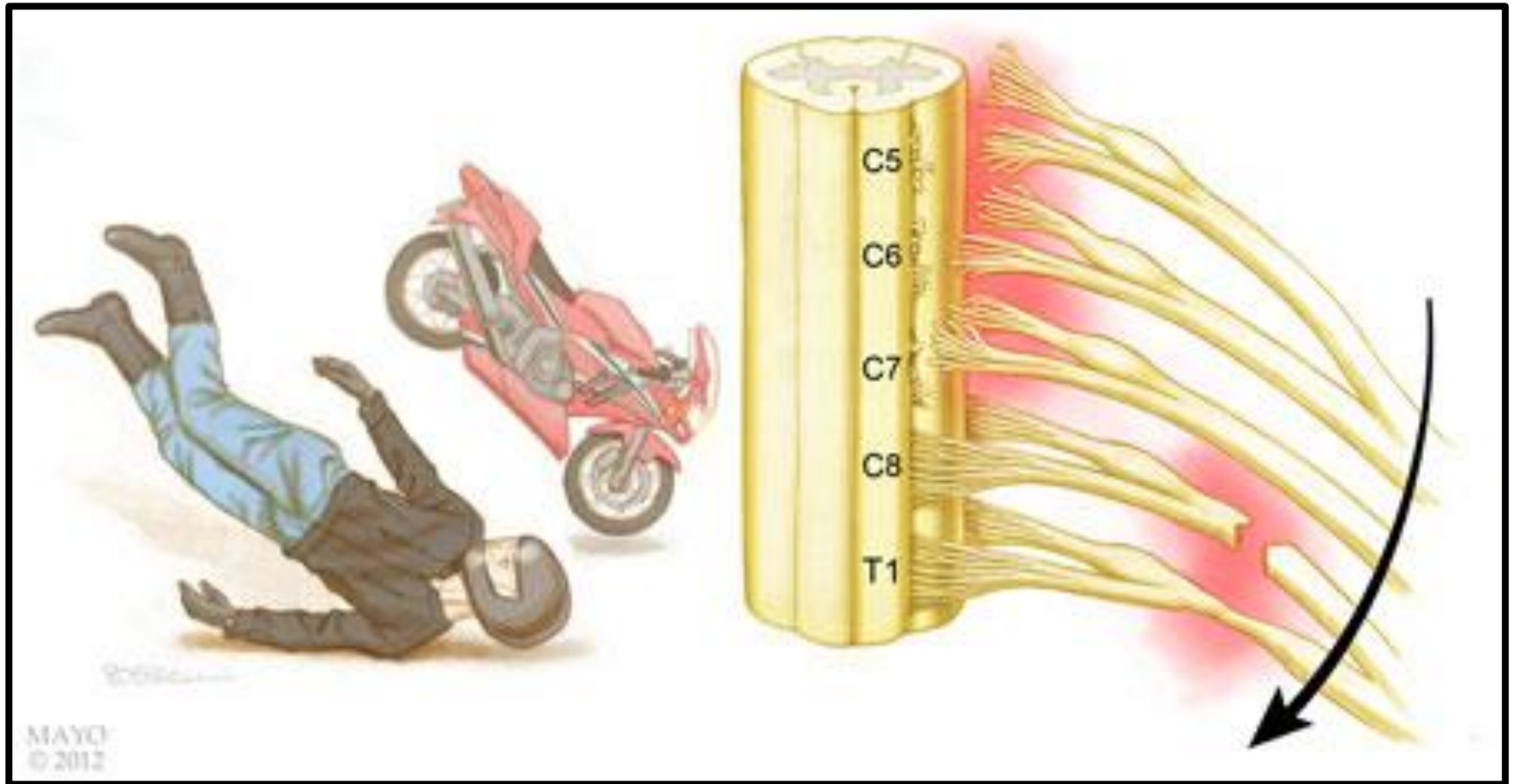


Mechanism

- Blunt
 - Majority of patients
 - MVA, MCC, fall
- Sharp
 - Stab, etc
 - Immediately explore
- Projectile
 - Small caliber: Delayed treatment similar to blunt
 - Thermal injury, contusion



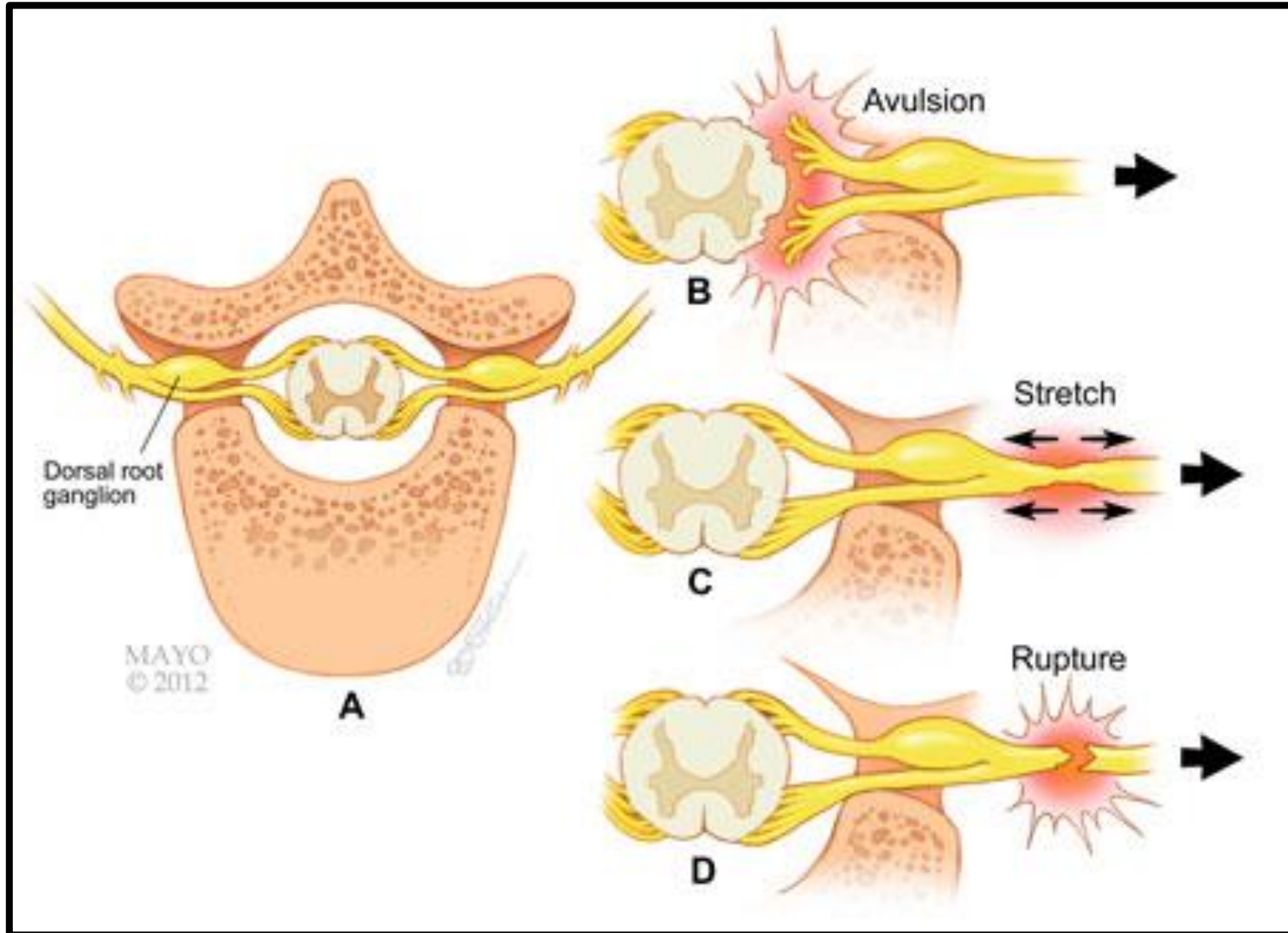
Ouch



Ouch



Blunt Trauma



Why transfer a nerve?

- Direct repair of plexus – poor outcomes
- Target too far
- Borrow from Peter to pay Paul
- Expendable local nerves → close target/quick re-innervation

Nerve Transfer to Biceps Muscle Using a Part of Ulnar Nerve for C5–C6 Avulsion of the Brachial Plexus: Anatomical Study and Report of Four Cases

**C. Oberlin, MD, D. Béal, MD, S. Leechavengvongs, MD, A. Salon,
M. C. Dauge, MD, J. J. Sarcy, MD, Paris, France**

- Case 1 (C5,6 in 29yo)
 - 2 yr – Biceps flexion MRC 4
- Case 2 (C5,6 in 28yo)
 - 6mo – biceps flexion MRC 3
- Case 3 (C5,6 in 29yo)
 - 14mo – MRC 4
- Case 4 (C5,6 in 18yo)
 - 10mo – MRC 4

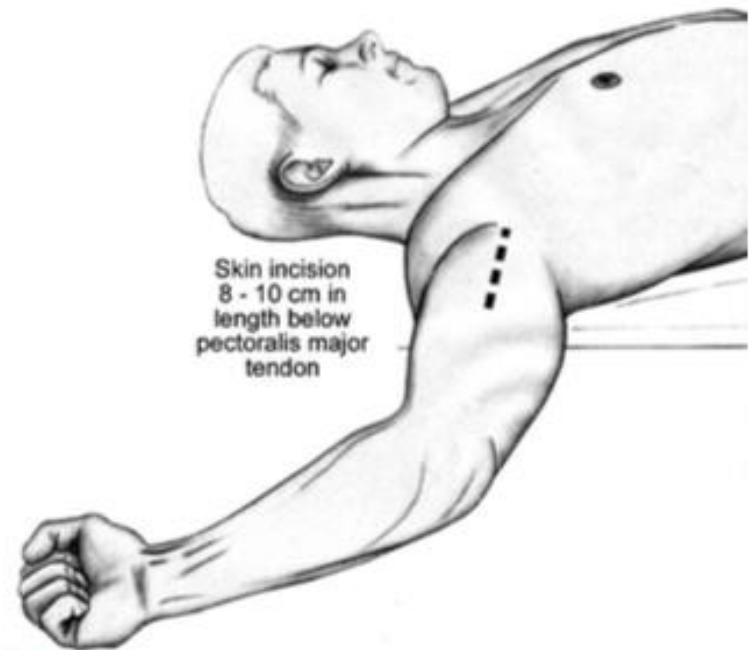
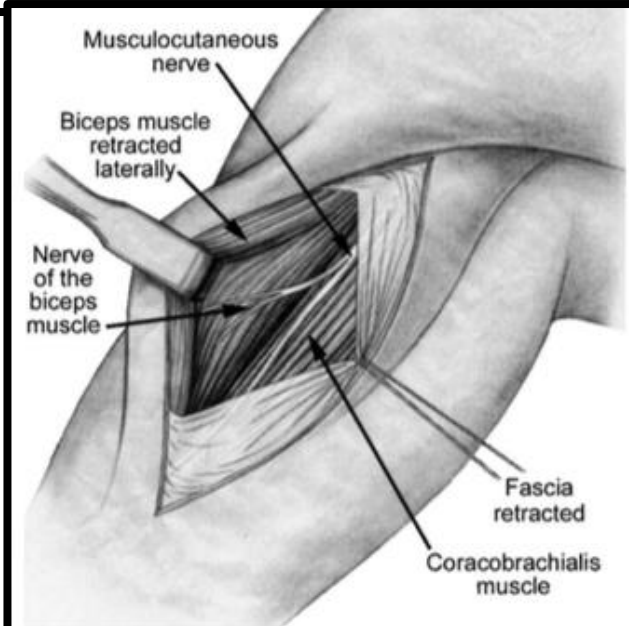
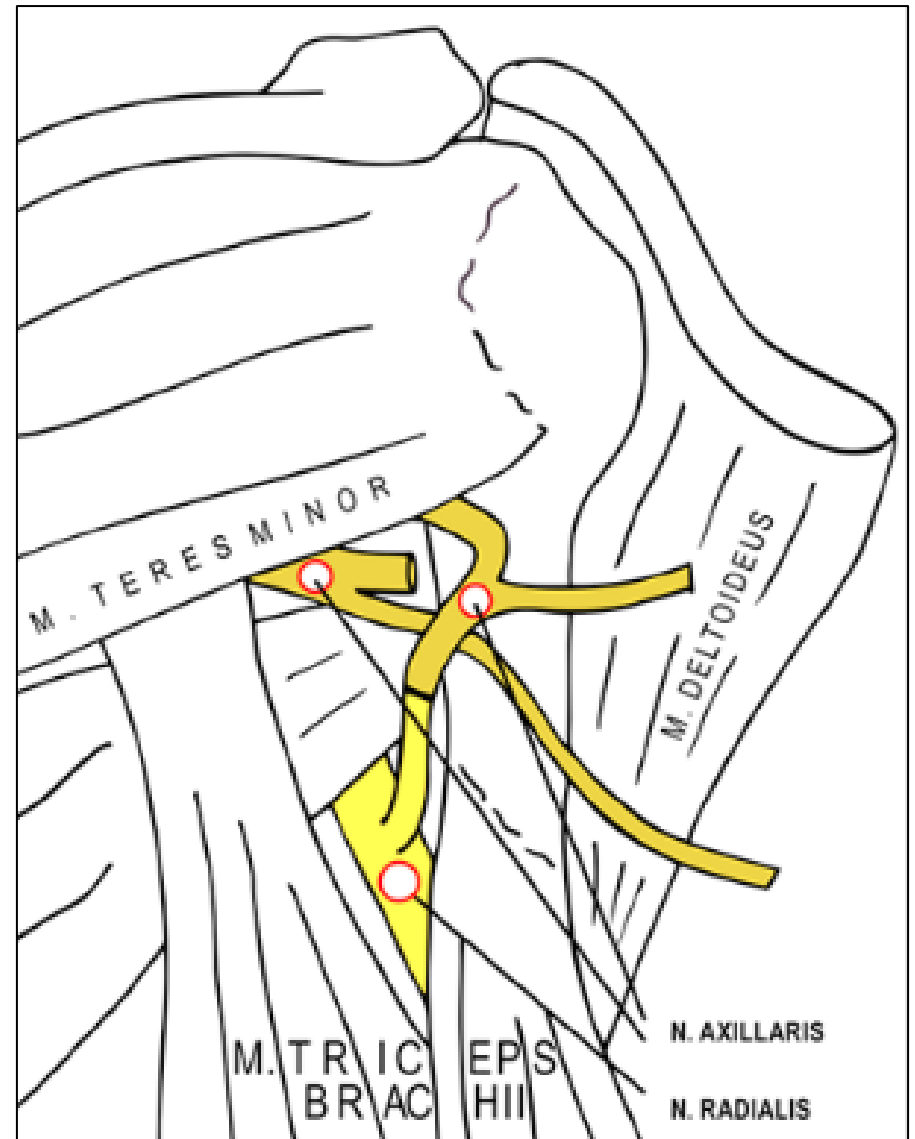
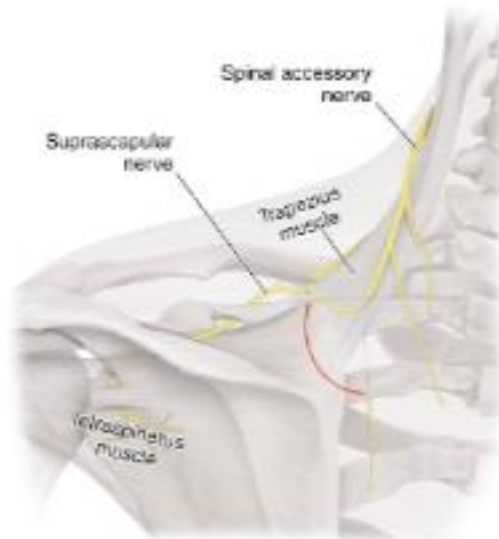
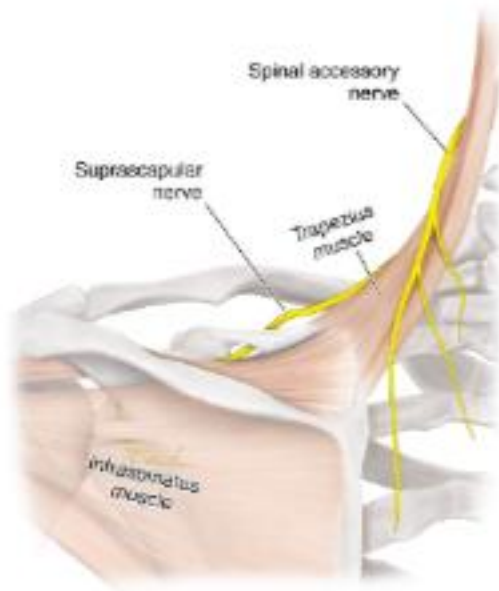


FIG. 1. Skin incision. It is a longitudinal incision below the pectoralis major tendon, 8–10 cm long.



Accessory to suprascap/radial to axillary

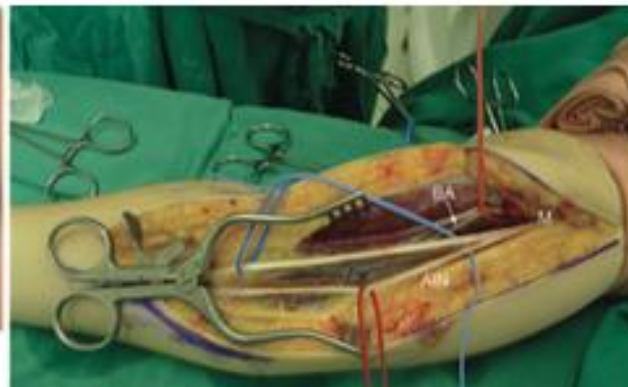
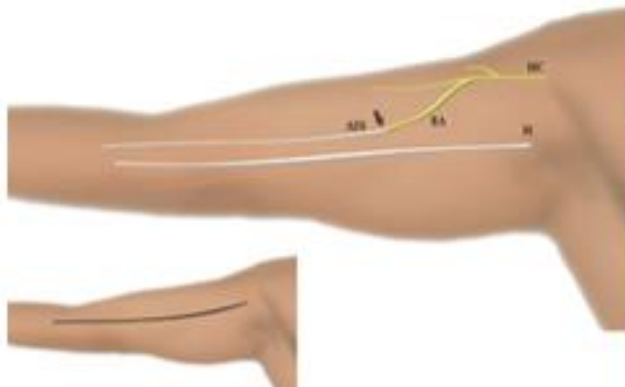


Nerve transfers for restoration of finger flexion in patients with tetraplegia

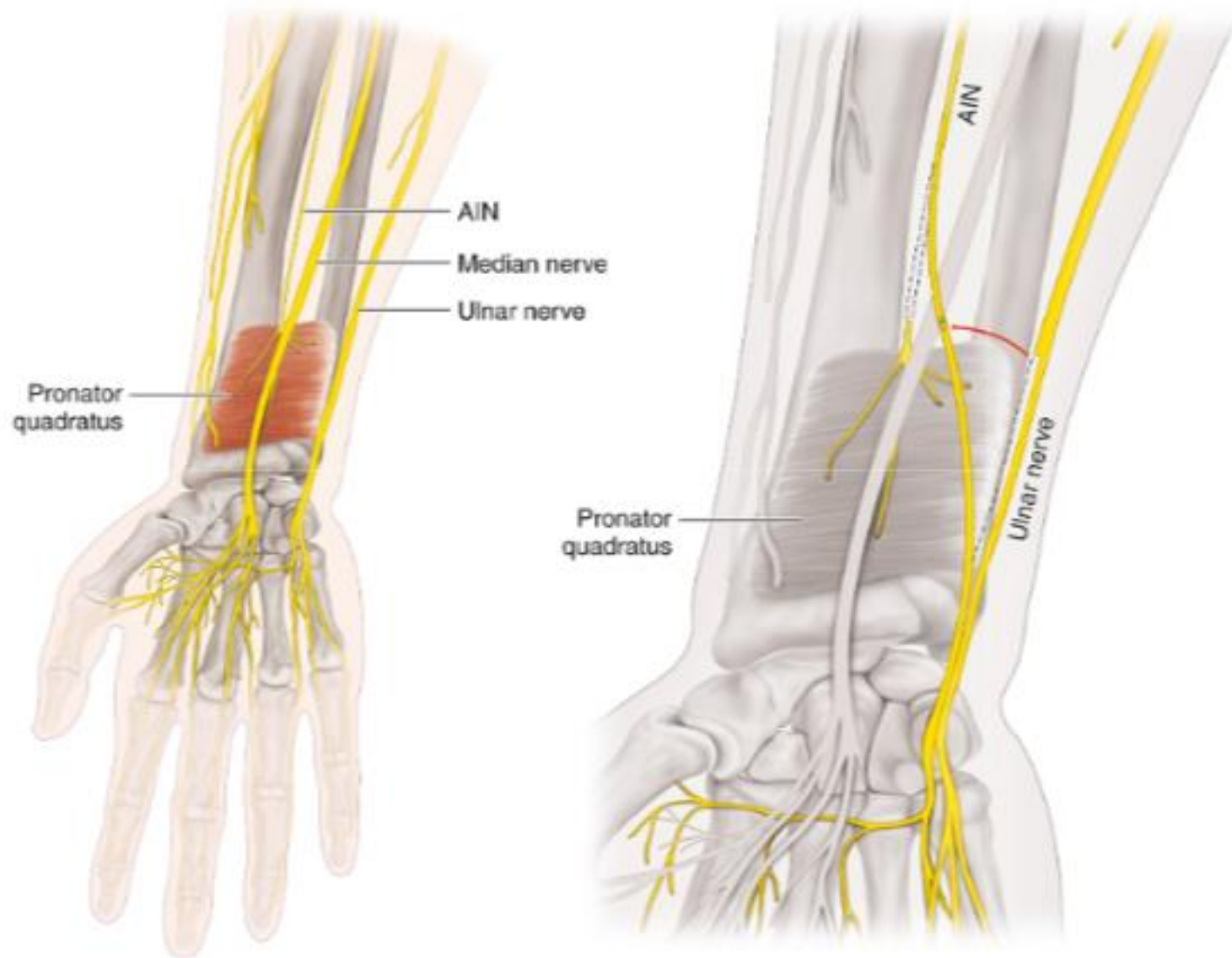
Jayme A. Bertelli, MD, PhD,^{1,2} and Marcos F. Ghizoni, MD, MSc²

¹Center of Biological and Health Sciences, Department of Neurosurgery, University of the South of Santa Catarina (Unisul), Tubarão; and ²Department of Orthopedic Surgery, Governador Celso Ramos Hospital, Florianópolis, Santa Catarina, Brazil

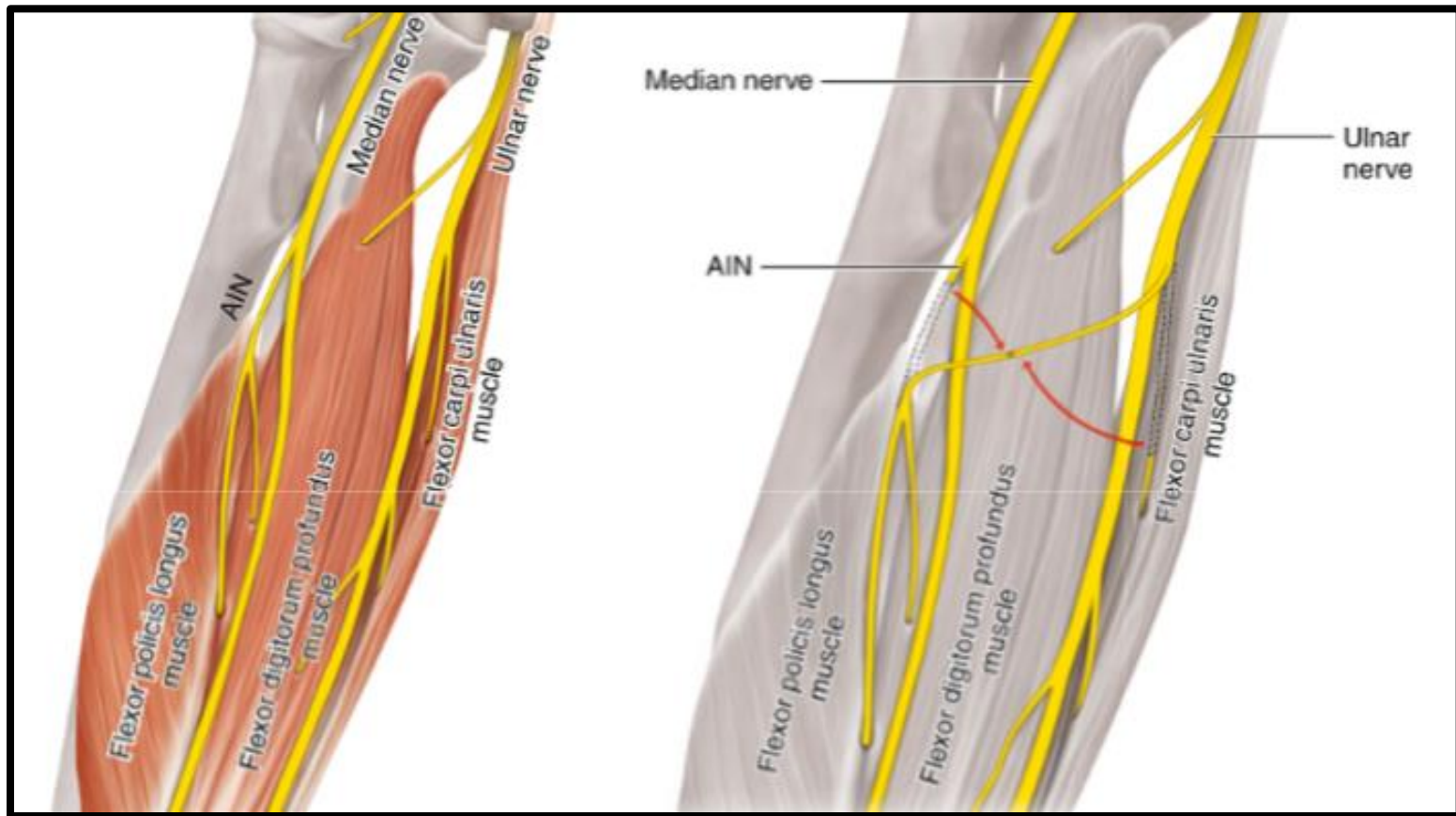
- Donor nerve
 - Nerve to brachialis in 8
 - Nerve to BR in 4
 - Nerve to ECRB in 5 - preferred
- Recipient nerve
 - AIN in 9
 - Median motor in mid-arm in 8



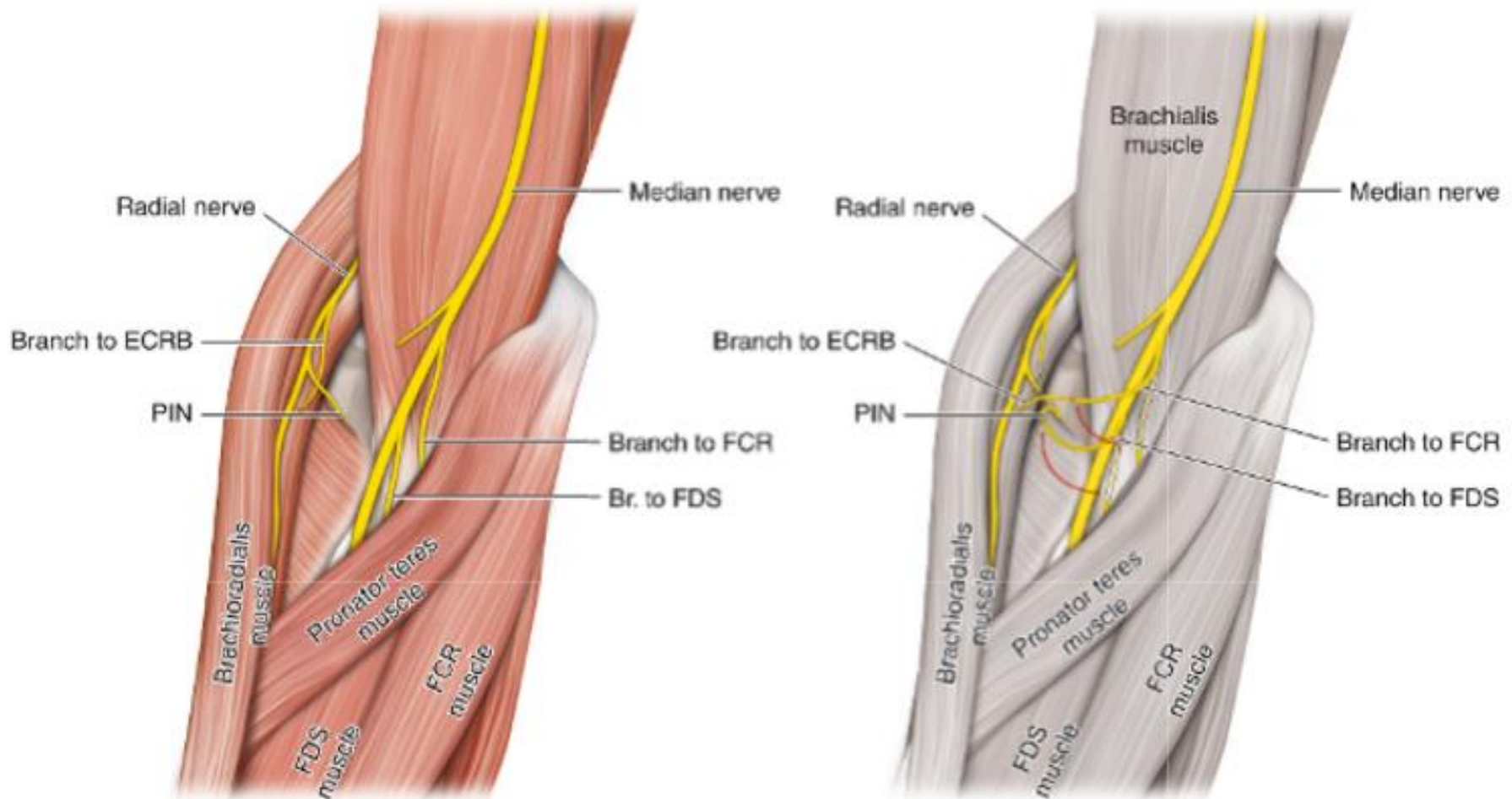
AIN to Ulnar Motor



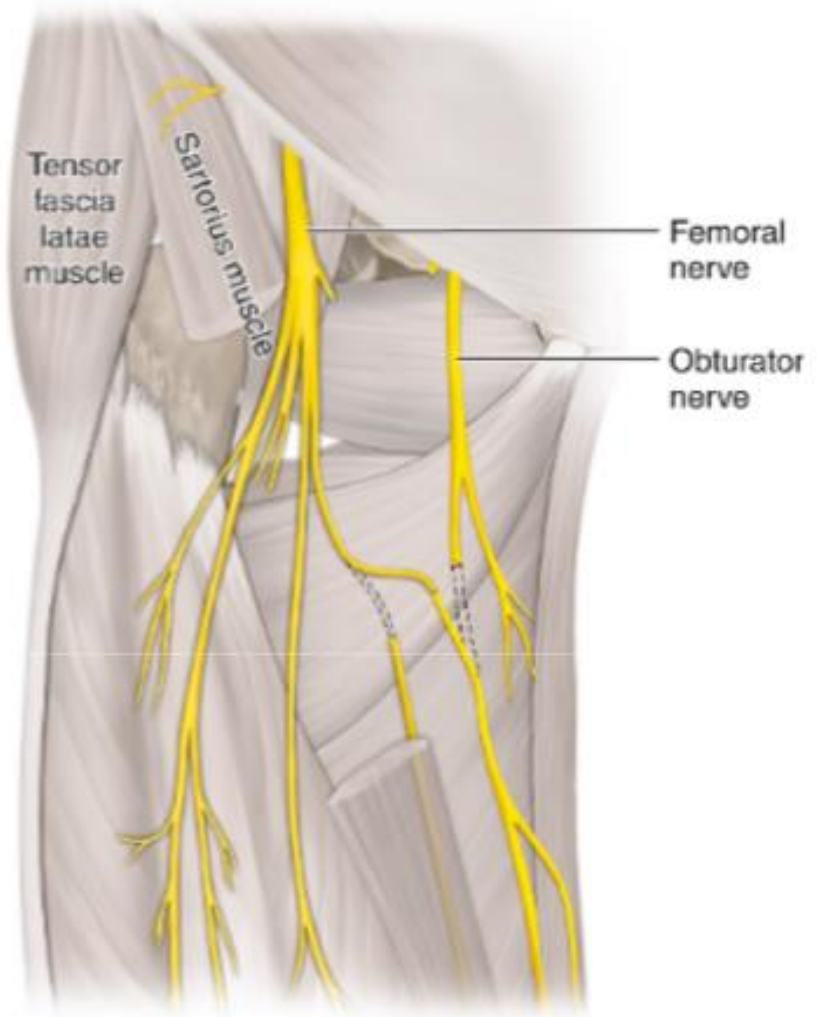
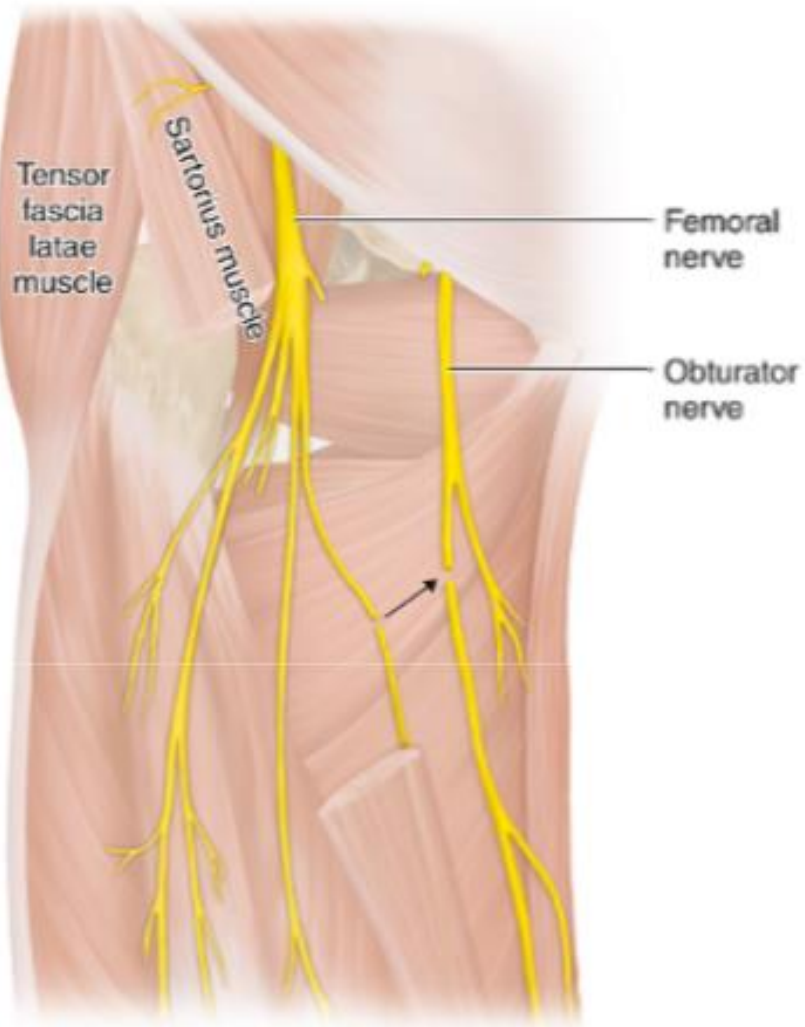
Ulnar (FCU) to AIN



Median to radial



Femoral to Obturator



Tibial to peroneal

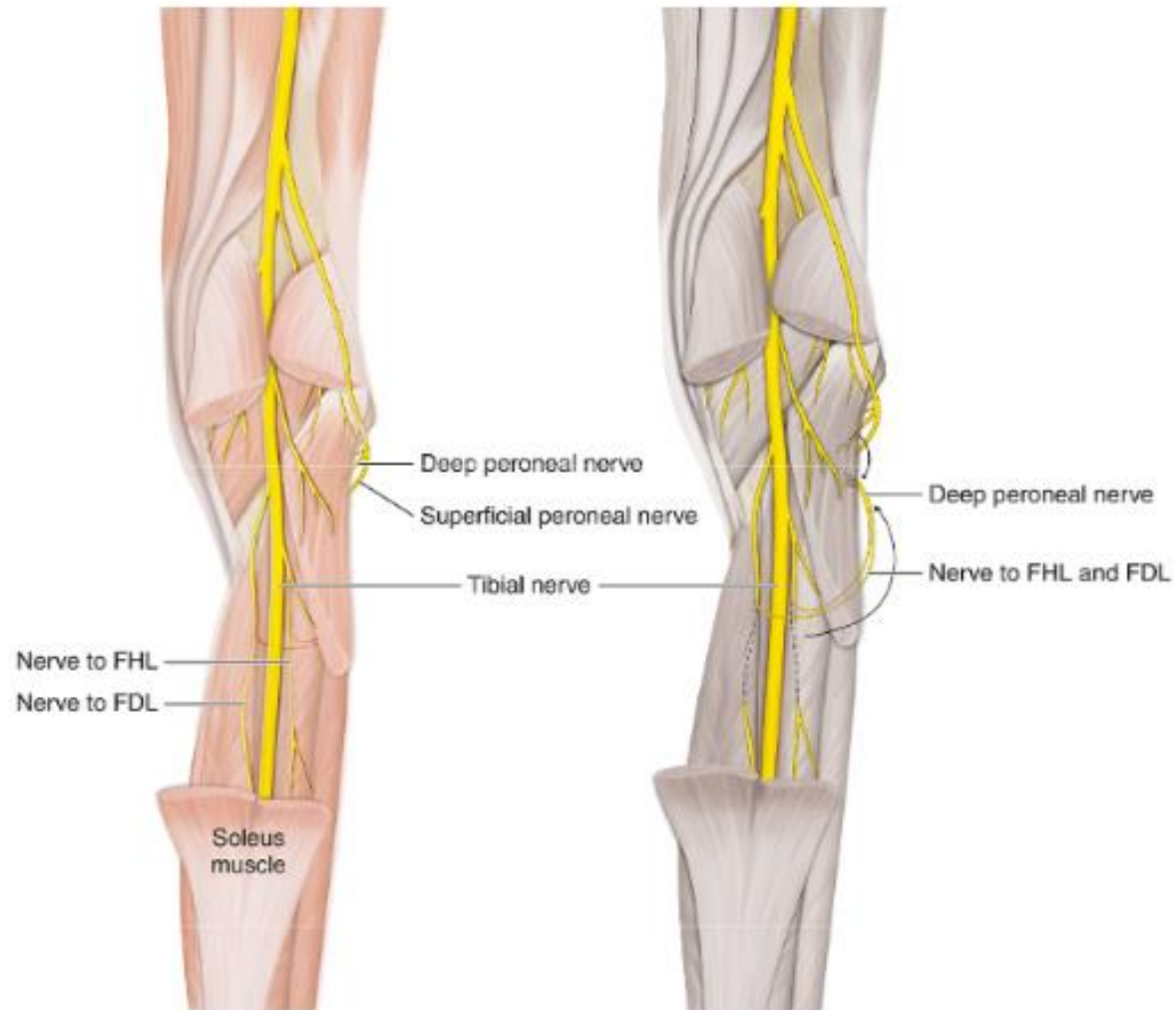


TABLE 2. Common Motor Nerve Transfers of Upper Extremity

Motor Deficit	Recipient Nerve(s)	Donor Nerve(s)
Elbow flexion	Biceps, brachialis branches of MCN	Ulnar nerve fascicle to FCU Median nerve fascicle to FDS/PL/FCR
Elbow flexion	MCN	Medial pectoral nerve branches
Elbow flexion	MCN	Thoracodorsal nerve
Elbow flexion	MCN	Distal accessory nerve
Elbow flexion	MCN	Intercostal nerves
Shoulder abduction/external rotation	Suprascapular nerve	Accessory nerve (distal end-to-end or end-to-side with neurectomy and proximal crush injury) ^{33*} Pectoral fascicle of C7, middle trunk
Shoulder abduction	Axillary nerve	Medial triceps branch
Shoulder abduction	Axillary nerve	Medial pectoral nerve
Shoulder abduction	Axillary nerve	Thoracodorsal nerve
Shoulder abduction	Axillary nerve	Intercostal nerves
Scapular winging/instability	Long thoracic nerve	Thoracodorsal nerve†
Scapular winging/instability	Long thoracic nerve	Pectoral fascicle of C7, middle trunk†
Scapular winging/instability	Long thoracic nerve	Intercostal nerves
Intrinsic hand	Deep motor branch/fascicle of ulnar nerve	Distal AIN
Pronation	Pronator teres branches of median nerve	ECRB branch of radial nerve FDS or FCR/palmaris longus branch of median nerve
Wrist, finger extension	ECRB, PIN branches of radial nerve	FDS, FCR/PL branches of median nerve*
Finger flexion		
Elbow extension		
Elbow extension		

Nerve Transfers: Indications, Techniques, and Outcomes

Care Providers

- Assessment
 - Motor difficulty at shoulder, elbow, wrist, fingers
 - Shoulder shrug
 - Arms above head
 - Flex and extend elbow
 - Flex and extend wrist
 - Full fist
 - BILATERAL EXAM
 - Xrays for any tender areas or abnormal ROM

Care Providers

- Assessment
 - Sensory changes at fingers
 - Palm side digits
 - Index – Median nerve
 - Pinky – Ulnar nerve
 - Facial exam
 - Ptosis, miosis, anhydrosis
 - CXR – elevated hemidiaphragm
 - MRI neck – spinal roots

Thanks!

