



NEURO-ULTRASOUND OF LOCOMOTIVE APPARATUS (WHAT WE NEED TO KNOW)



THE
UNIVERSITY OF
LAHORE

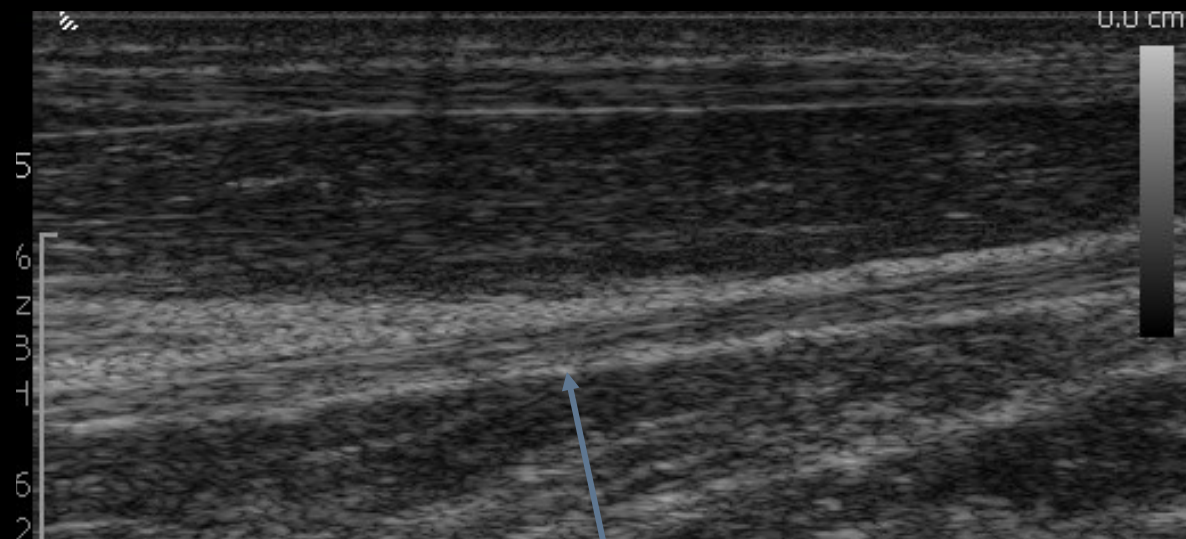


Prof.Dr Syed Amir Gilani

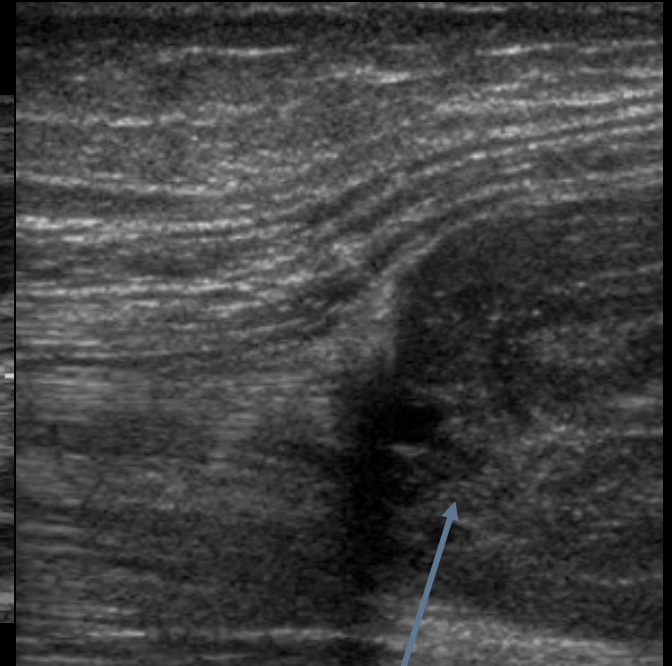
MBBS,MD(Rad),DMRD,PhD(Rad)PhD(ultrasound)



Sonography of peripheral Nerves



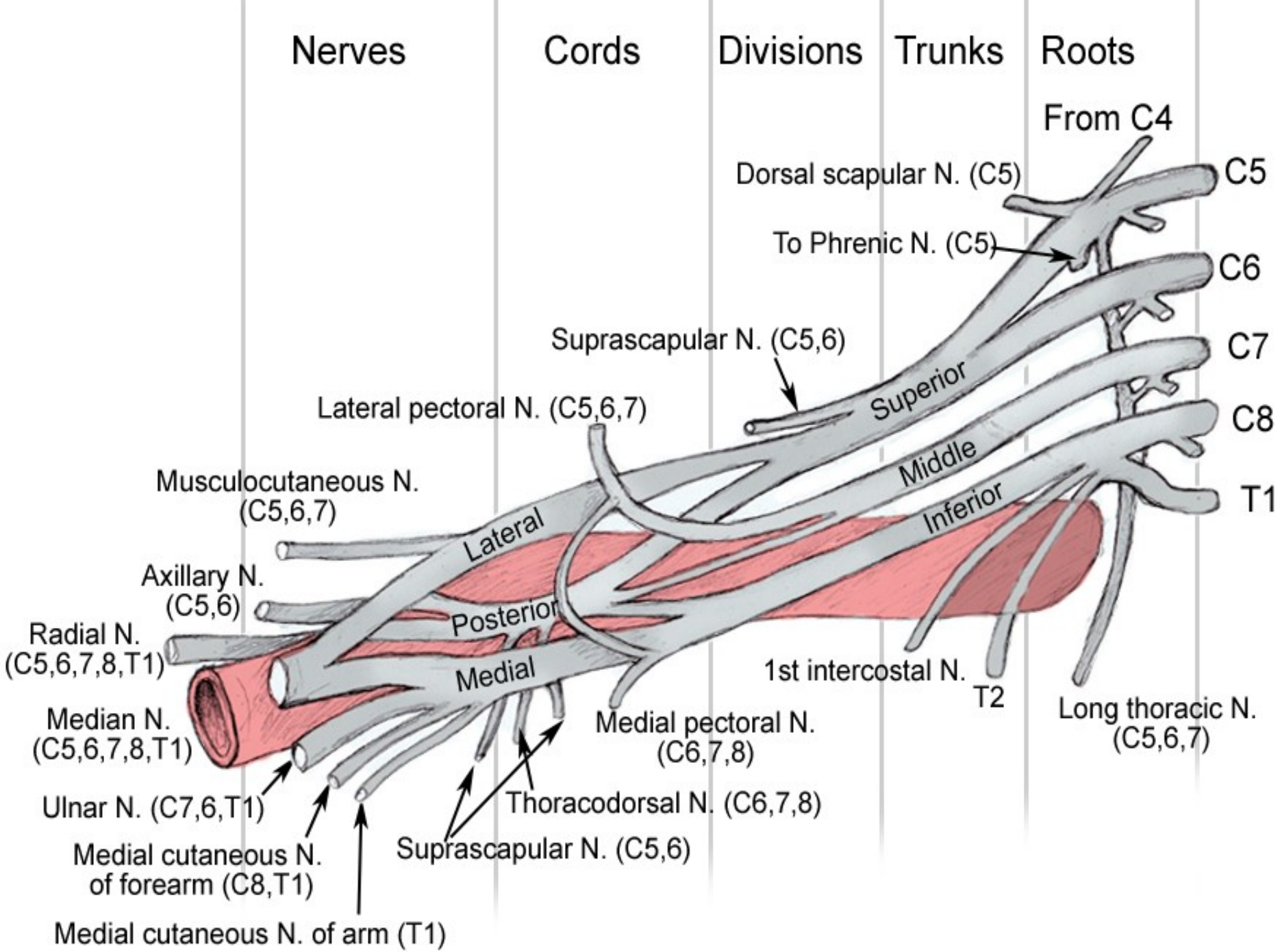
**Longitudinal image
of normal nerve**

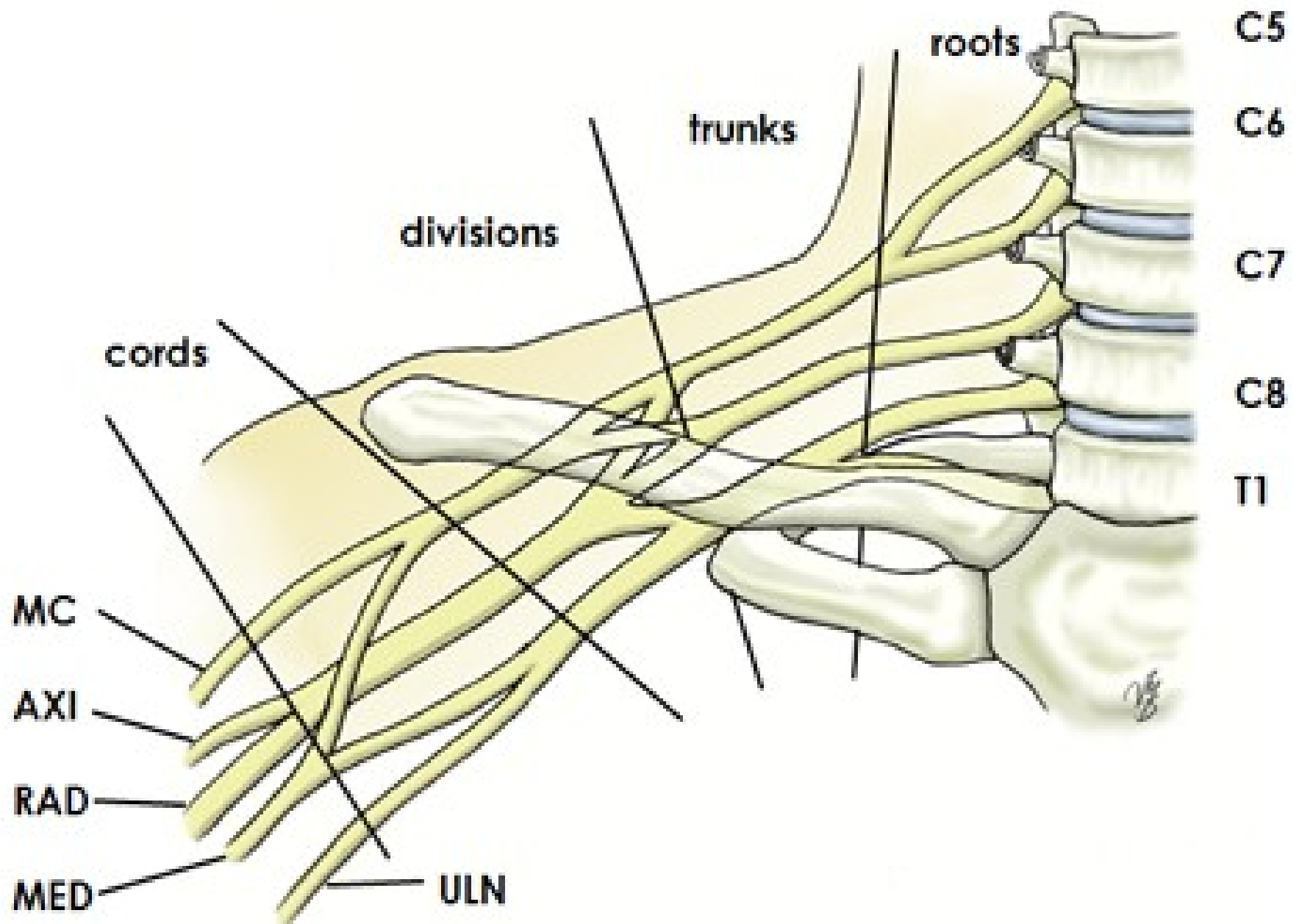


**Longitudinal image
of neuronal tumour**

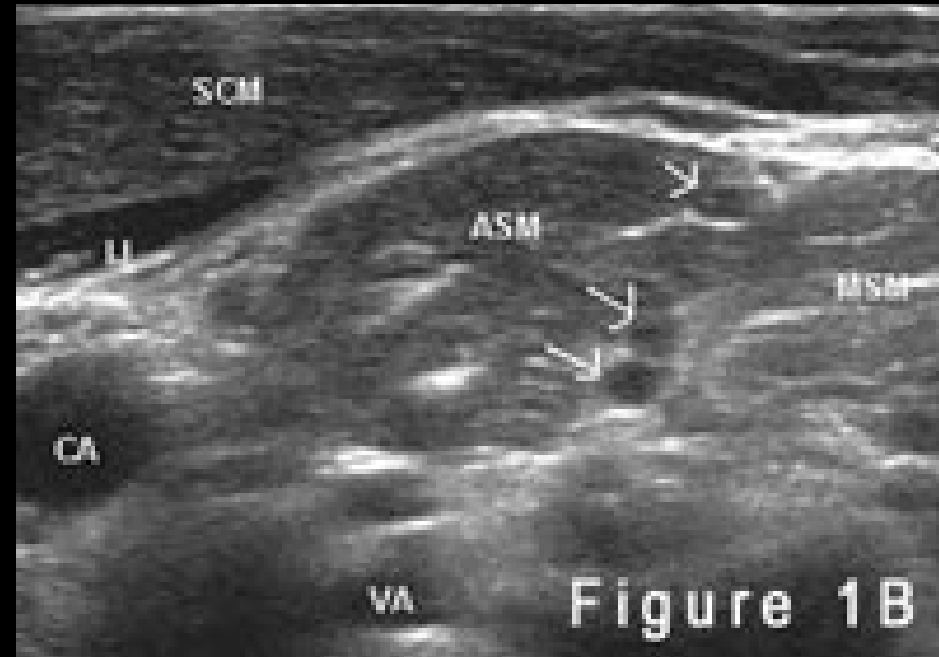
UPPER EXTREMITY

- High-resolution sonography can show normal brachial plexus anatomy .
- Mapping of the brachial plexus with broad band high-frequency linear transducers such as (5-10 MHz), (10-13MHz) and (8-14MHz) is in possible.





Ultrasound probe position to obtain a transverse view of the brachial plexus in the interscalene area.



*Ultrasound image of the brachial plexus in the interscalene area. SCM = Sternocleidomastoid muscle
ASM = Anterior Scalene Muscle
MSM = Middle Scalene Muscle
IJ = Internal Jugular Vein
CA = Carotid Artery
VA = Vertebral Artery.
Arrows mark brachial plexus roots in the interscalene groove.*

Axial oblique plane



- The examinations are performed while patients lying supine and the head turned 45 degrees to the contra-lateral side.

Scanning started from the interscalene region, the probe positioned in an axial oblique plane.

Coronal oblique plane

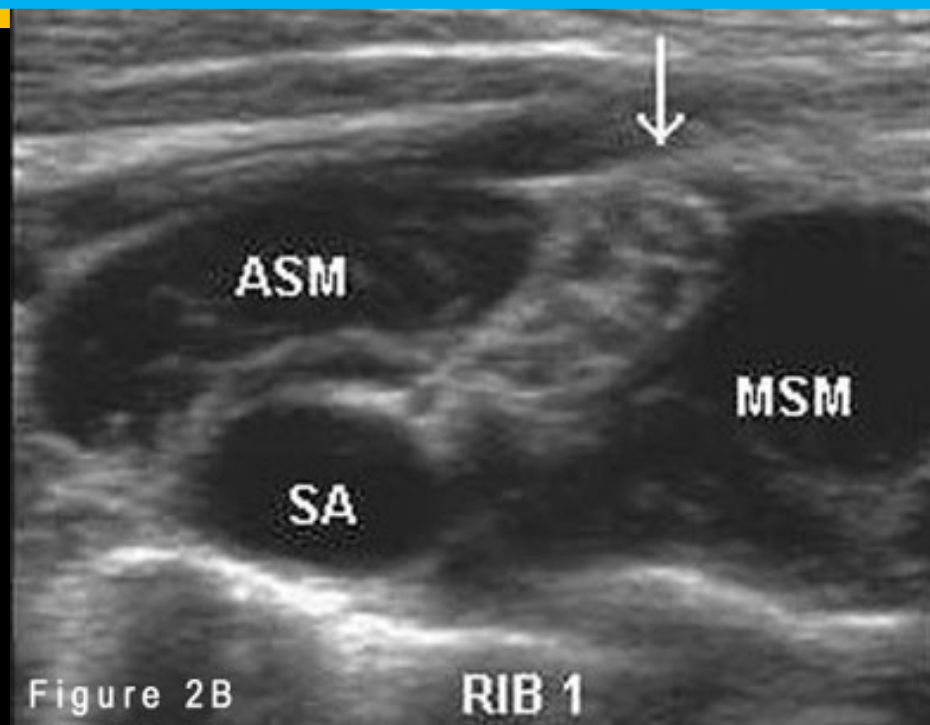


- In the supraclavicular fossa, the probe was placed in a coronal oblique plane .

The Supraclavicular region

Ultrasound probe position for imaging the brachial plexus in the supraclavicular area

The arrow signals the brachial plexus located in the most distal part of the interscalene space, just cephalad and lateral to the subclavian artery.



Ultrasound image of the brachial plexus in the supraclavicular area.

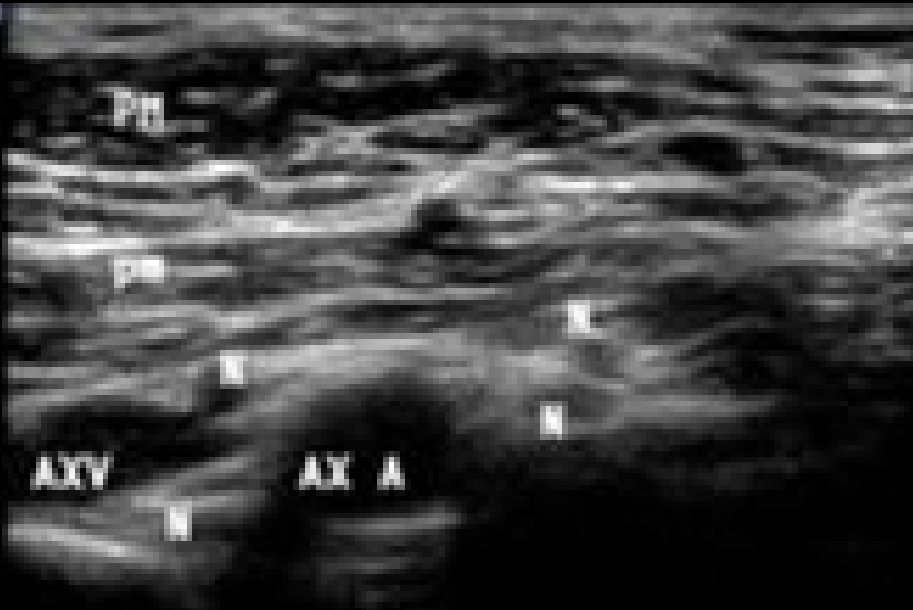
ASM = Anterior Scalene Muscle

MSM = Middle Scalene Muscle

SA = Subclavian Artery

RIB 1 = First rib

Infraclavicular region



- The brachial plexus cords are visualized deep to the pectoralis minor around the axillary artery .

Transverse sonogram in the infraclavicular region showing the brachial plexus nodules (N).

AXA = axillary artery;

AXV = axillary vein;

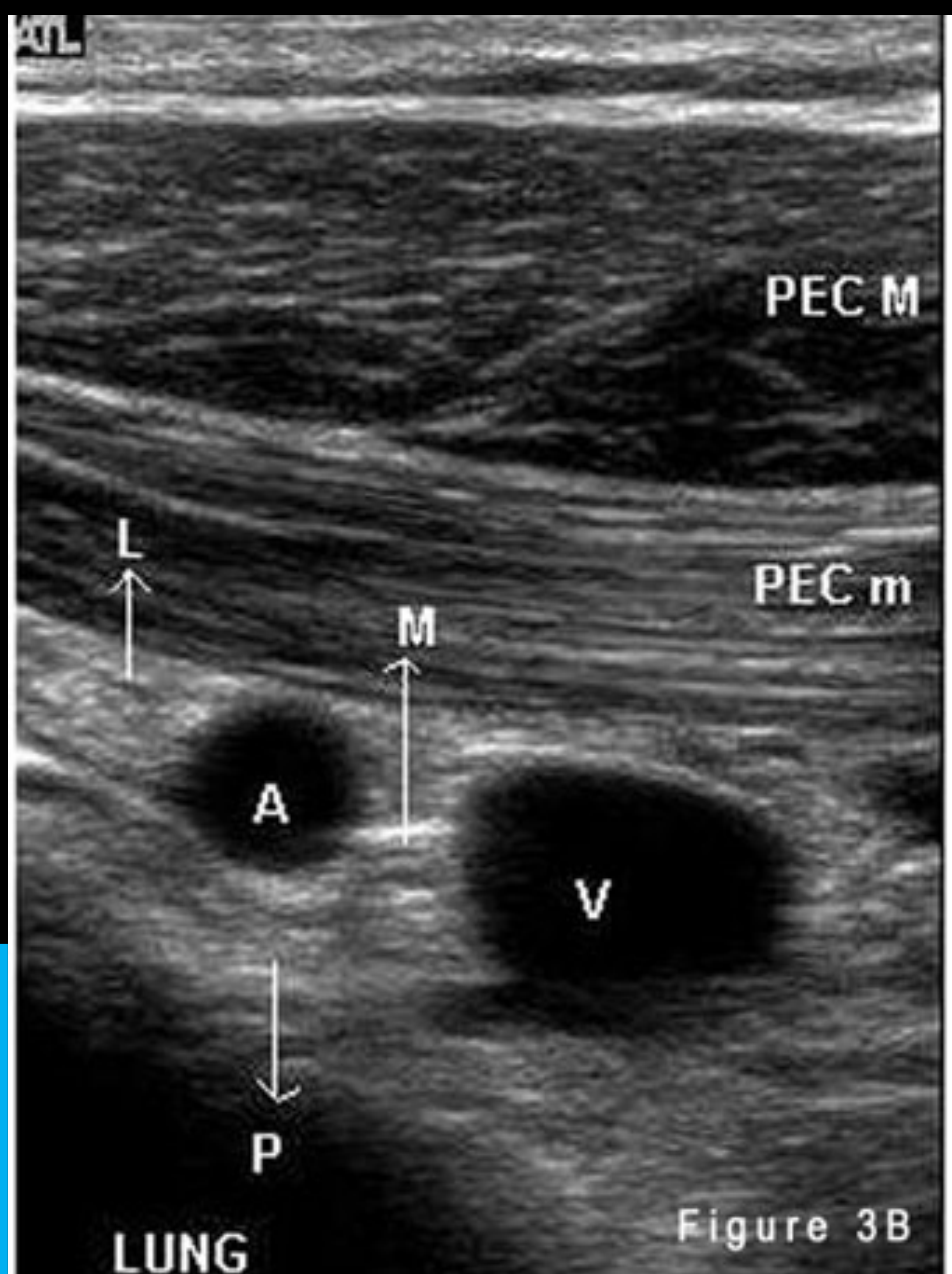
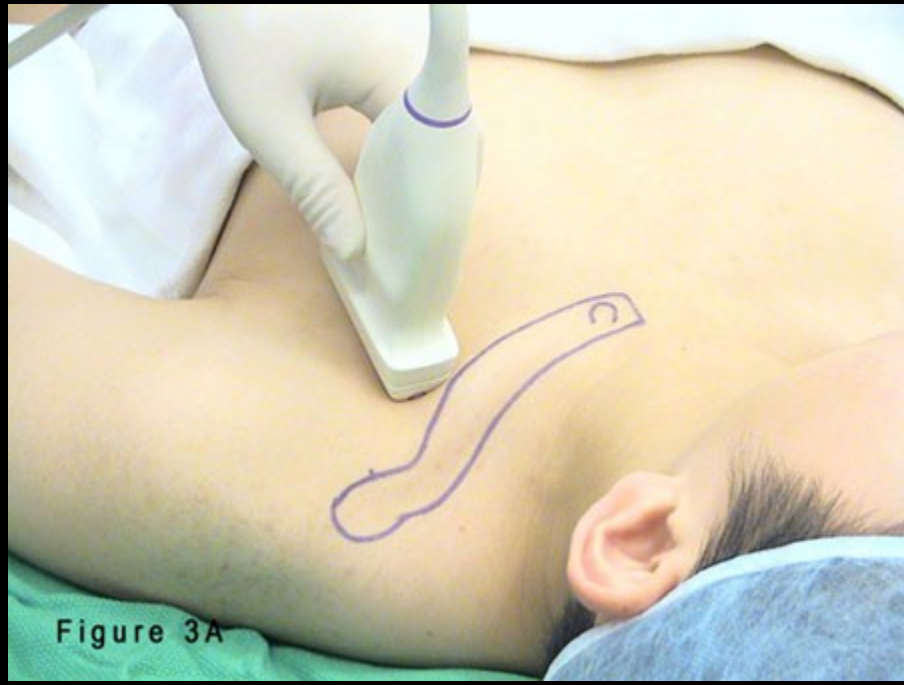
PM = pectoralis major muscle;

Coronal transverse view.



- The infraclavicular region was imaged in a parasagittal plane , and the axillary region is scanned in a transversal view.

Ultrasound probe position for imaging the brachial plexus in the infraclavicular area.

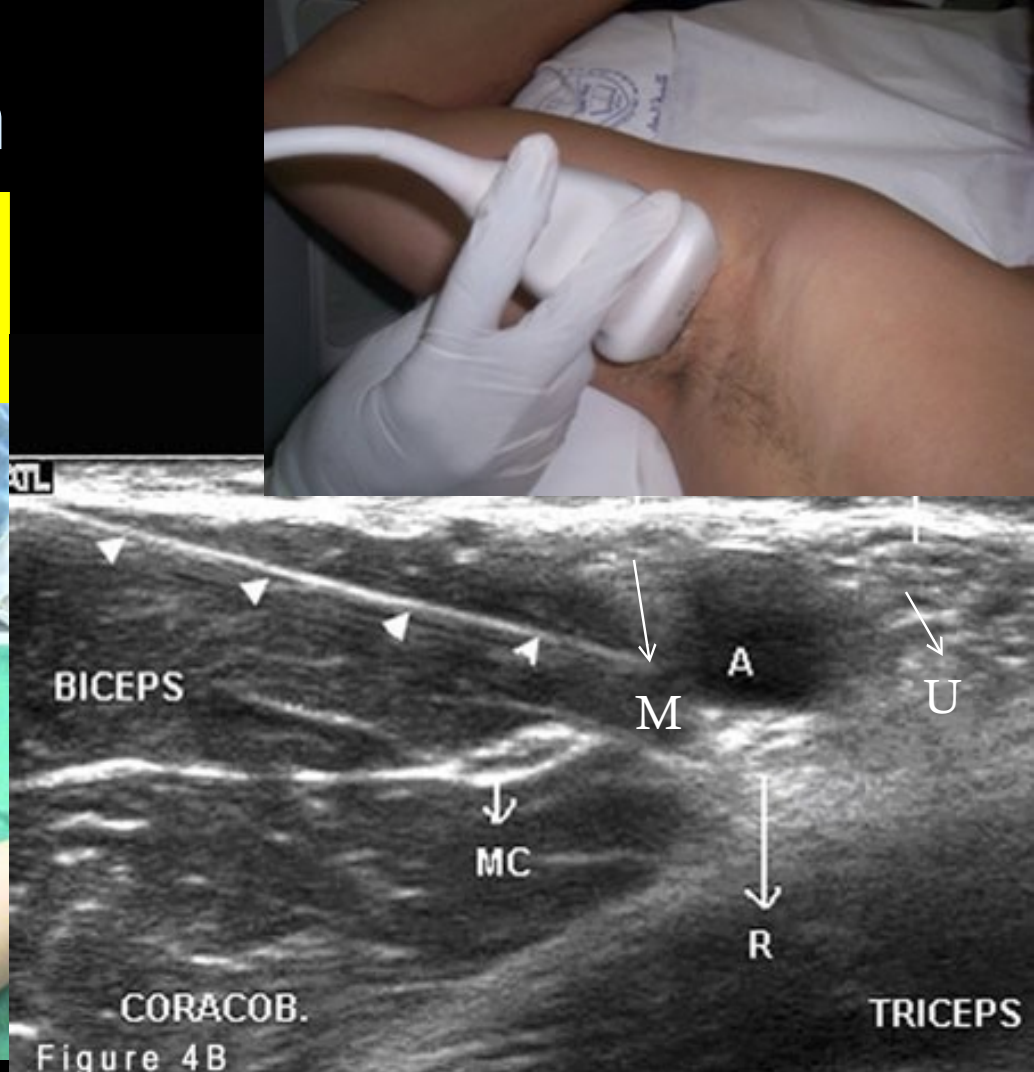
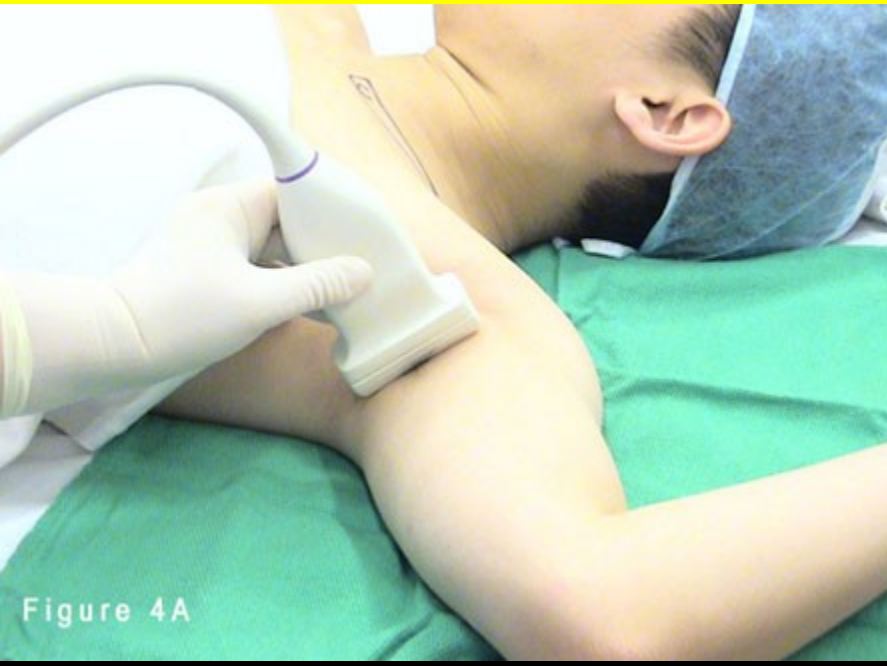


Ultrasound image of the brachial plexus in the infraclavicular area
PEC M = Pectoralis major muscle
PEC m = Pectoralis minor muscle
A = Axillary Artery
V = Axillary Vein
L = Lateral cord
M = Medial Cord
P = Posterior Cord.

Figure 3B

The Axillary region

Ultrasound probe position for imaging the brachial plexus in the axillary area.



*Ultrasound image of the brachial plexus in the axillary area. A = Axillary Artery
M = Median nerve
U = Ulnar Nerve
R = Radial nerve
MC = Musculocutaneous Nerve*

RADIAL NERVE

- Cervical C6, C8.
- Posterior to the axillary and brachial arteries.
- Run with the profunda brachii artery between the long and medial heads of triceps.
- Before leaving the axilla, the radial nerve gives the posterior cutaneous nerve of arm that innervates the posterior upper arm skin.

MEDIAN NERVE

- Cervical C6, thoracic T1.
- The median nerve lies lateral to the axillary artery and then lateral to the brachial artery before crossing the artery at the level of the mid-humerus.

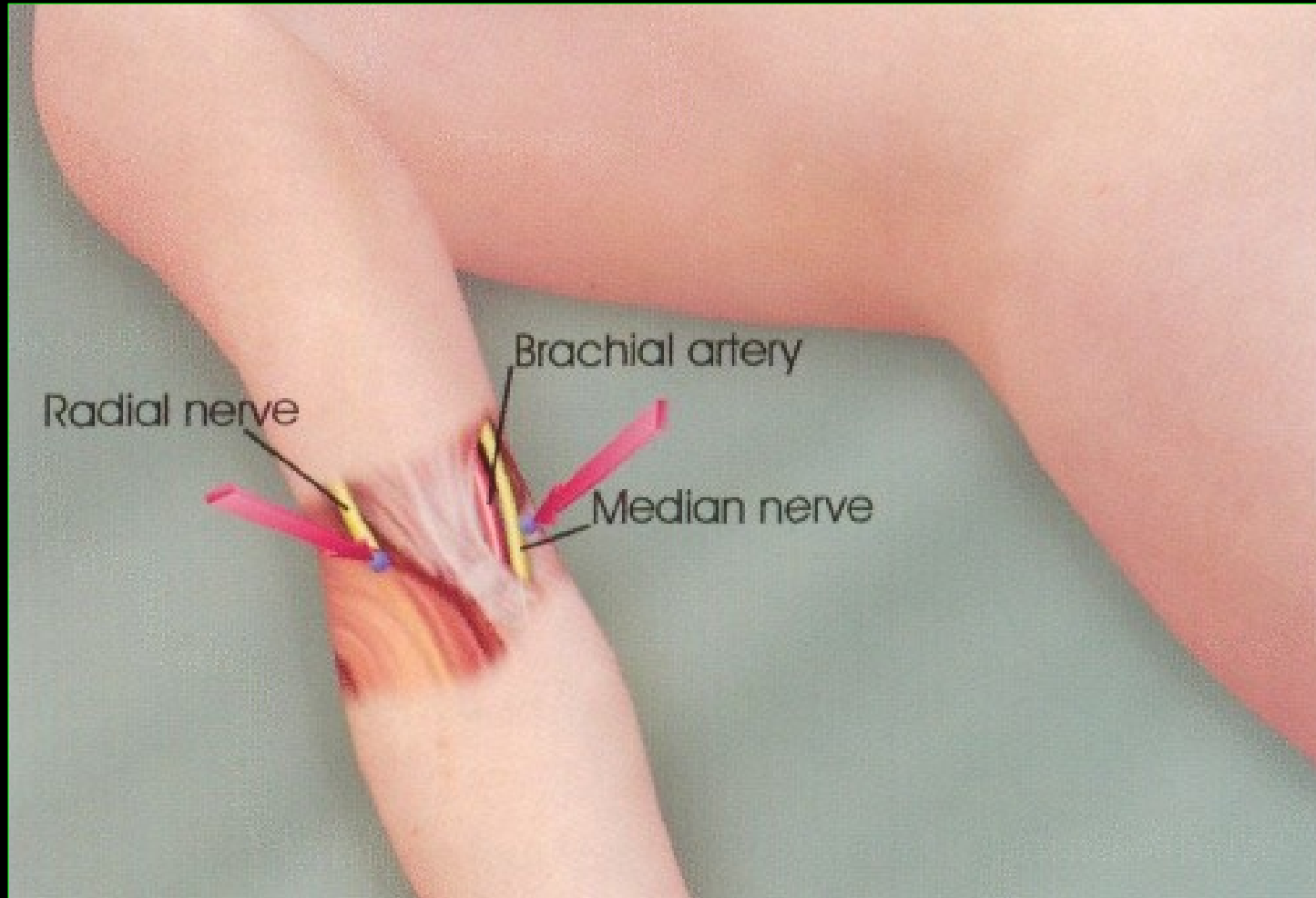
MEDIAN NERVE

- Gives branch to elbow joint (superior portion of the radioulnar joint): capitulum of humerus, radial head, and epitrochlea of humerus.
- Gives branch to pronator muscles at level of forearm .

ULNAR NERVE

- Cervical C8, thoracic T1.
- Medial to the axillary and brachial arteries.
- Gives a branch to elbow joint: olecranon and medial epicondyle of humerus. Divides into terminal branches at the pisiform bone.

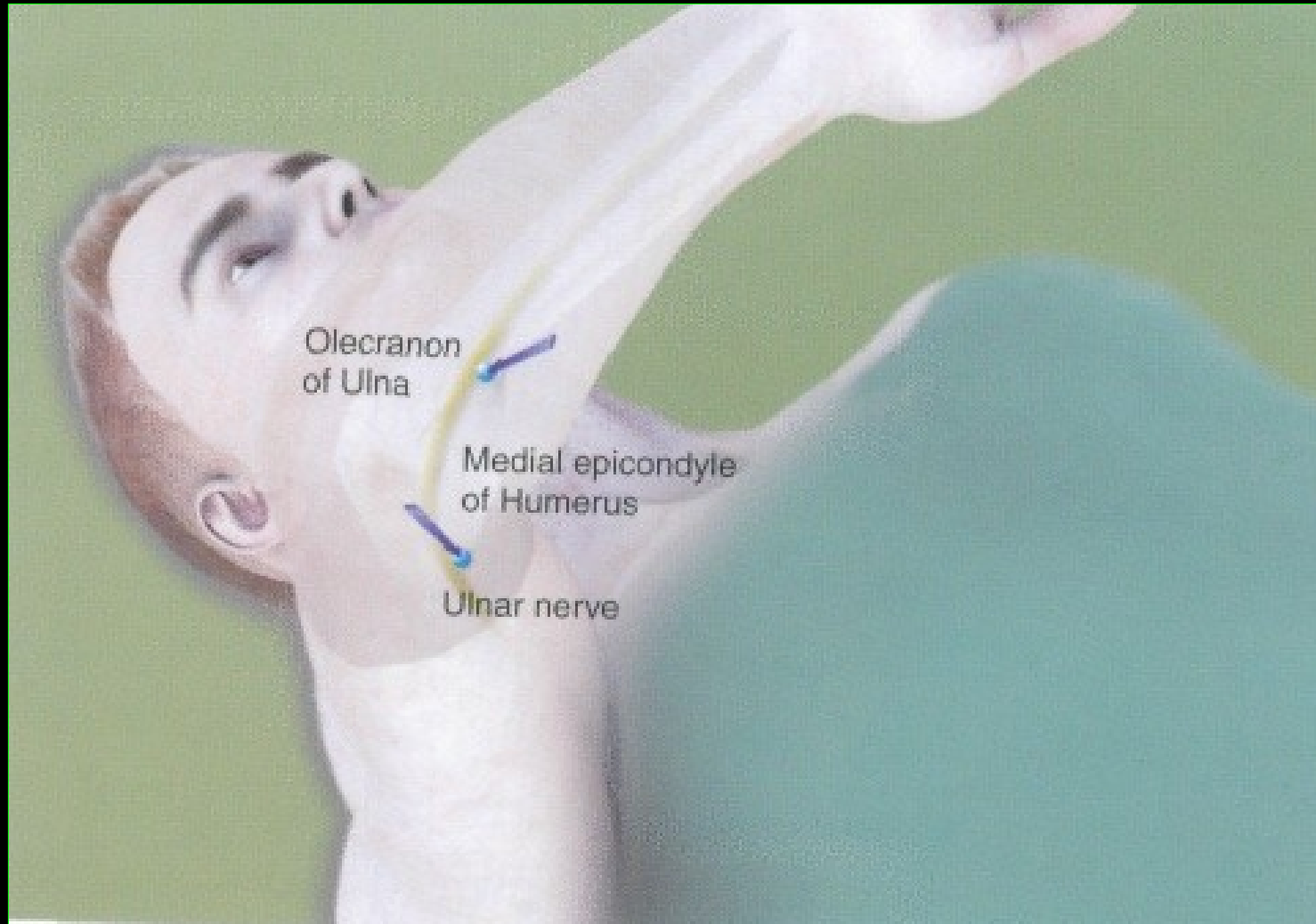
RADIAL AND MEDIAN AT THE ELBOW



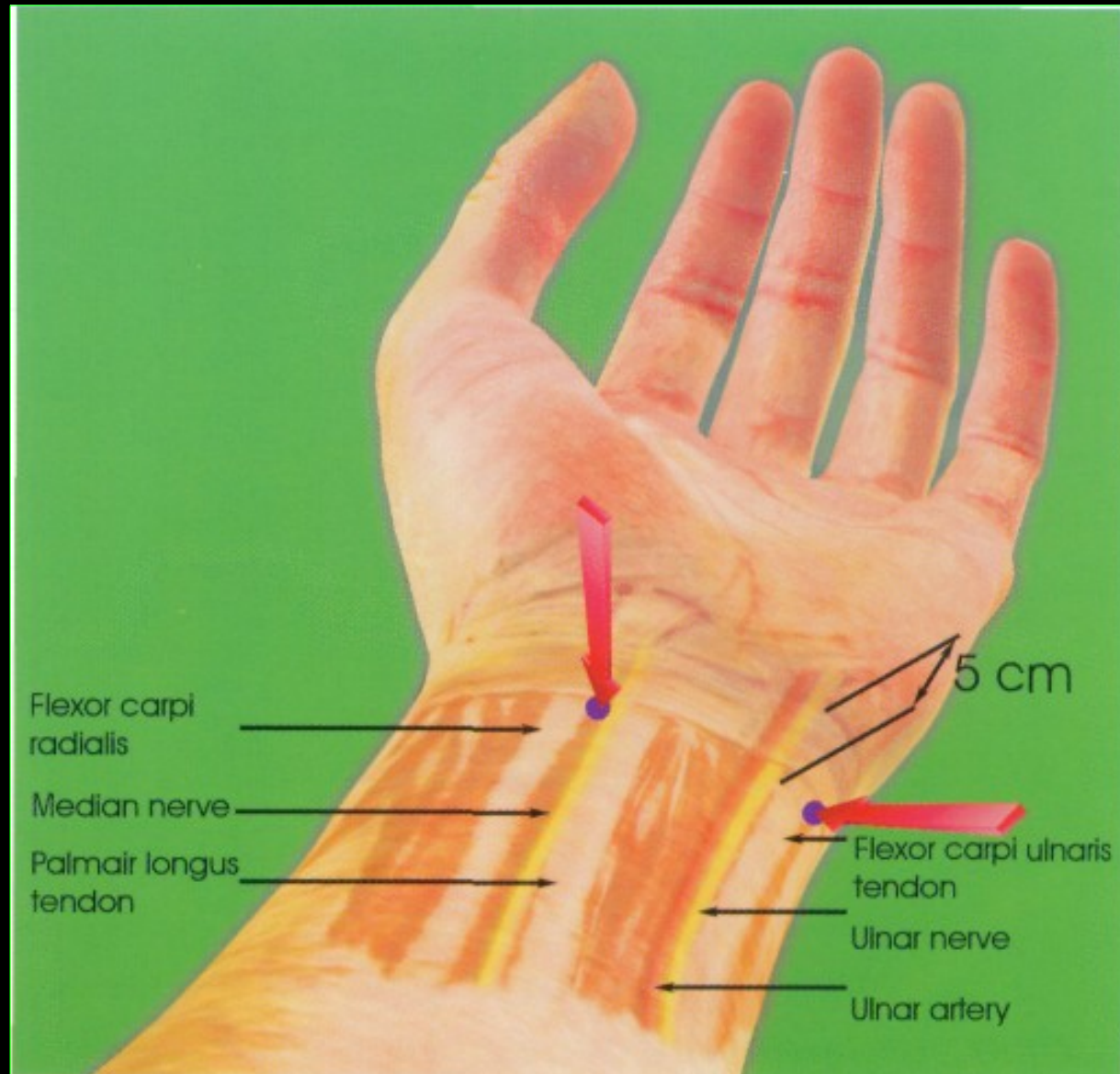
ULNAR NERVE

- **Landmarks:** Ulnar groove.
- With the elbow flexed, the needle is introduced at the apex of a triangle, with the line from the medial epicondyle to the olecranon process as a base.

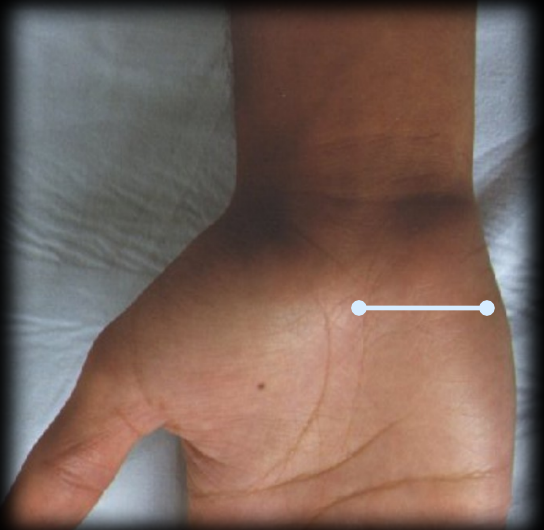
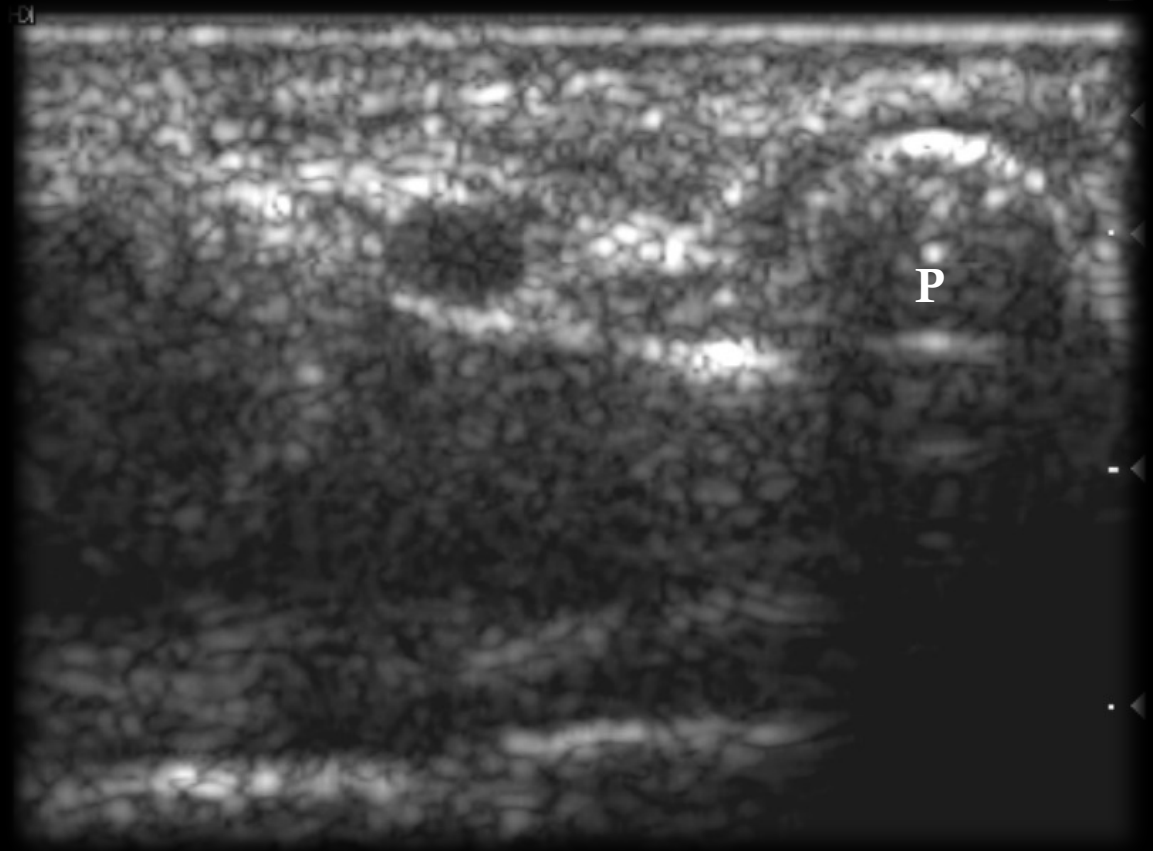
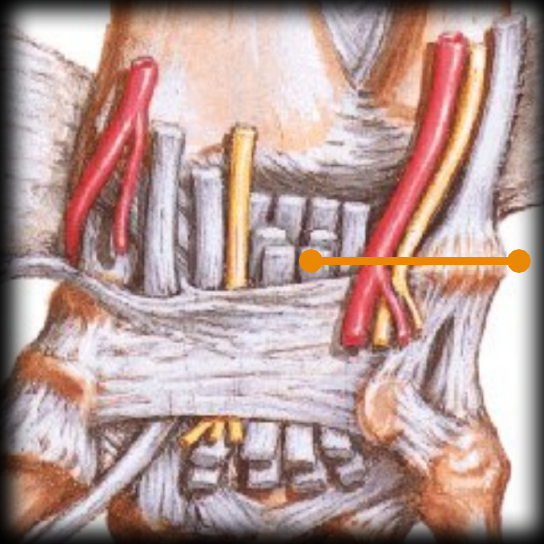
ULNAR AT THE ELBOW



MEDIAN AND ULNAR AT THE WRIST



GUYON'S CANAL : ULNAR NERVE



Short Axis Rht Wrist
Curtsy ; Dr Antonio Buffard



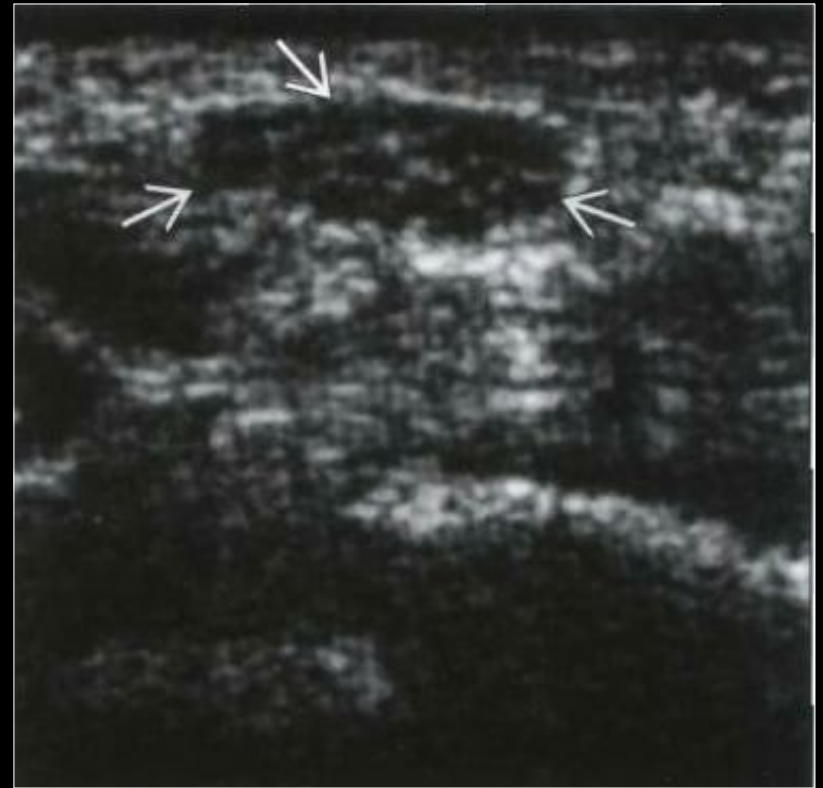
RA

MN

UN

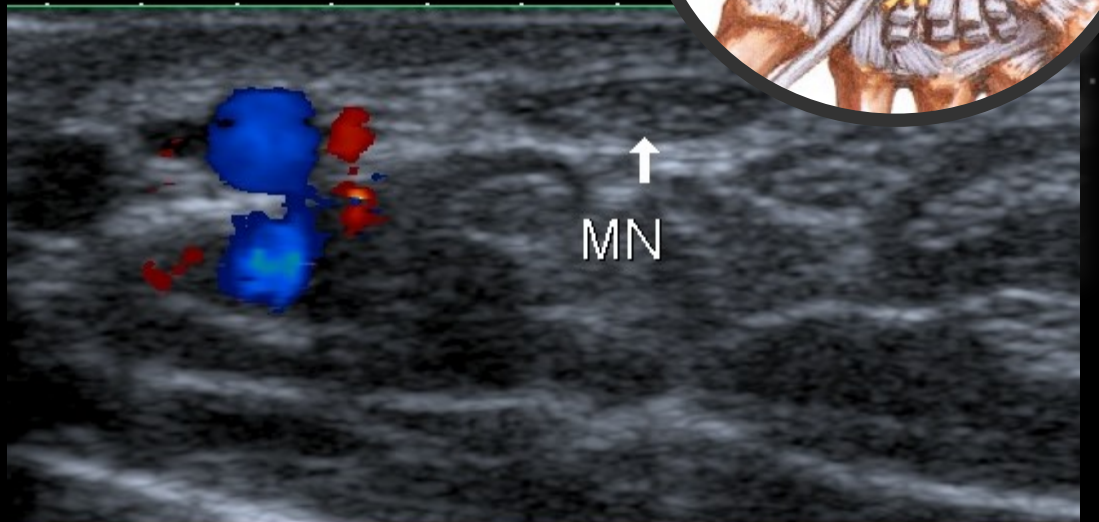
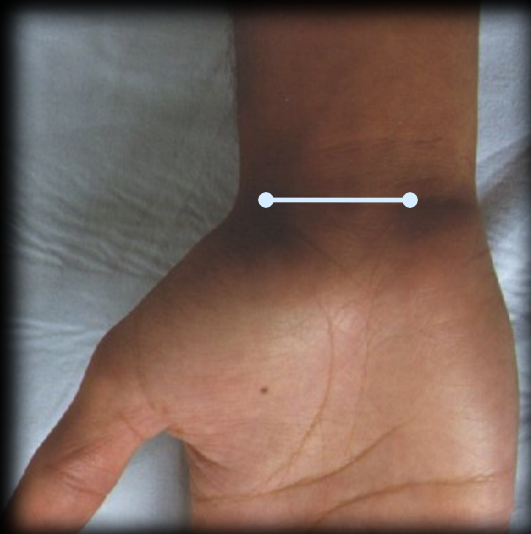
UA

Longitudinal graphic shows the median nerve deep to the flexor retinaculum and superficial to tendons.



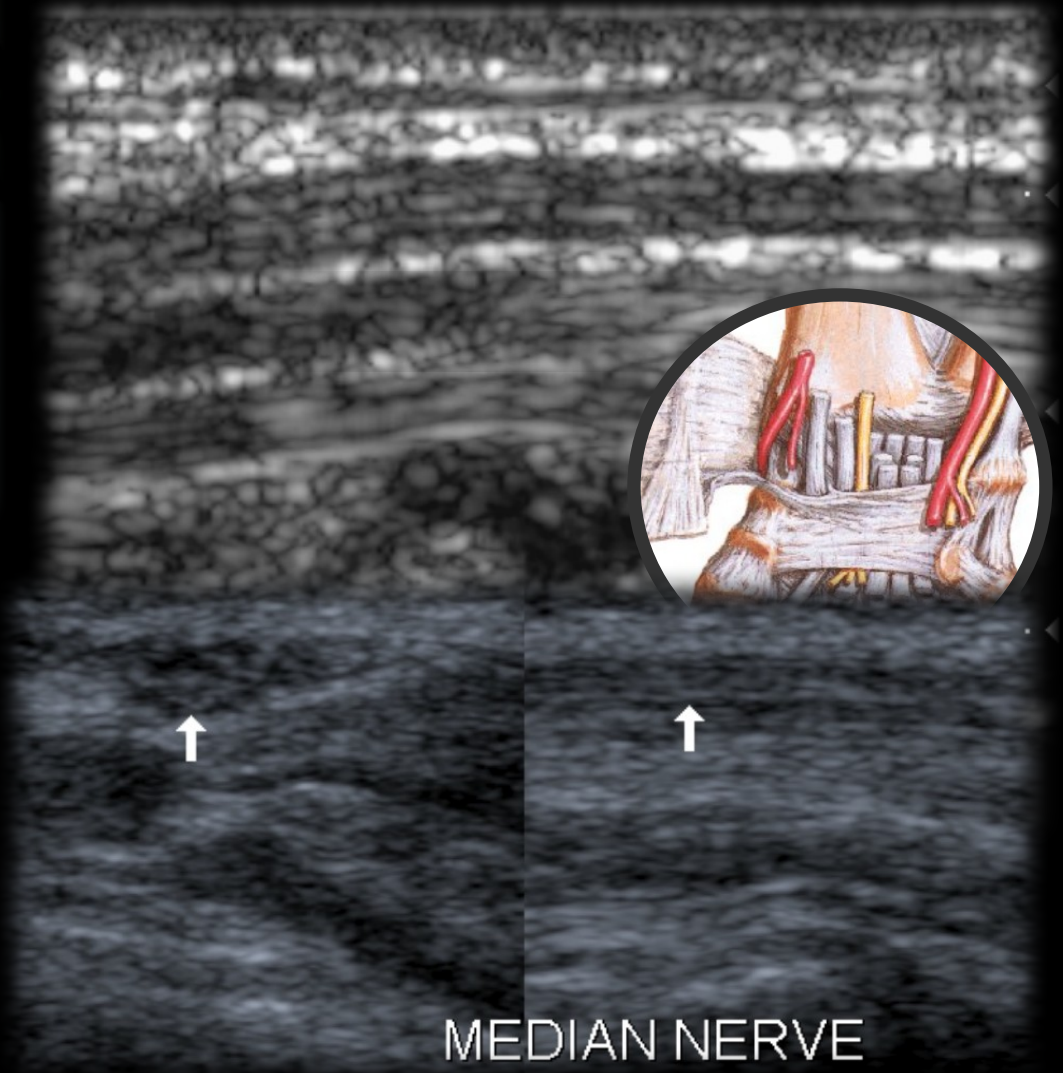
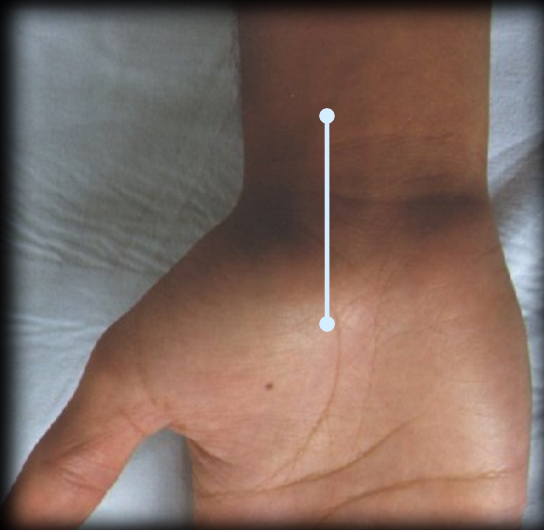
CARPAL TUNNEL : MEDIAN NERVE

Short Axis Rht Wrist



CARPAL TUNNEL : MEDIAN NERVE

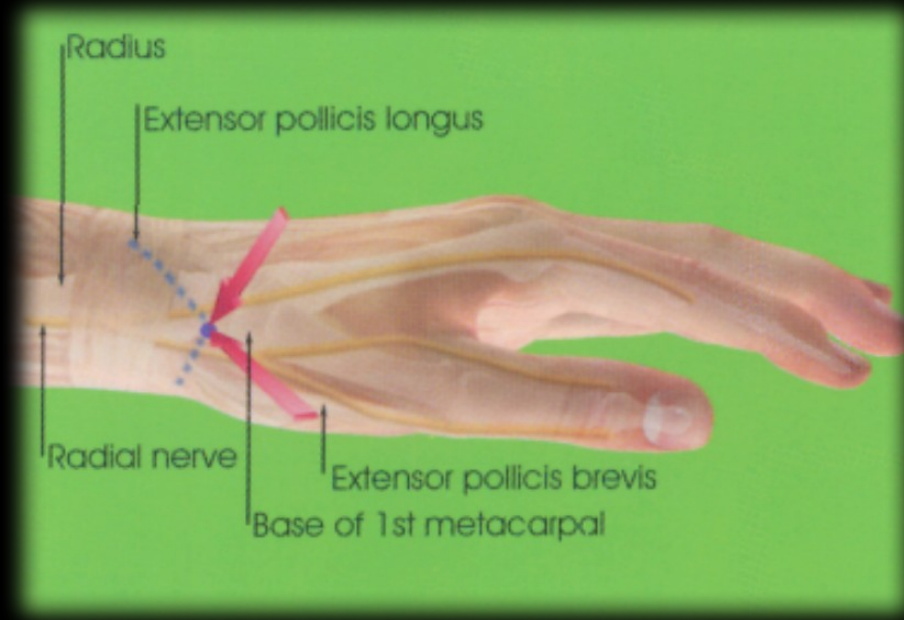
Long Axis Rt Wrist



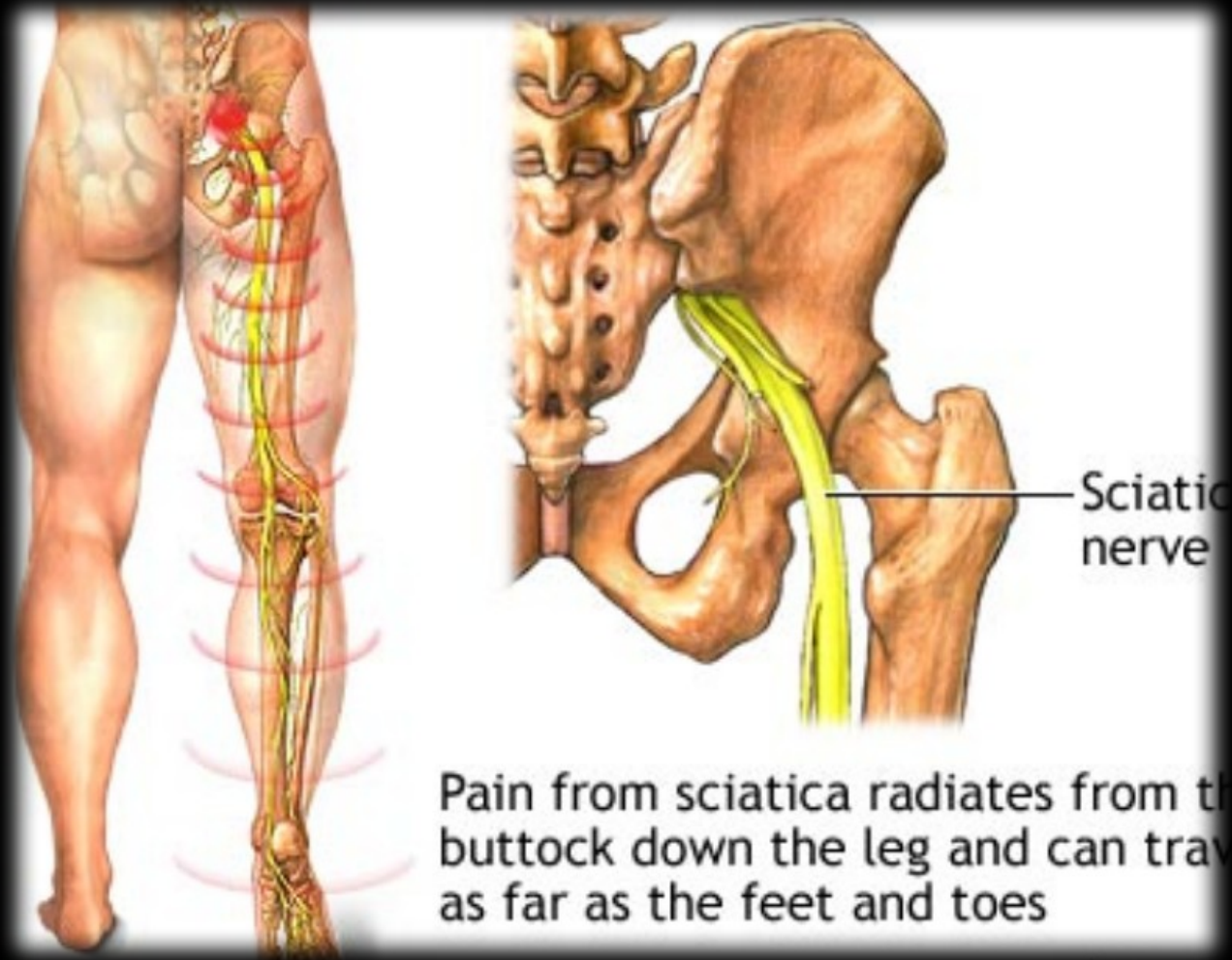
MEDIAN NERVE

RADIAL NERVE

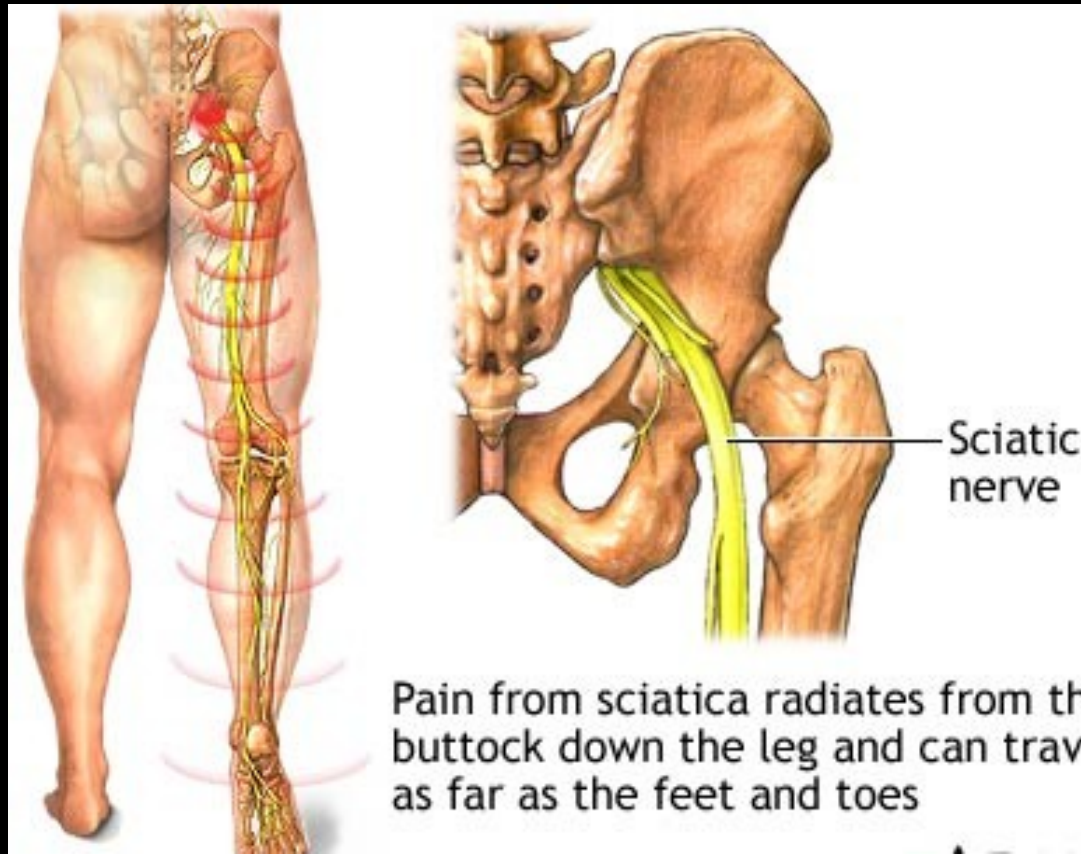
- Landmarks: Above the radial artery in the anatomic snuff box.
- Subcutaneous infiltration anteriorly and posteriorly at the level of the radial styloid.
- Below the wrist, the radial nerve is purely sensory.



LOWER LIMB NERVES

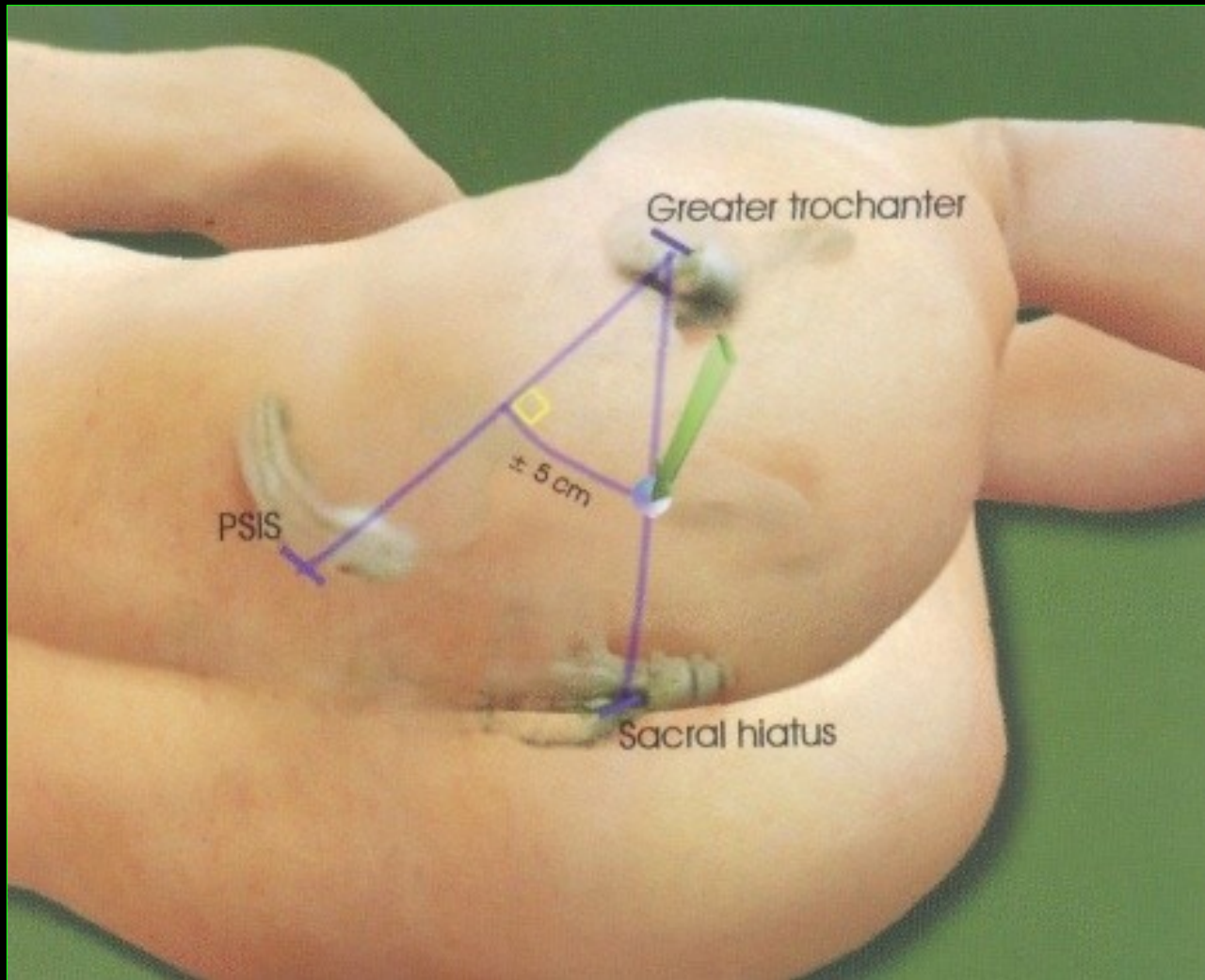


Sciatic Nerve

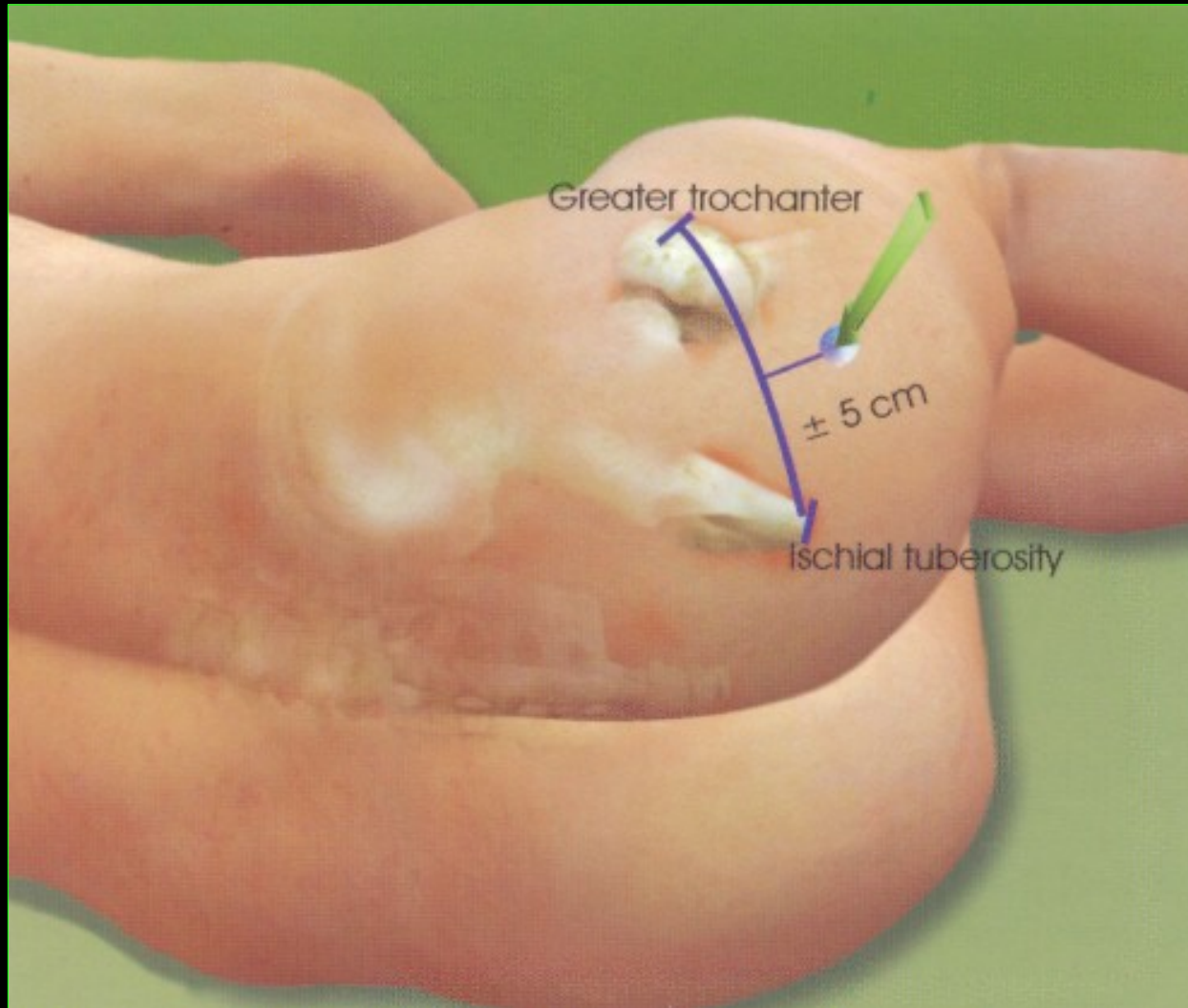


- The sciatic nerve also originates from the lumbosacral plexus (L₄-S₃) and enters the gluteal region through the greater sciatic foramen, between two muscle planes.

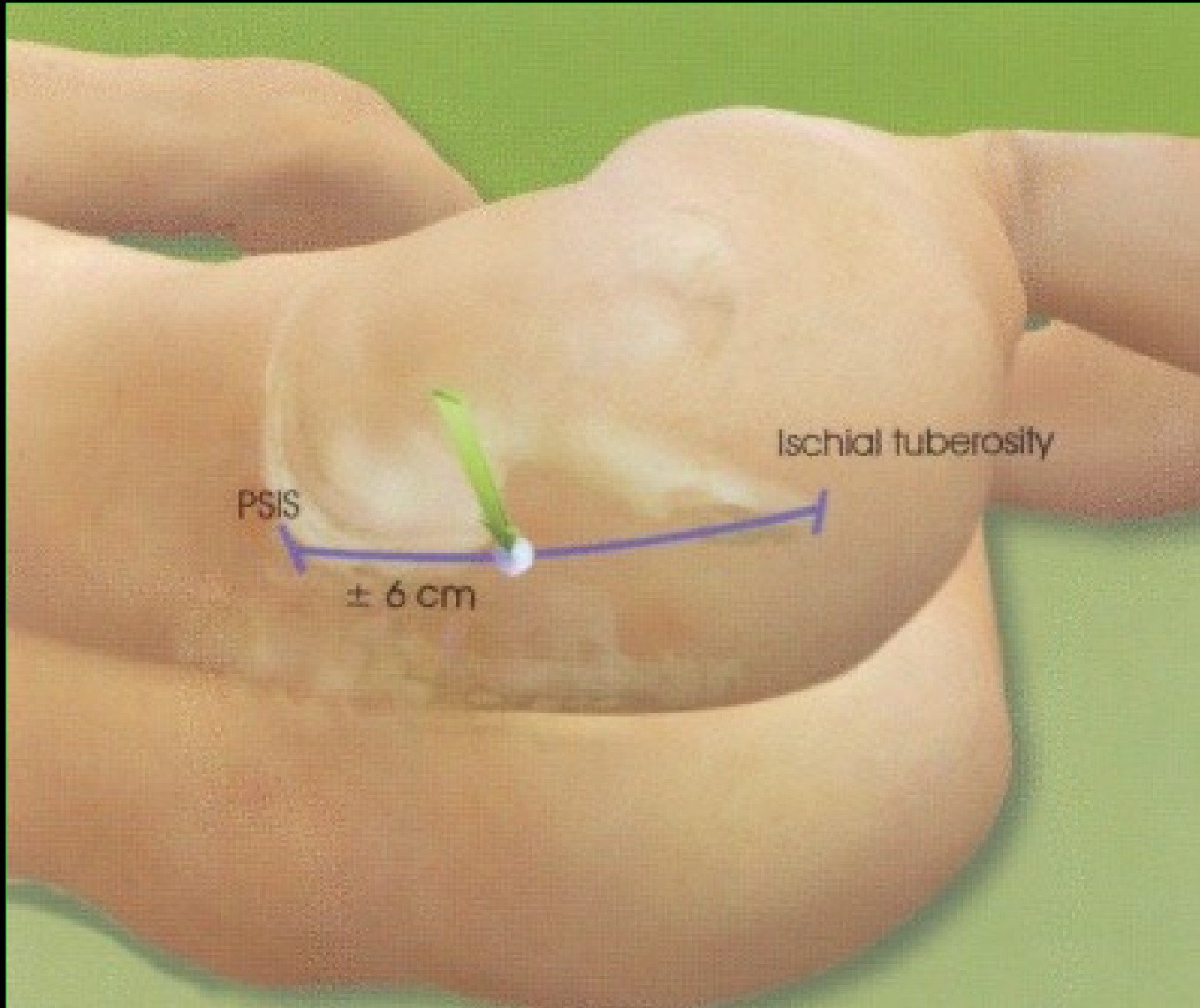
CLASSIC POSTERIOR APPROACH



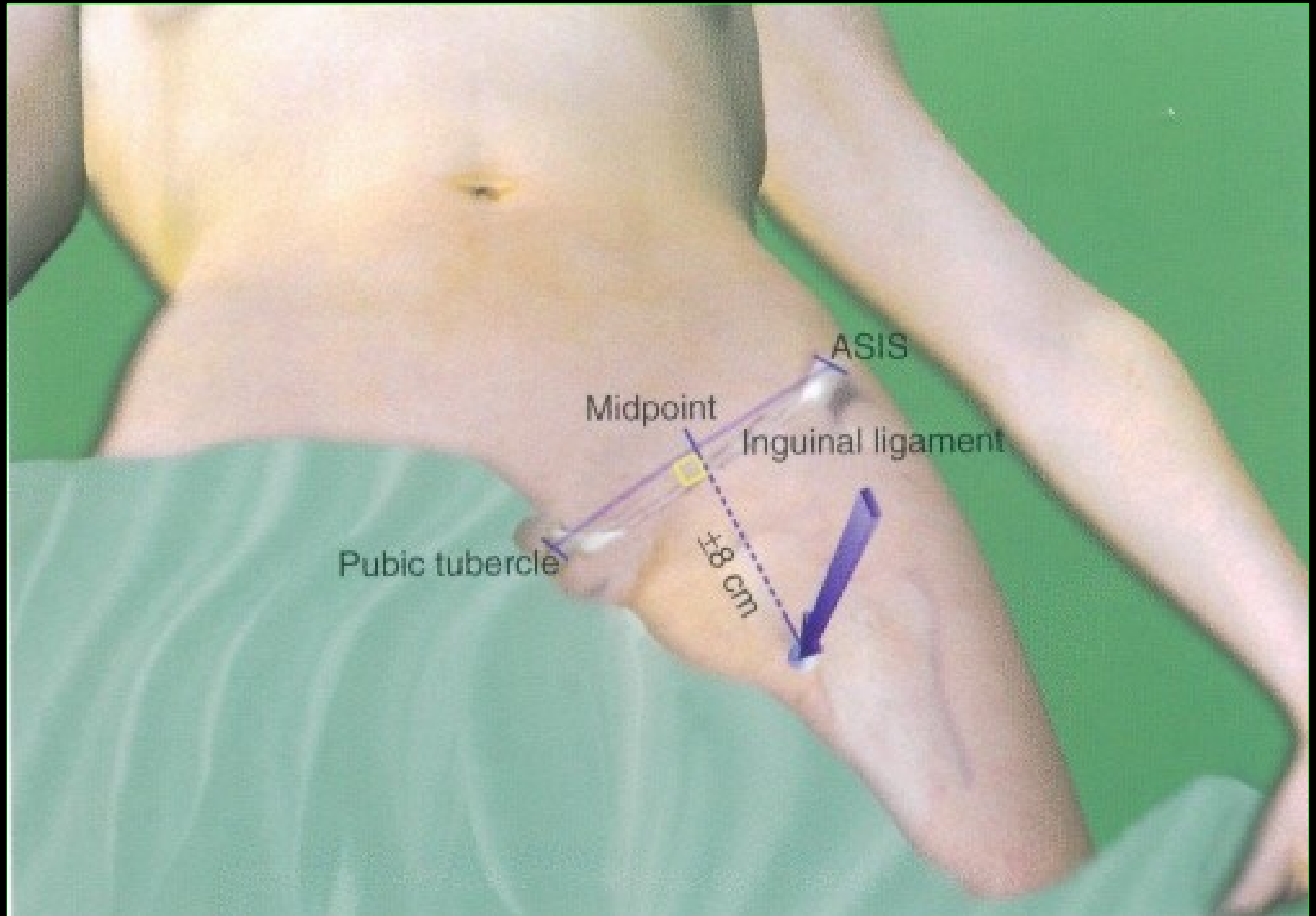
SUB-GLUTEAL APPROACH



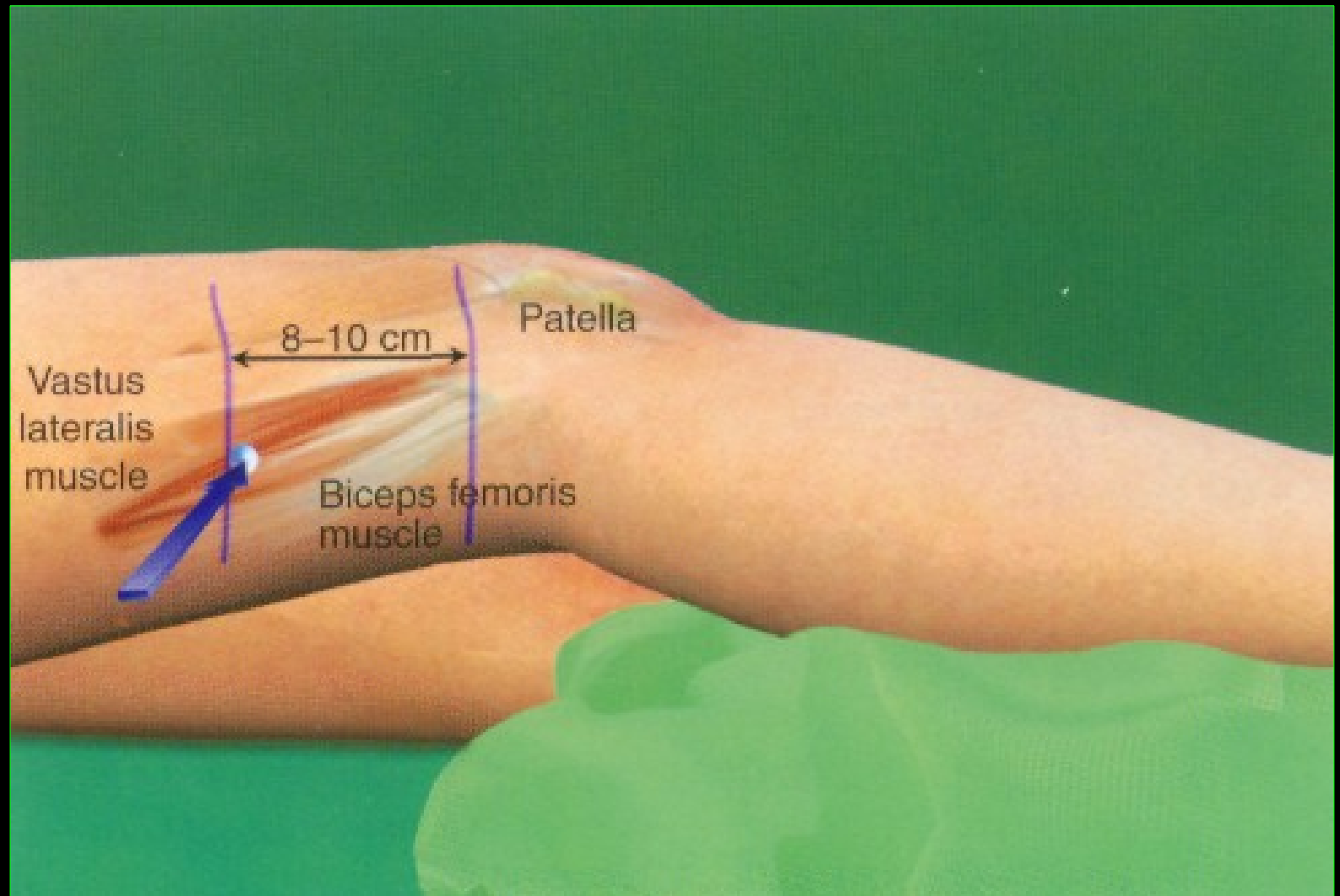
PARASACRAL APPROACH



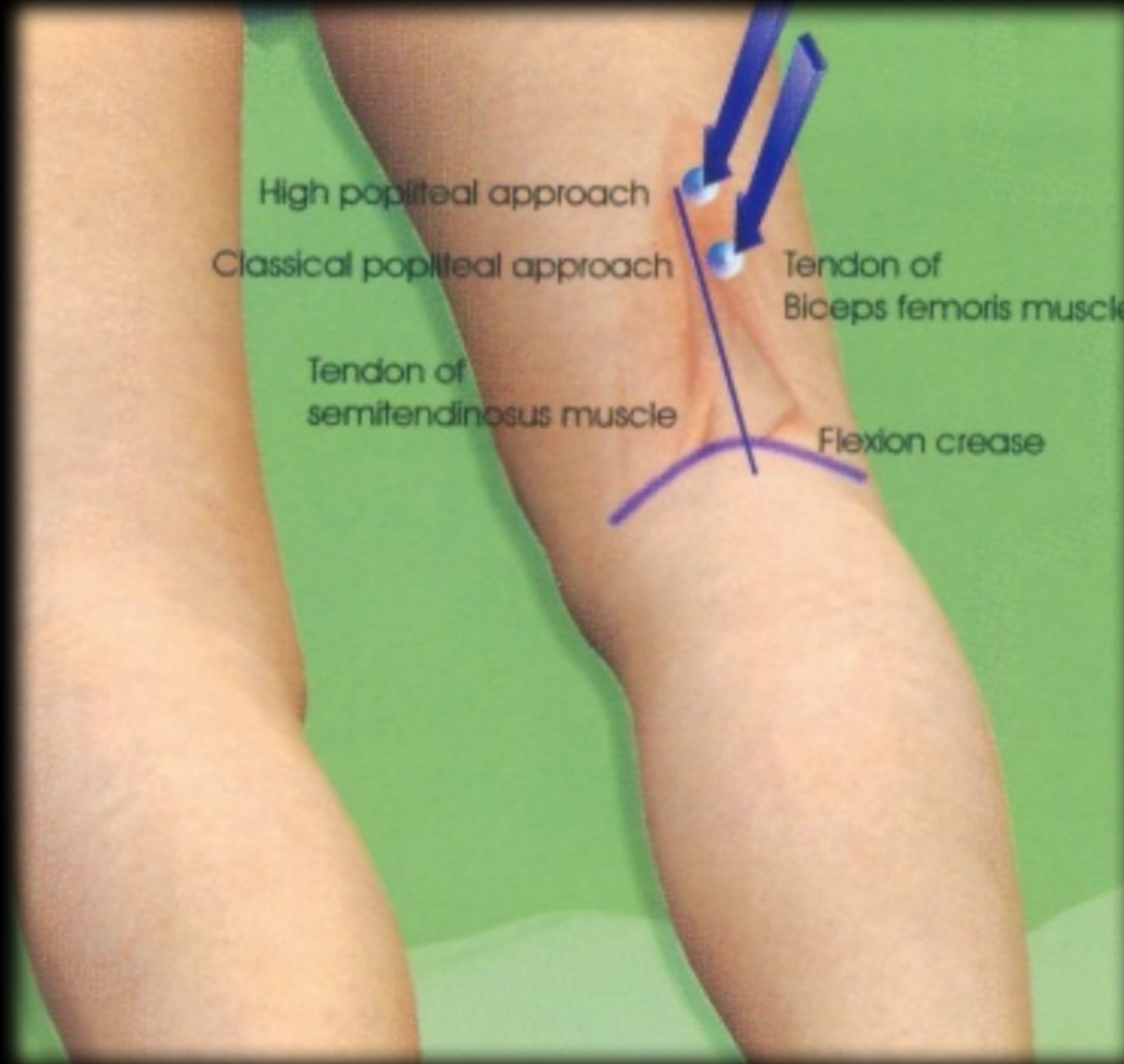
PROXIMAL ANTERIOR APPROACH



LATERAL POPLITEAL APPROACH



POSTERIOR POPLITEAL APPROACH



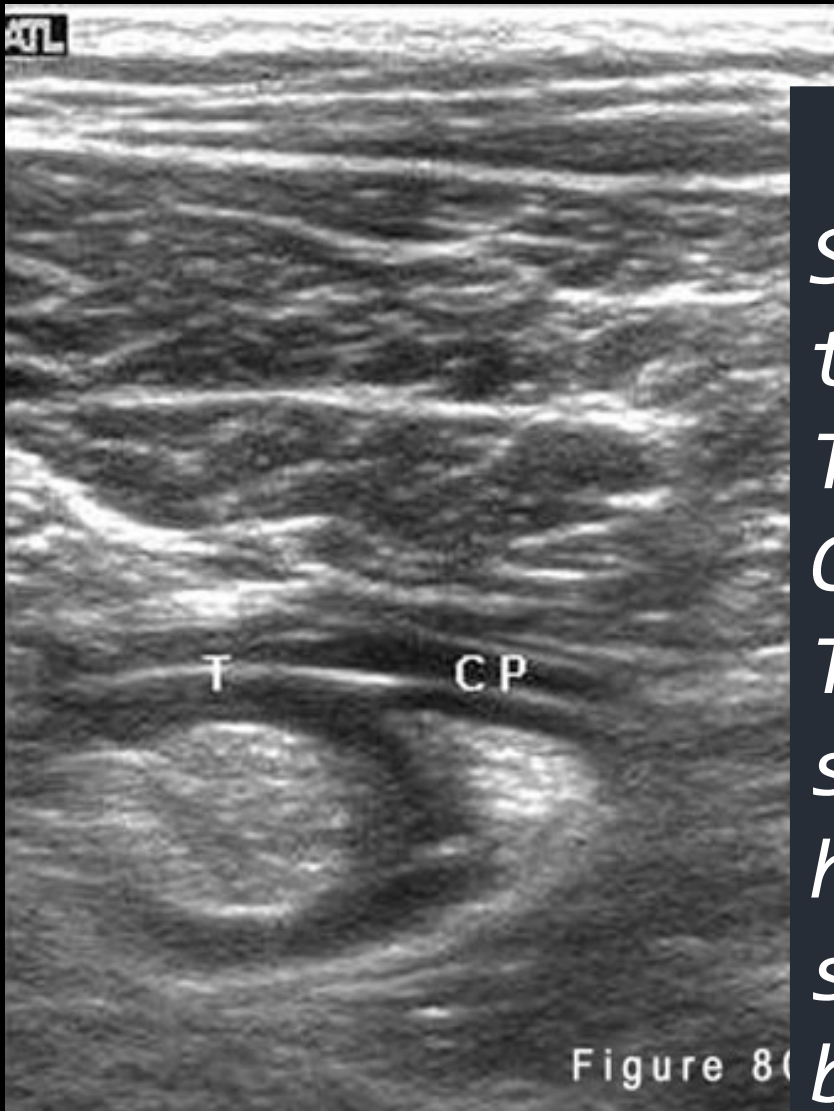


Probe position for imaging the sciatic nerve in the popliteal area.



*Ultrasound image of the Sciatic nerve in the popliteal area. BF = Biceps Femoris
ST/SM =
Semimembranous / Semitendinous muscle
PA = Popliteal Artery
SN = Sciatic Nerve*

Division of Sciatic Nerve



The division of the Sciatic nerve into two branches.
T = Tibial Nerve
CP = Common Peroneal.
The local anesthetic solution appears as a hypoechoic (black) space surrounding both nerve branches.

POSTERIOR FEMORAL CUTANEOUS NERVE

- Sacral S₁, S₂, S₃ Nerves.
- Emerges from the pelvis through the greater sciatic foramen below the piriformis.

COMMON PERONEAL NERVE

- L4, L5, sacral S1, S2 nerves.
- Winds around the neck of the fibula from posterior to lateral. .
Divides into superficial and deep peroneal nerves.

COMMON PERONEAL NERVE

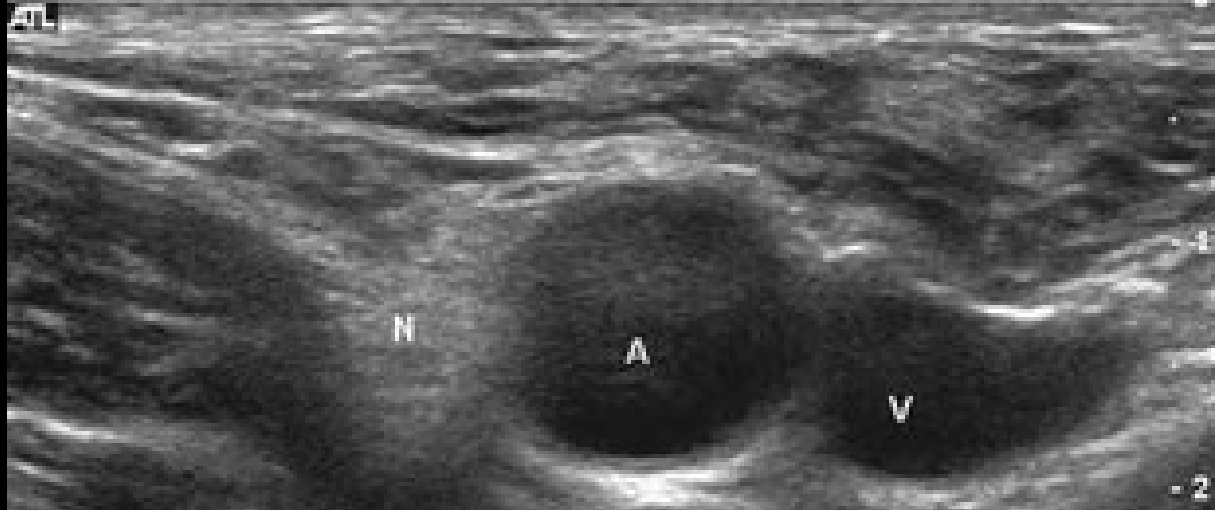
- The superficial peroneal nerve gives innervation to the skin on the dorsum of the foot.
- The deep peroneal nerve gives innervation to extensor muscles of the ankle and foot and the skin on first dorsal web space.

TIBIAL NERVE

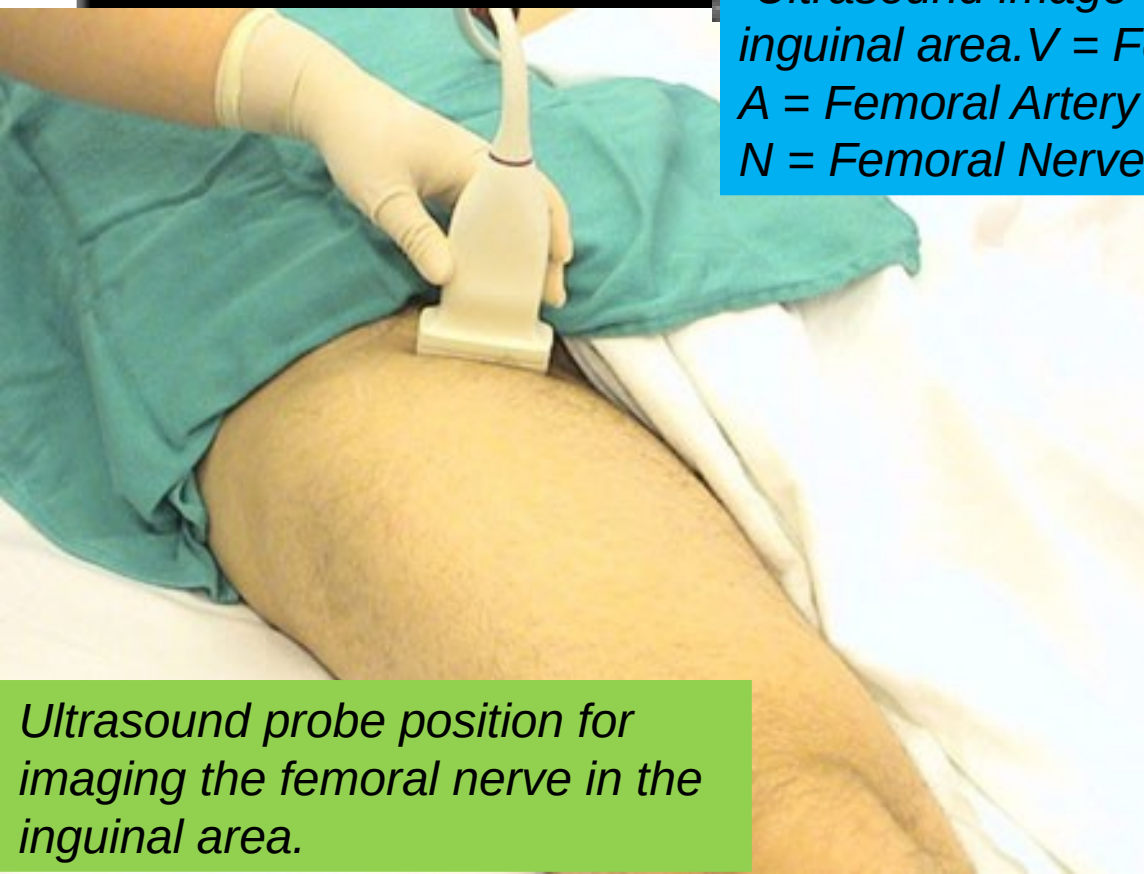
- L₄, L₅, sacral S₁, S₂, S₃ nerves.
- Passes down in the midline into the fossa between the semitendinosus and biceps femoris m. and lies lateral to the popliteal artery.

TIBIAL NERVE


- Divides into terminal branches, medial and lateral plantar n., and calcaneal n. Sural n. arises in the poplitea fossa and pierces the deep fascia to become subcutaneous.



*Ultrasound image of the Femoral nerve in the inguinal area. V = Femoral Vein
A = Femoral Artery
N = Femoral Nerve*



Ultrasound probe position for imaging the femoral nerve in the inguinal area.

An aerial photograph of Hurricane Fran, showing a well-defined eye and a dense, swirling cloud structure. The colors range from dark grey and black in the inner eye to bright white and yellow in the outer cloud bands. The word "Thanks" is written in a large, bold, black sans-serif font across the center of the image, partially overlapping the hurricane's eye and the surrounding cloud bands.

Thanks

Hurricane Fran, September 4, 1996