

# Surgery Under Regional Anesthesia

*Jean Daniel Eloy, MD*

*Assistant Professor*

*Residency Program Director*

*Rutgers-New Jersey Medical School*

*Rutgers The State University of New Jersey*



# Regional Anesthesia

- Peripheral Nerve Block
- 1) Some decrease in Stress Response
- 2) Decrease in Tumor Recurrence ( Mastectomy)
- 3) Better Glucose Control
- 4) Reduced Opiates Used and Requirement

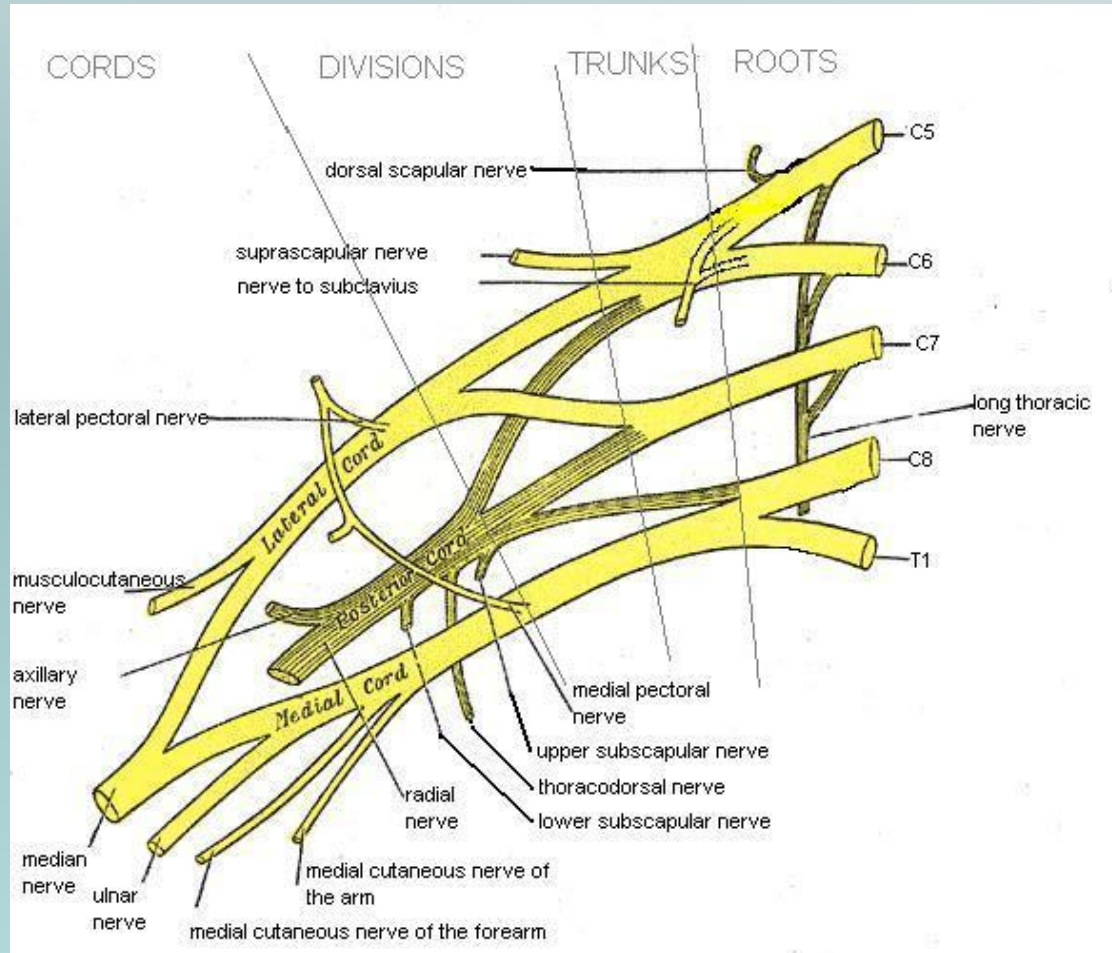
# Principles Of Solography

- Frequency of medical US: 2MHz –13MHz
- Structures >1mm
- Nerves are 2mm-10mm

# Quality and Resolution of US

- High frequency probes: Better Images Resolution
- Fat: Low resolution
- Angle of Incidence
- Gain=Brightness

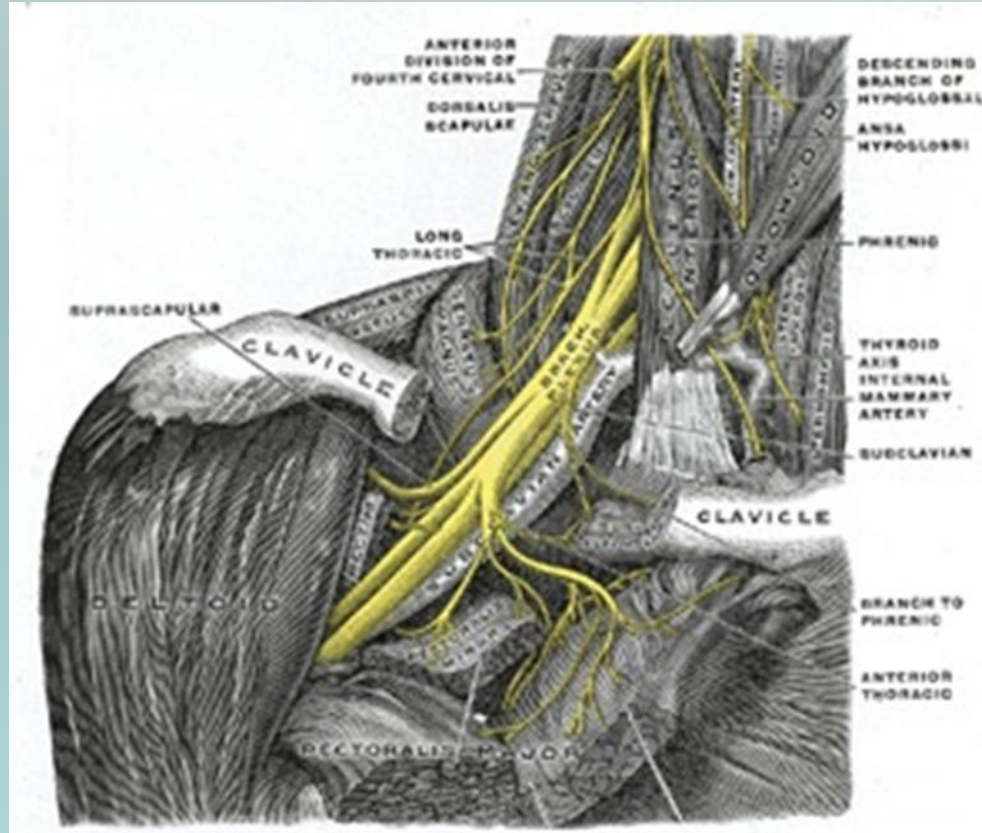
# Brachial Plexus Anatomy



# ANATOMY

- The Brachial Plexus is made up of anterior primary rami of C5, C6, C7, C8 and T1 with variable contributions from C4 and T2
- After leaving their intervertebral foramina these nerves course between the anterior and middle scalene muscles
- Between the scalene muscles the nerves unite to form three trunks. The superior (C5, C6), middle (C7) and inferior (C8 and T1)

# Anatomy of the Brachial Plexus



# Interscalene Nerve Block

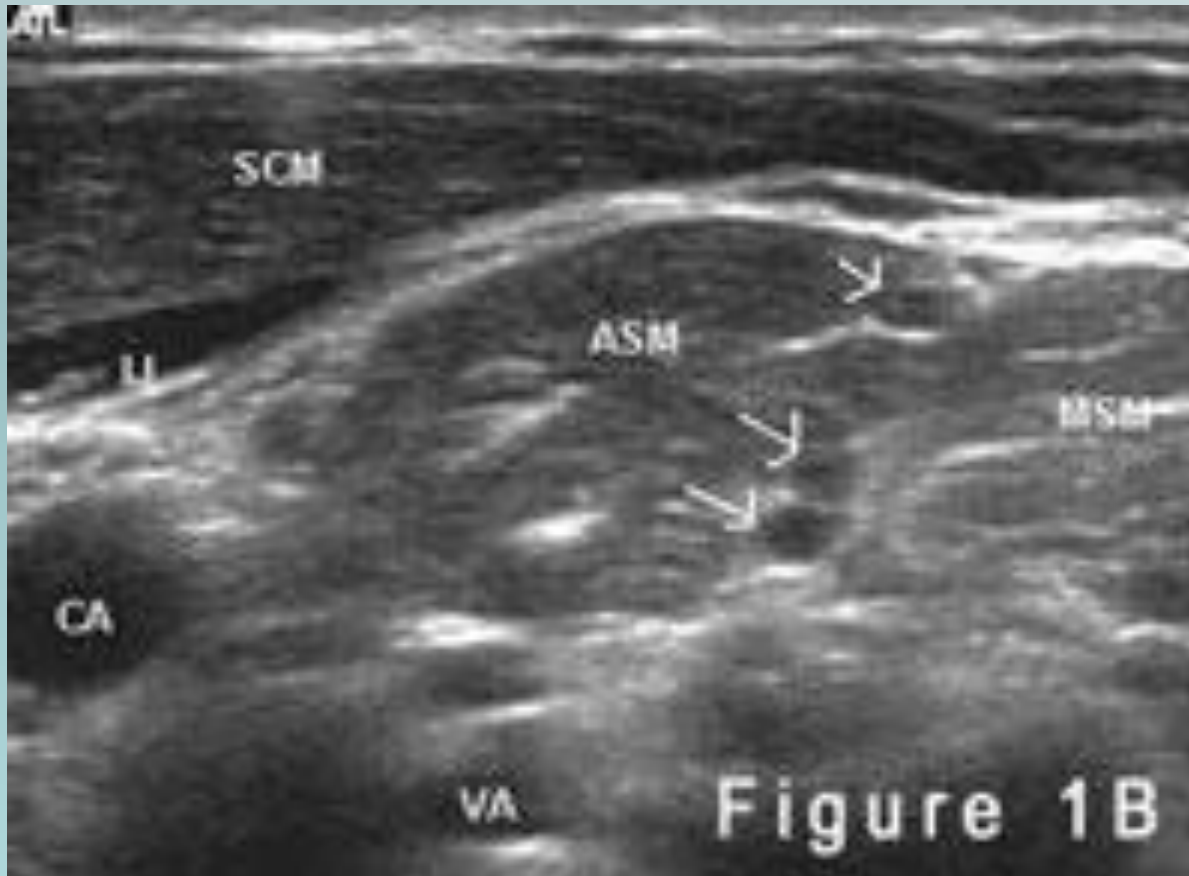
- Principal indication for interscalene block is shoulder surgery
- This block is not performed for forearm and hand surgery because the inferior trunk (C8—T1) is often incomplete
- Ultrasound guided block technique



# Ultrasound Guided Brachial Plexus Block



# Ultrasound Guided Brachial Plexus Block



# COMPLICATIONS OF INTERSCALENE BLOCKS

- Ipsilateral phrenic nerve resulting in diaphragmatic paresis occurs in 100% of patients undergoing interscalene blockade
- - a) This results in 25% reduction in pulmonary function
  - b) The phrenic nerve is blocked because of its location overlying the anterior scalene muscle

# COMPLICATIONS OF INTERSCALENE BLOCKS

- A cervical sympathetic block occurs frequently :  
(Horner's syndrome)
  - a) miosis
  - b) anhidrosis
  - c) ptosis
  - d) vasodilation
- Recurrent laryngeal nerve block can occur resulting in hoarseness

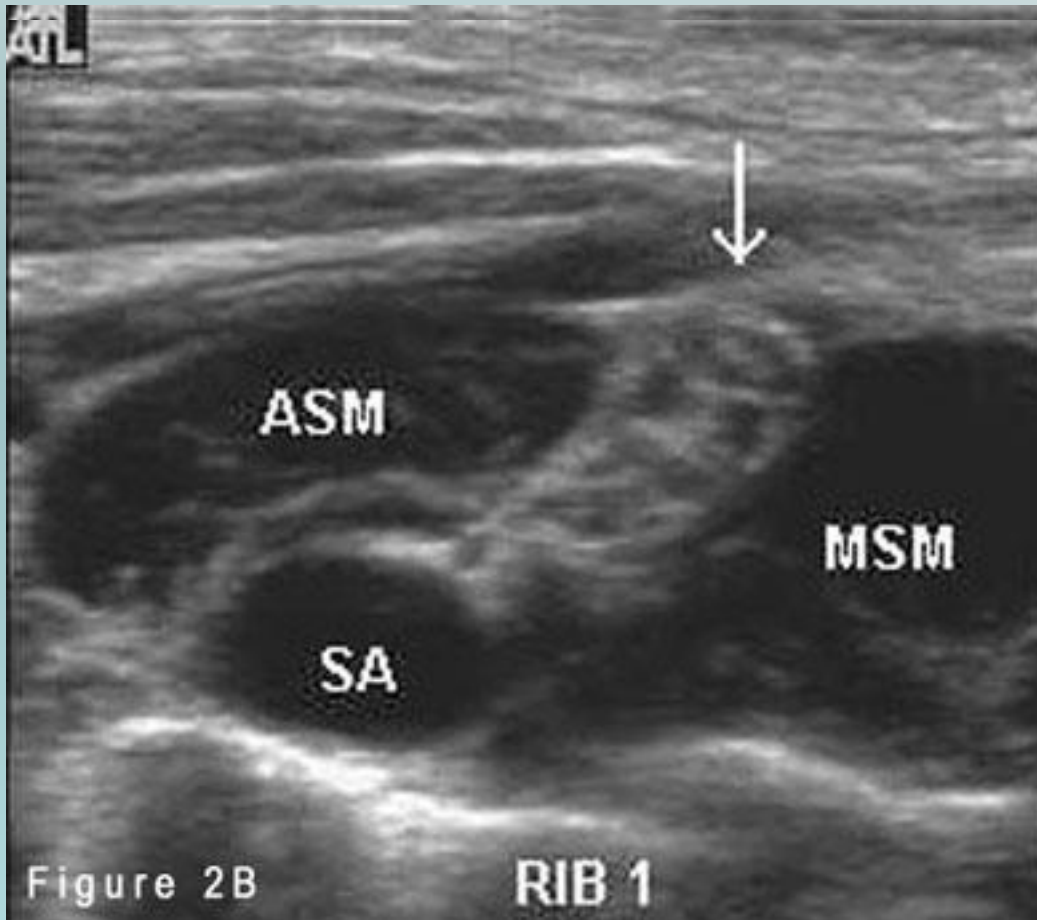
# SUPRACLAVICULAR BLOCKS

- Is used for upper extremity surgery distal to the level of the shoulder
- Is done at level of the trunks dividing into divisions
- Has the fastest onset of all brachial plexus blocks because of its compact volume at this location
- The incidence of pneumothorax with classical block technique was .5 to 6%

# SUPRACLAVICULAR BLOCKS

- Using a 22 G needle symptoms is usually delayed. May take up to 24 hrs.
- Chest x-ray is not justified
- Phrenic nerve block occurs 40 to 60% of the time
- Horner's syndrome is common

# Supraclavicular Nerve Block



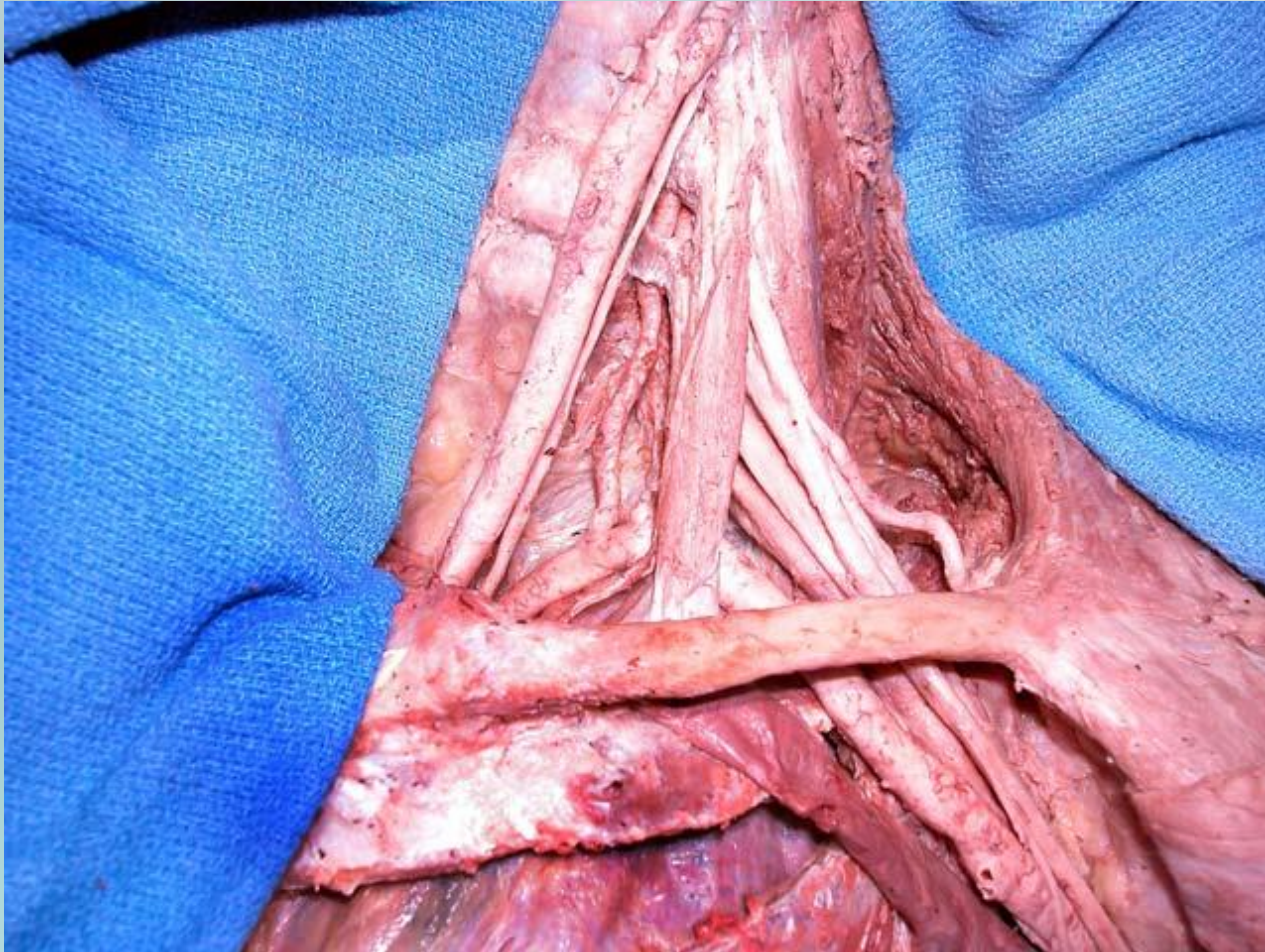
# Supraclavicular Nerve Block



Figure 2A



# Supraclavicular Nerve Block



# Supraclavicular Nerve Block



# Supraclavicular Nerve Block



# Supraclavicular Nerve Block



# Supraclavicular Nerve Block



# Supraclavicular Nerve Block



# Infraclavicular Nerve Block

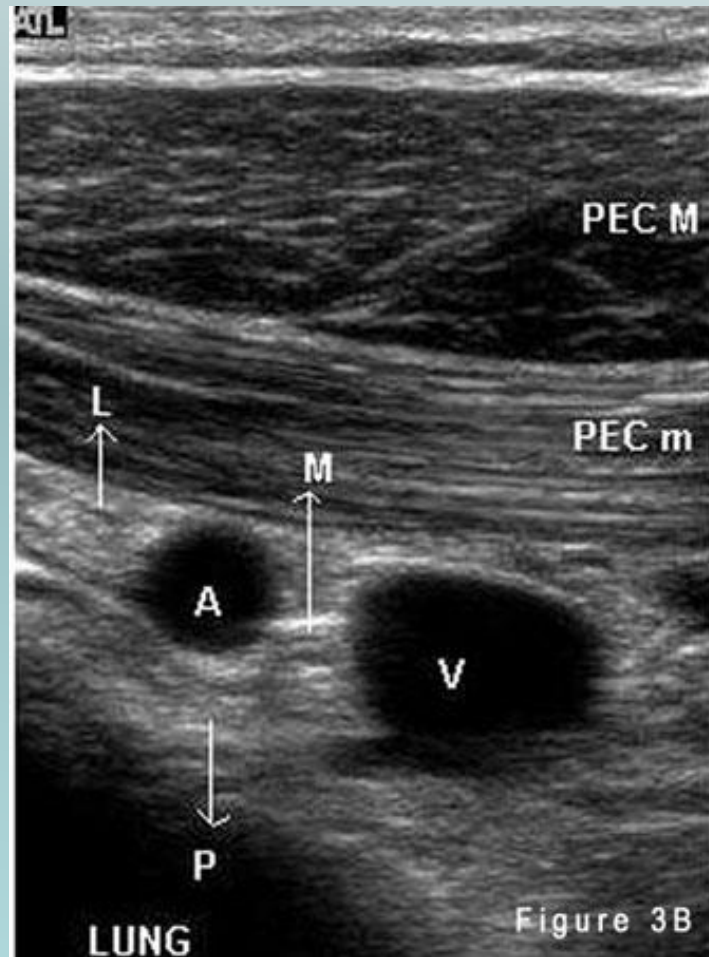
- Provides anesthesia for any procedure below the level of shoulder
- Blockade occurs at the level of the cords
- Offers the theoretical advantage of avoiding pneumothorax while blocking the musculocutaneous when it is still in the plexus
- Technique for performing block:
  - a) nerve stimulator
  - b) ultrasound guided
- Complications are rare

# INFRACLAVICULAR BLOCK





# INFRACLAVICULAR BLOCK



# Axillary Nerve Block

- Axillary can be used for any surgery distal to the elbow
- The block occurs at the level of the terminal nerves
- Techniques for axillary block
  - a) trans arterial technique
  - b) nerve stimulator technique
  - c) ultrasound
- The musculocutaneous nerve is not in the axillary sheath and must be blocked separately
  - a) it innervates biceps and coracobrachialis muscle
  - b) below the level of the elbow it innervates the skin on the lateral part of the forearm down to the base of the thumb

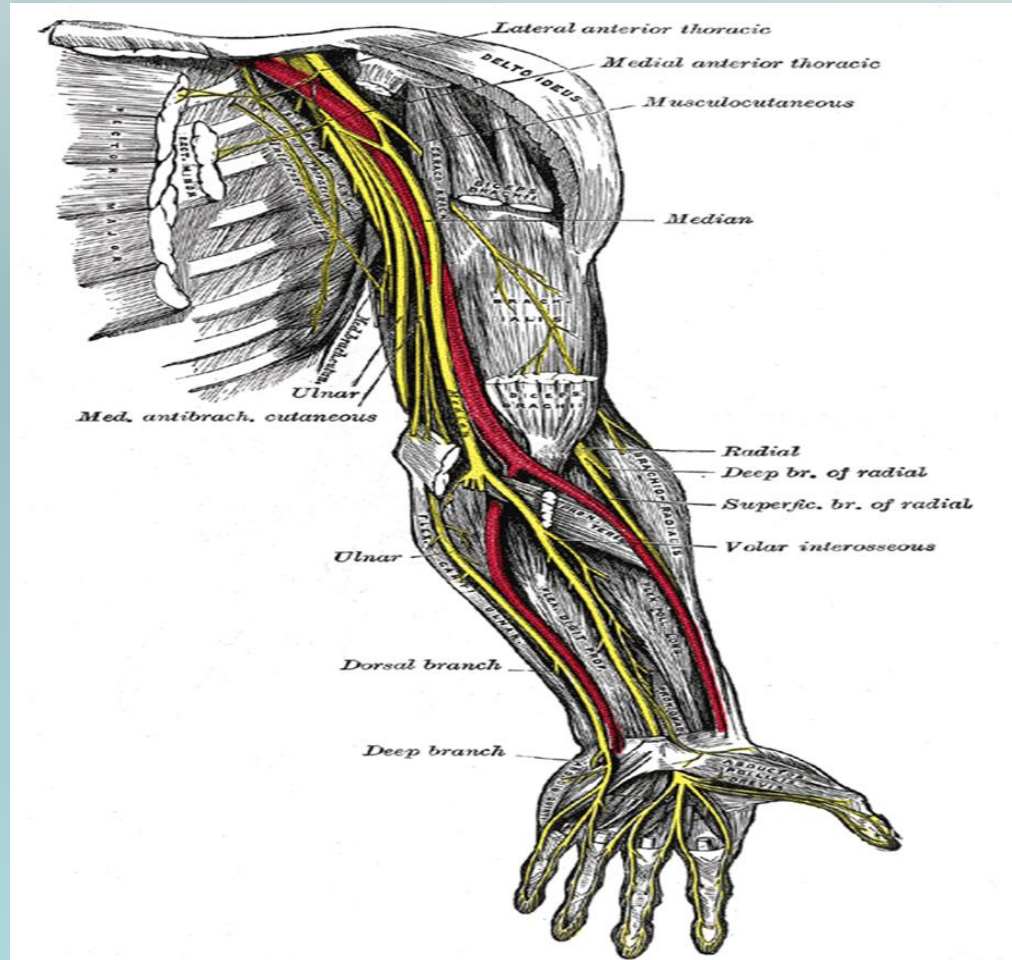
# Axillary Nerve Block

c) the musculocutaneous nerve lies in the body of the coracobrachialis muscle which is deep and lateral to the axillary artery

d) the intercostobrachial nerve is often blocked at this level by injecting a subcutaneous wheal of local anesthetic 2 cm above and below the axillary artery

- Complications are rare

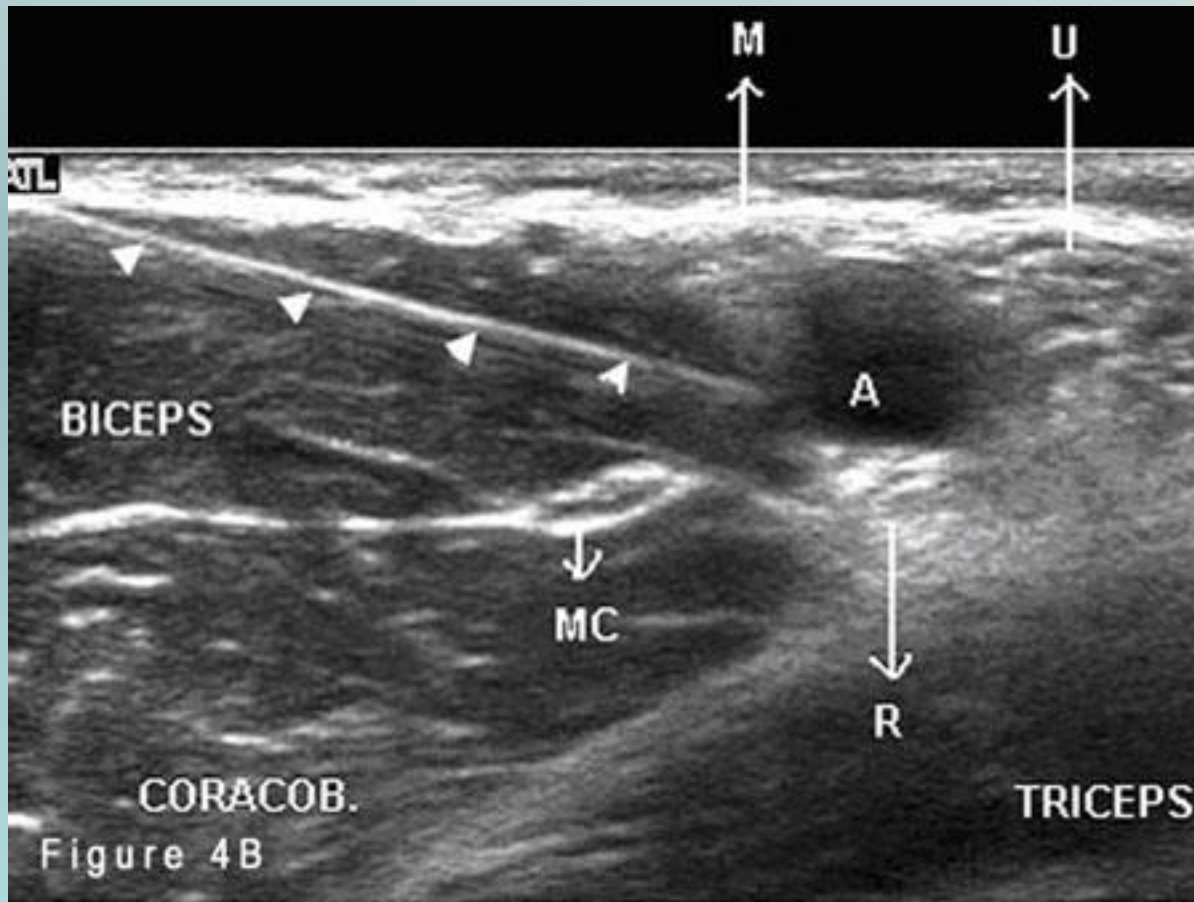
# Nerve Anatomy



# Axillary Block



# AXILLARY BLOCK



# ANATOMY LOWER EXTREMITY BLOCKS

- The nerve supply to the lower extremity is derived from the lumbar and sacral plexuses
- The lumbar plexus is formed by the anterior rami of first four lumbar nerves and variable contributions from T12 and L5.
- The plexus lies between the psoas major and quadratus lumborum muscles in what is called the psoas compartment
- The lumbar plexus gives rise to the lateral femoral cutaneous, femoral and obturator nerves
- The sacral plexus is derived from the first, second, and third sacral nerves and the anterior rami of L4 and L5

# ANATOMY LOWER EXTREMITY BLOCKS

(cont.)

- The sacral plexus gives rise to the posterior cutaneous nerve of the thigh and the sciatic nerve
- The sciatic nerve passes down through the pelvis and greater sciatic foramen. It travels down the back of the thigh to the popliteal fossa where it separates into the tibial and common peroneal nerves



# PSOAS COMPARTMENT BLOCK

- Psoas compartment used for postoperative analgesia for patients undergoing major knee and hip surgery
- Offers a simple injection technique for blocking femoral, obturator and lateral femoral cutaneous nerves
- Techniques:
  - a) locate L4 by drawing a line that connects the iliac crest
  - b) 10 cm insulated needle is inserted 4 cm lateral to the midline of spinous process for L4 on the side to be blocked

# PSOAS COMPARTMENT BLOCK (cont.)

c) Insert the needle perpendicular to the skin until a quadriceps response is obtained

e) Inject 30ml of local anesthetic

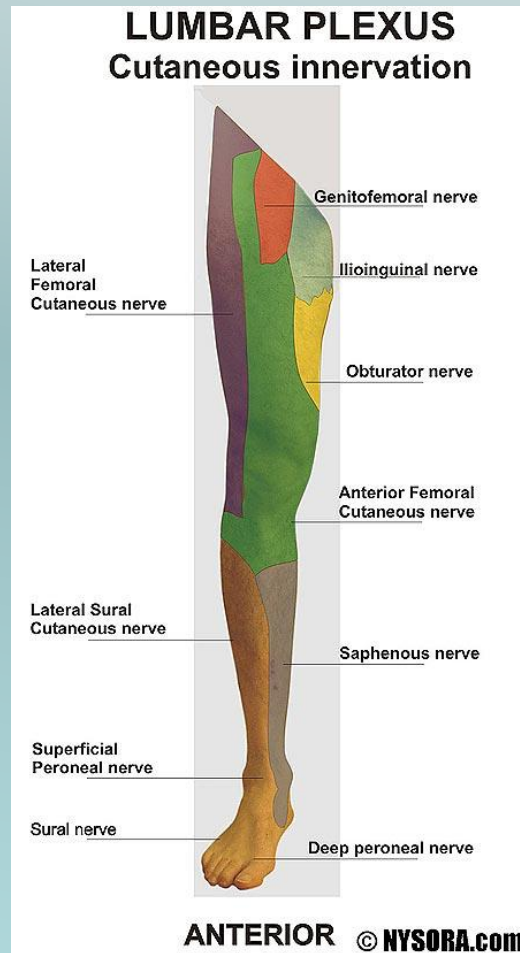
- Complications:

- a) epidural injection or spread

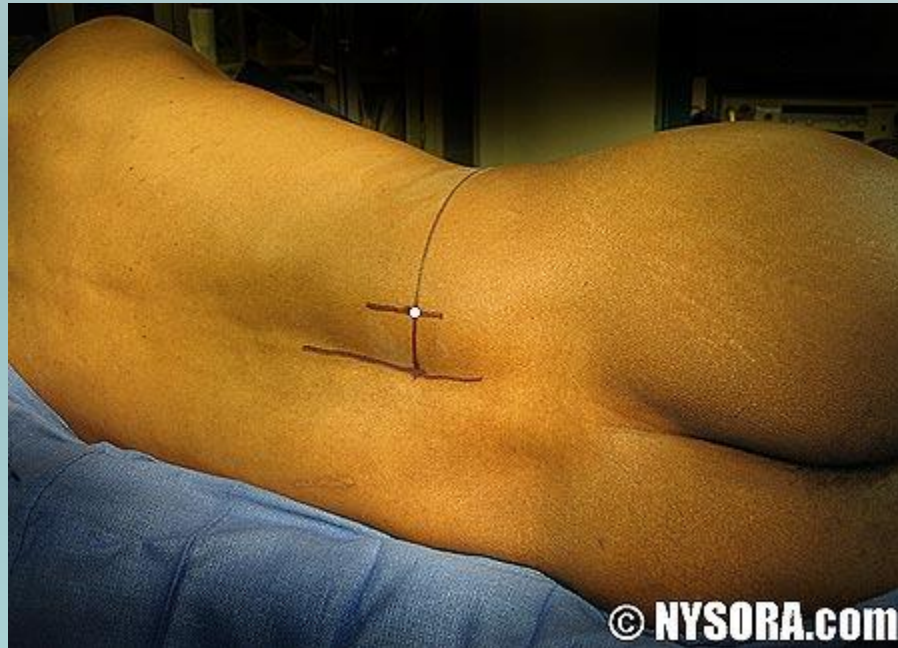
- b) Subarachnoid

- c) vascular injection

# PSOAS COMPARTMENT BLOCK



# PSOAS COMPARTMENT BLOCK



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# PSOAS COMPARTMENT BLOCK

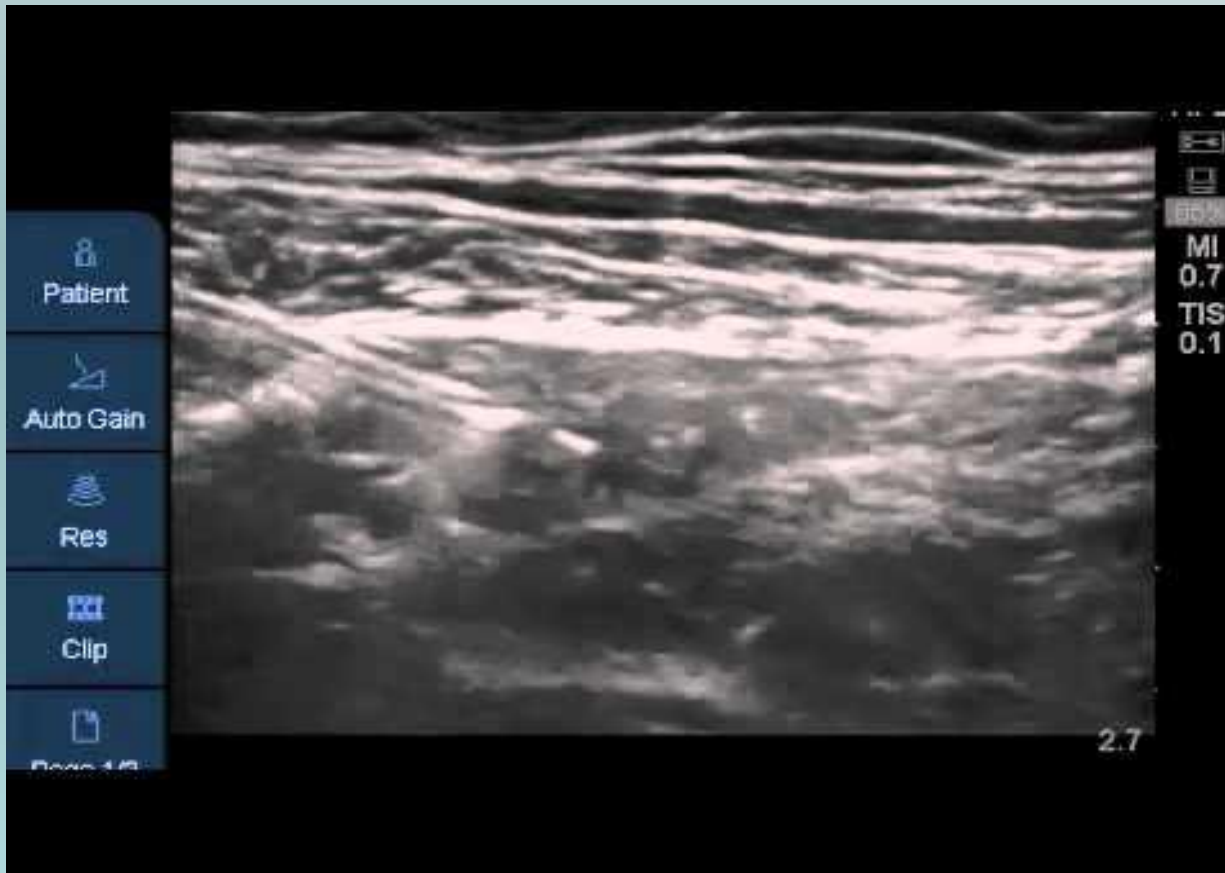


# ANTERIOR PSOAS COMPARTMENT BLOCK

- Assumes that the fascial sheath that surrounds the lumbar roots extends into the femoral canal and acts as an enclosed conduit for the spread of local anesthetic.
- Work in the minority of cases even when large volumes of local anesthetic are used
- Reliable and provides anesthesia for the femoral and lateral femoral cutaneous nerves



# Fascia Iliaca Block



# FEMORAL NERVE BLOCKS

- Used for postoperative analgesia for knee surgery
- Technique :
  - a) ultrasound stimulator
  - b) nerve stimulator
    - 1) lateral to medial  
nerve to artery to vein
    - 2) insert insulated needle 1 cm lateral to femoral artery

# FEMORAL NERVE BLOCKS

Look for patellar movement to make sure the main part of the femoral nerve is being stimulated

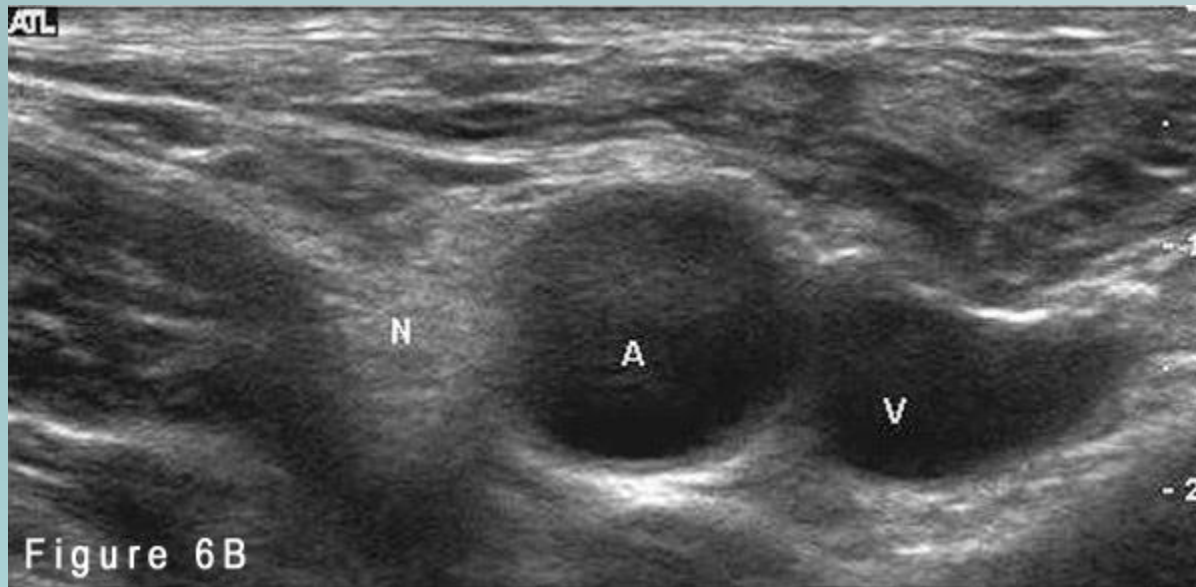
- Complications are usually rare
- The terminal branch of femoral nerve becomes the saphenous nerve

# FEMORAL NERVE BLOCKS



Figure 6A

# FEMORAL NERVE BLOCKS



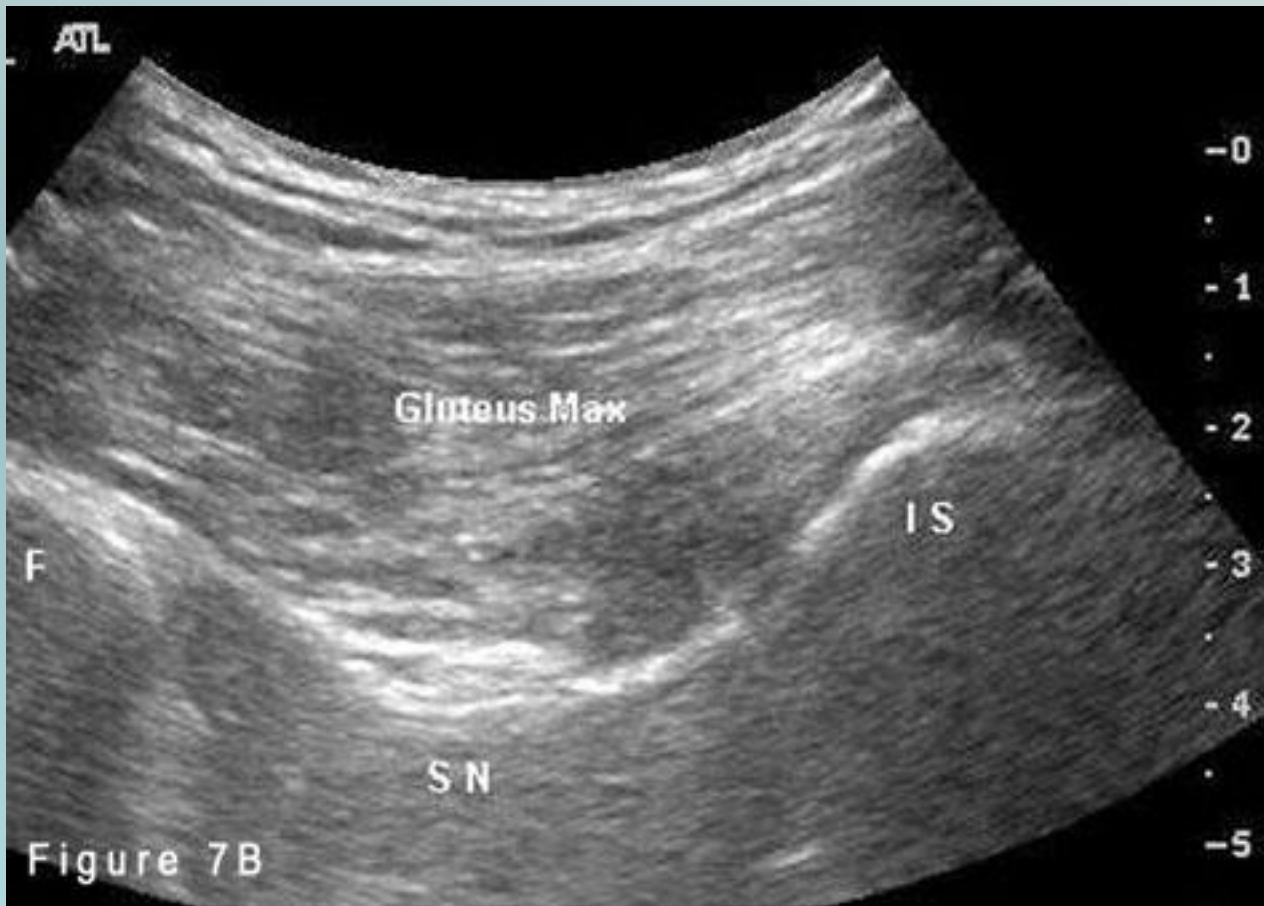
# SCIATIC NERVE BLOCK

- Can be used for any surgery below the knee when combined with a saphenous nerve block
- Technique:
  - a) Ultrasound
  - b) Nerve Stimulator
    - 1) Lateral position, with leg to be blocked rolled forward onto the flex knee as the heel rests on the dependent knee
    - 2) A line is drawn to connect the posterior superior iliac spine to the greater trochanter
    - 3) A perpendicular line is drawn bisecting this line and extending caudad
    - 4) A second line is drawn from the greater trochanter to the sacral hiatus
    - 5) Where the bisecting intersects this second line is the point of needle entry
- Complications--Rare

# SCIATIC NERVE BLOCK

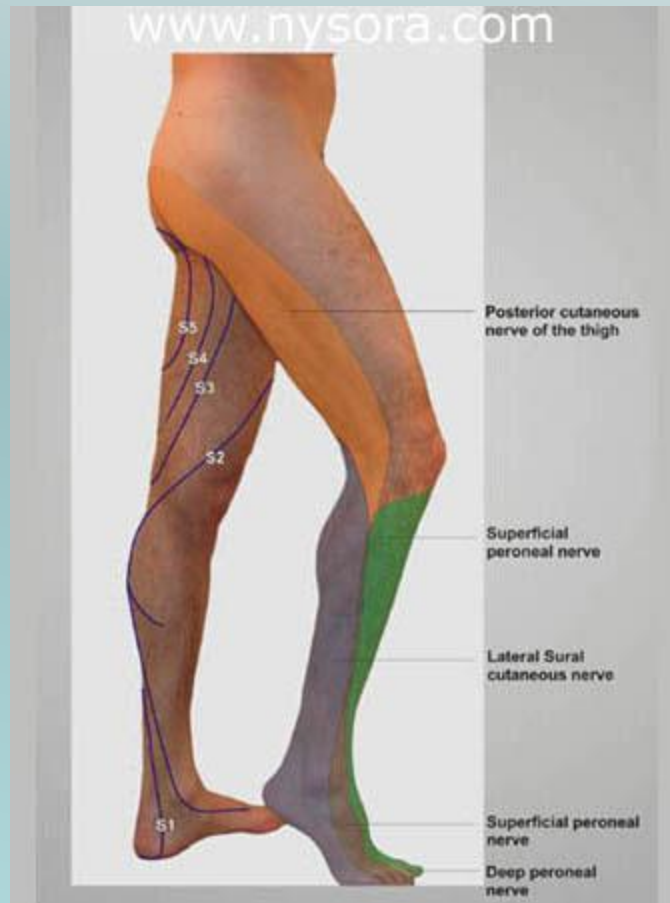


# SCIATIC NERVE BLOCK





# SCIATIC NERVE BLOCK



# SCIATIC NERVE BLOCK



# SCIATIC NERVE BLOCK



# SCIATIC NERVE BLOCK



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# POPLITEAL FOSSA BLOCK

- Clinical application-foot and ankle surgery when combined with saphenous nerve block
- This is a sciatic nerve block in the proximal part of the popliteal fossa before it divides into the tibia and common peronei nerves
- Techniques:
  - a) Ultrasound
  - b) Nerve Stimulator
    - 1) Outline the borders of the popliteal fossa

# POPLITEAL FOSSA BLOCK

medial border- semimembranosus and semitendinosus

lateral border- biceps femoris

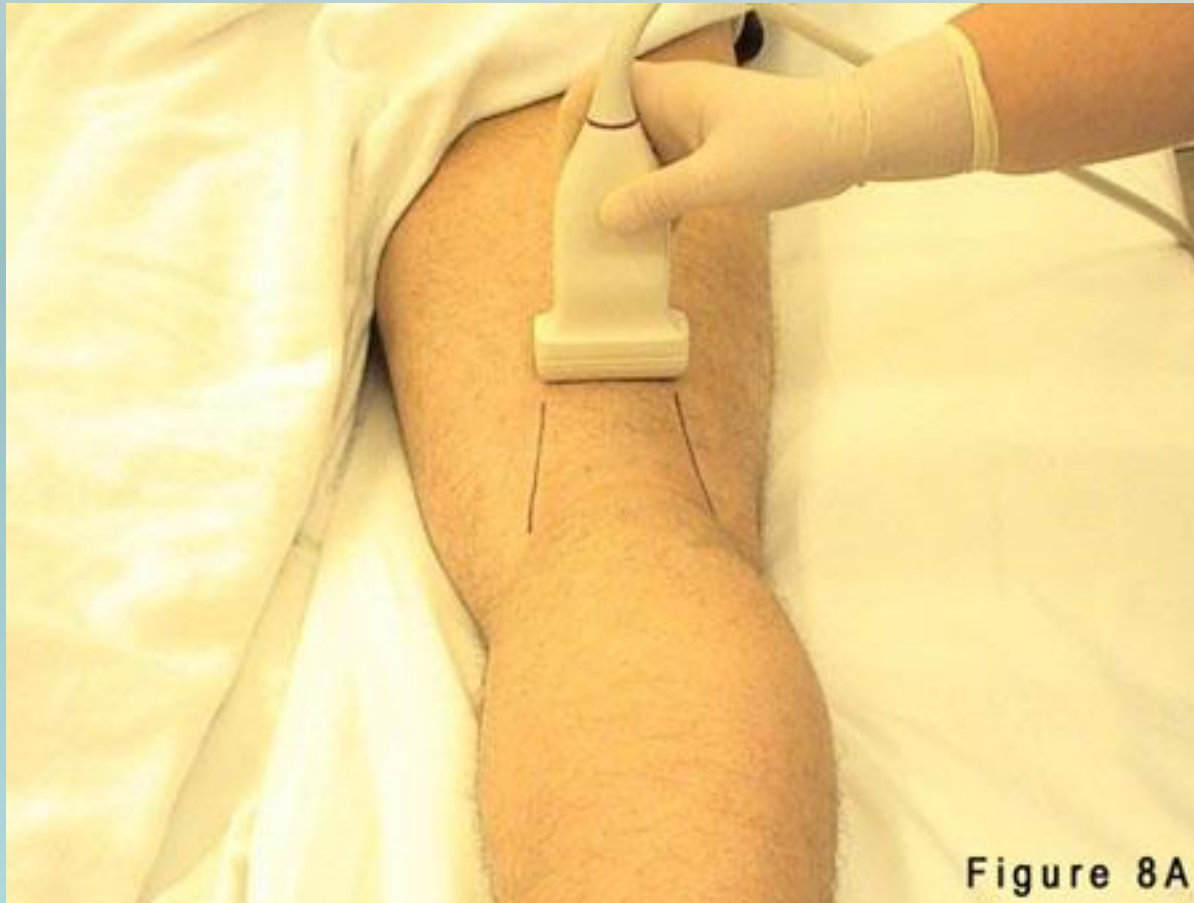
caudad border- crease formed by gastrocnemius muscles

- 2) Draw a line bisecting the fossa from the apex to the base
- 3) Mark a point at least 7 cm proximal to the base

# POPLITEAL FOSSA BLOCK

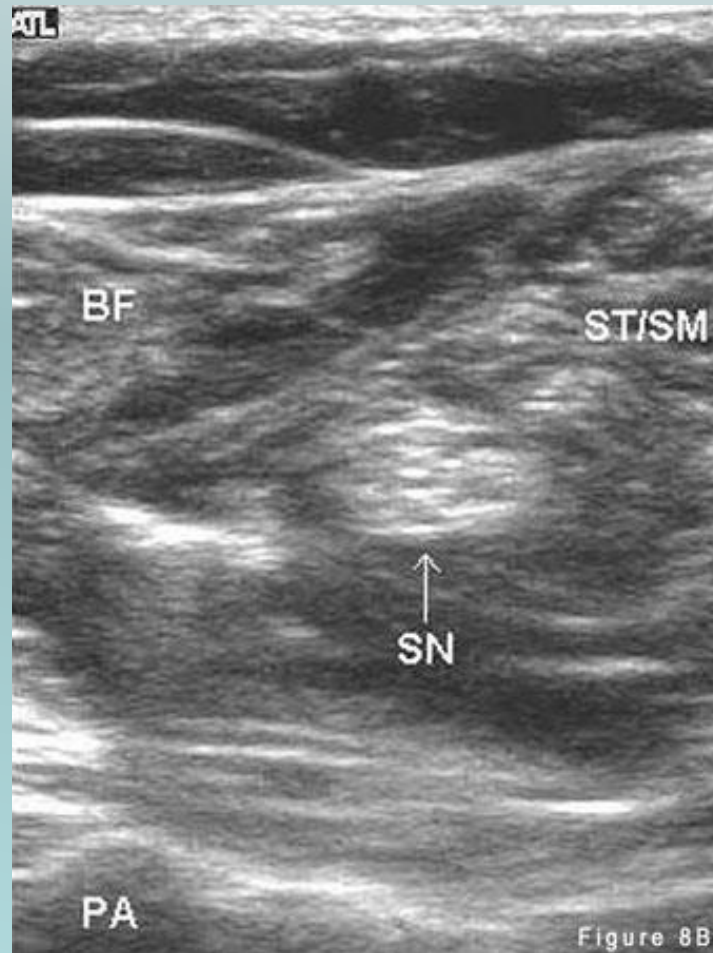
- 4) Mark an injection point 1 cm lateral to this point
  - 5) Insert stimulating needle (plantar flexion, tibia nerve stimulation provides more reliable block)
- Complications- Rare

# POPLITEAL FOSSA BLOCK

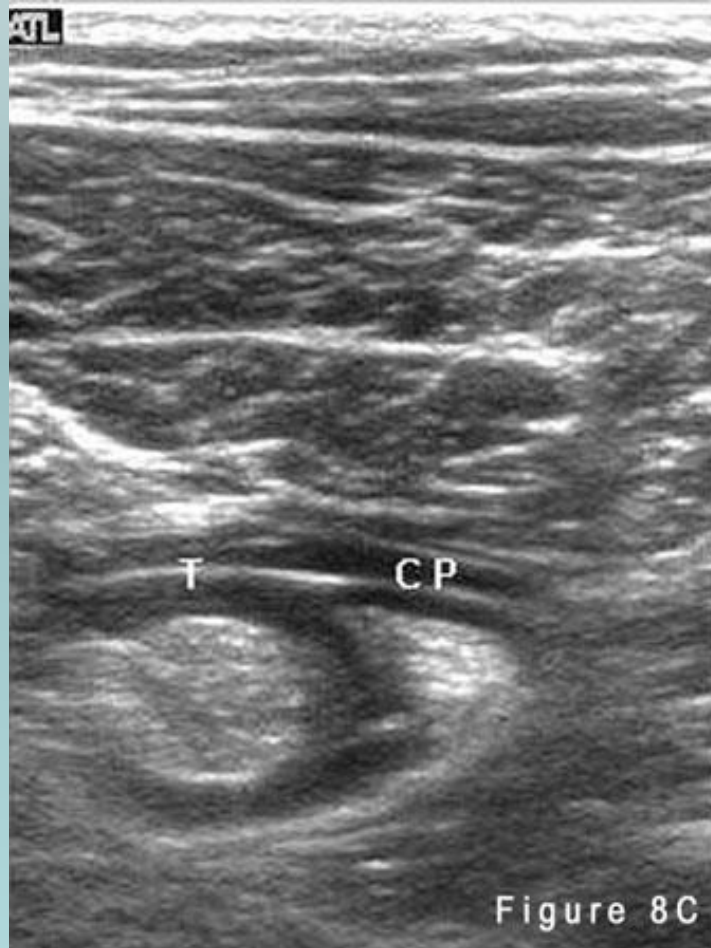




# POPLITEAL FOSSA BLOCK



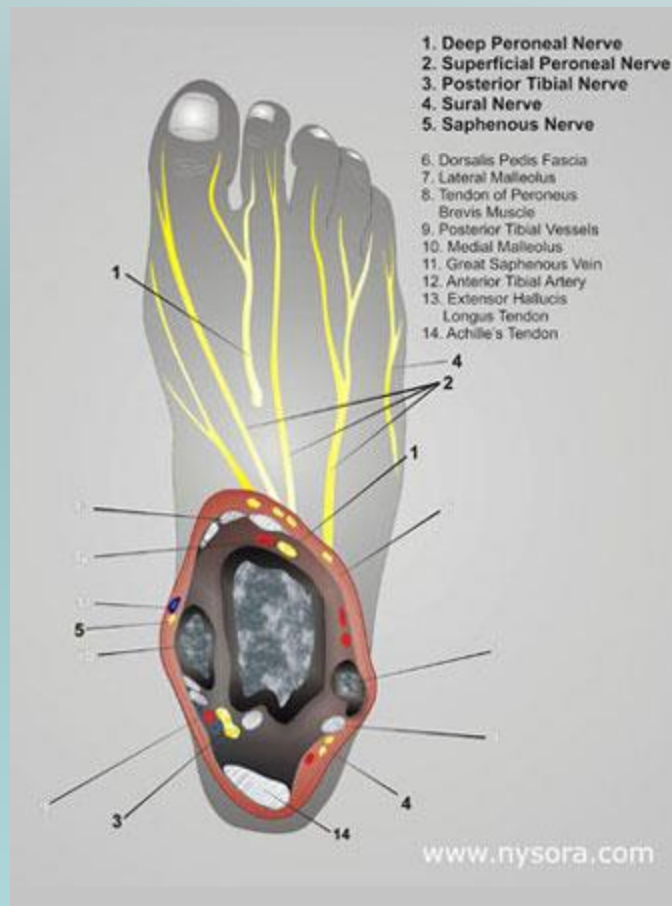
# POPLITEAL FOSSA BLOCK



# ANKLE BLOCKS

- Provides surgical anesthesia to the foot not requiring a tourniquet
- Four of five nerves are terminal branches of the sciatic nerve. The saphenous nerve is the terminal branch of the femoral nerve
- Ankle block consists of two deep nerves below superficial facial (posterior tibia and deep peronei) and three superficial nerve above the superficial facial (surah, saphenous and superficial peronei)

# ANKLE BLOCKS



# ANKLE BLOCKS

- Deep blocks can be performed with ultrasound guidance
- Deep peronei nerve:
  - a) Provides anesthesia between the first and second toes
  - b) it is located between the extensor hallucis longus and the extensor digitorum longus

# ANKLE BLOCKS



# ANKLE BLOCKS



# ANKLE BLOCKS





# ANKLE BLOCKS



# ANKLE BLOCKS



# PARAVERTEBRAL BLOCK

- Clinical applications: post-thoracotomy and post-mastectomy pain
- Paravertebral blockade occurs as the spinal nerves emerge from the vertebral foramina.
- This results in somatic and sympathetic block of multiple contiguous thoracic dermatomes above and below the injection site

# PARAVERTEBRAL BLOCK

- Techniques:

- a) Thoracic region

- 1) the spinous processes are identified

- 2) a needle is inserted 2.5 to 3 cm lateral to the most cephalic aspect of the spinous process and advanced perpendicular to the skin

- 3) the vertebral transverse process of the level below is contacted at 2 to 4 cm

# PARAVERTEBRAL BLOCK

4) The transverse process is walked off in a cephalic direction and advanced until a loss of resistance is obtained (about 1 to 1.5 cm)

5) 15 ml of local results four or five dermatomes spread

## b) Lumbar region;

1) Lines drawn across the cephalic edge of the spinous processes

# PARAVERTEBRAL BLOCK

- 2) 3 cm lateral along these lines a needle is advanced perpendicular to the skin until the homologous transverse processes are contacted (about 3 to 5 cm)
- 3) Walk off the caudal edge of the transverse processes and insert needle and additional 1 to 2 cm
- 4) 6 to 10 ml of local is injected
- 5) Complications—Epidural or subarachnoid injections, intravascular injections, plural puncture, pneumothorax

# PARAVERTEBRAL BLOCK



# PARAVERTEBRAL BLOCK





# PARAVERTEBRAL BLOCK



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# PARAVERTEBRAL BLOCK



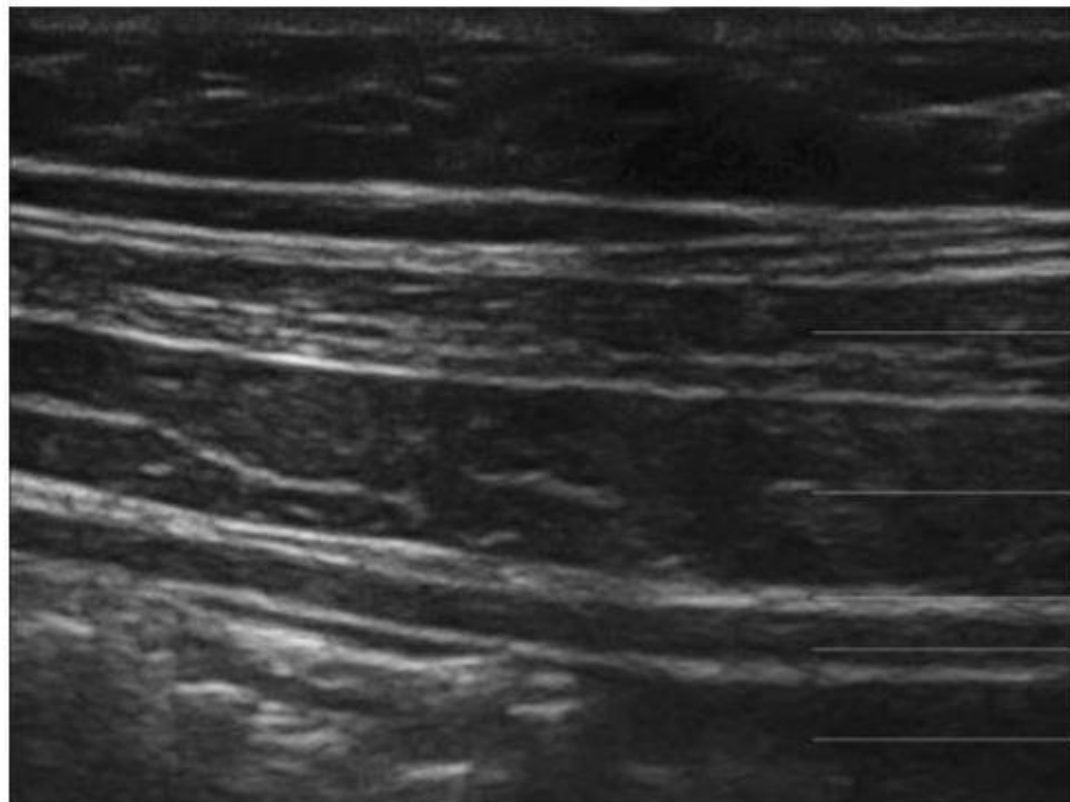
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# Transverses Abdominals Plan Block

- Regional anesthetic technique used to block sensation to the anterior abdominal wall.
- 
- Provides anesthesia and analgesia coverage from T9 to T11 dermatomes
- Great for Appendectomies, ventral and inguinal hernia repairs as well as open gastrostomy tube insertion.

# Transverses Abdominals Plan Block

Medscape



External oblique

Internal oblique

Transversus abdominis plane

Transversus abdominis

Peritoneal cavity