

# Training workbook

*Ultrasound-guided Nerve Blocks and Interventional Pain Procedures in Emergency Care*

## The Femoral Nerve Block



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# The Femoral Nerve Block

## Goals:

1. To know the surface landmarks
2. To know what is blocked
3. To understand the innervation
4. To recognize the sonographic anatomy
5. To know the common ED uses of this block
6. Recognize common pitfalls and how to avoid them

## Background Reading:

Herring A *et al* Focus On: Ultrasound-Guided Femoral Nerve Block. ACEP News, December 2011  
Muttu CE, Jensen EJ, Manka Jr MA, Anders MJ, Bone LB. Femoral nerve block for diaphyseal and distal femoral fractures in the emergency department. *J. Bone Joint Surg. Am.* 2007;89(12):2599.

Patient selection (indications) →  
1. “Hip” and femoral shaft fractures  
2. Proximal tibia fractures  
3. Knee/Patellar Injuries  
4. Anterior Thigh Abscesses or Lacerations

Patient setup → Supine Position.

Block setup →  
Linear probe  
22 gauge 3.5-inch spinal needle  
10-30cc local anesthetic  
In-plane (lateral to medial)

Pitfalls →  
1. Vascular puncture  
2. Nerve injury  
3. Potential to delay the diagnosis of compartment syndrome

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Stay Safe

- Keep needle tip at least 1 cm lateral to the femoral nerve and vessels to avoid vascular puncture or intraneural injection.
- Always discuss potential risk of compartment syndrome with consulting services

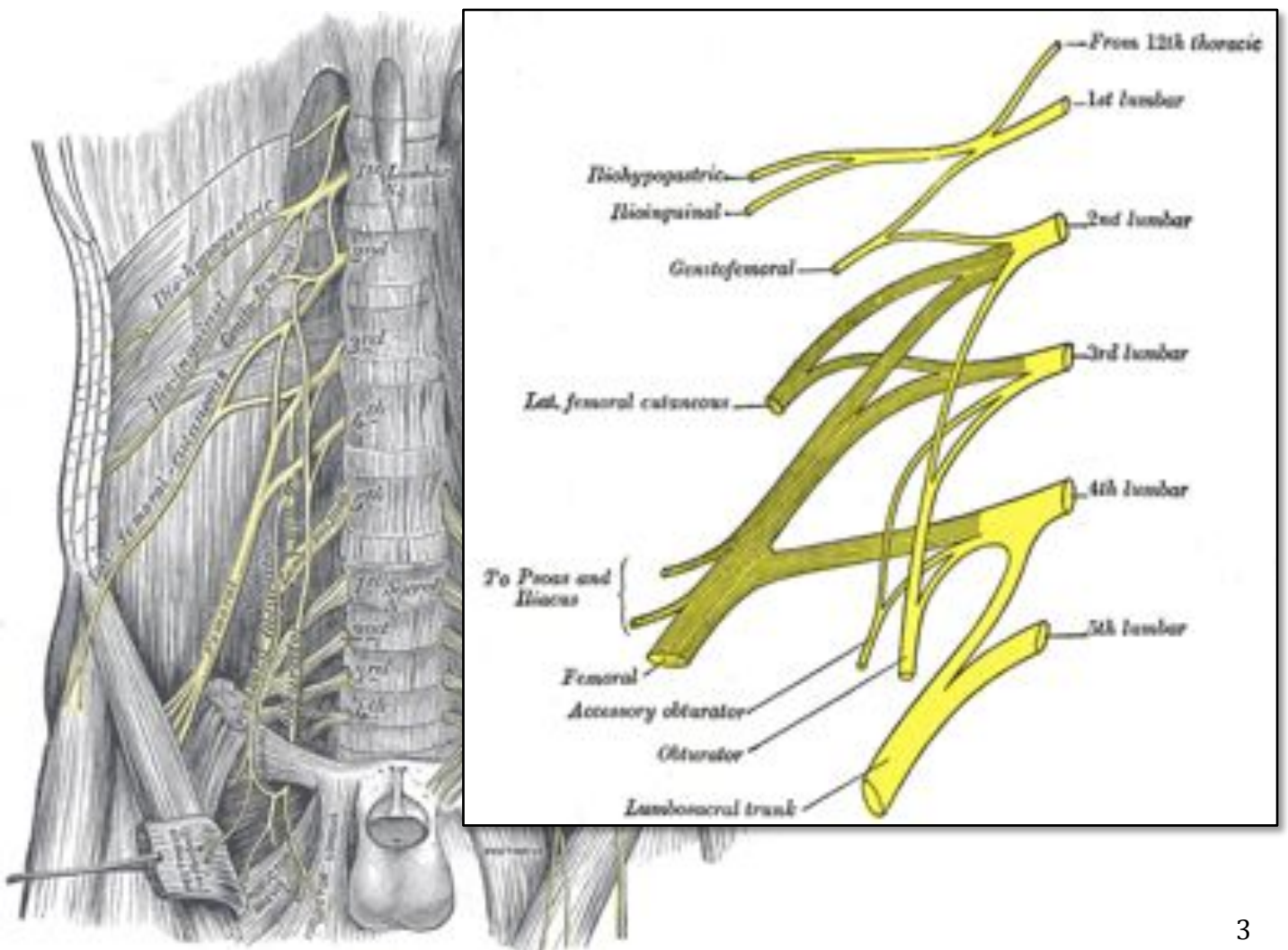
## Femoral Block: Lumbar Plexus Anatomy

The femoral nerve is one of the three major branches of the lumbar plexus, arising from the L2-L4 ventral rami.

The *lumbar plexus* passes from the spinal roots through the psoas muscle, then descends in a groove between the iliacus and psoas muscles and branches into three major divisions before entering the thigh:

1. the lateral femoral cutaneous nerve
2. the femoral nerve
3. the obturator nerves.

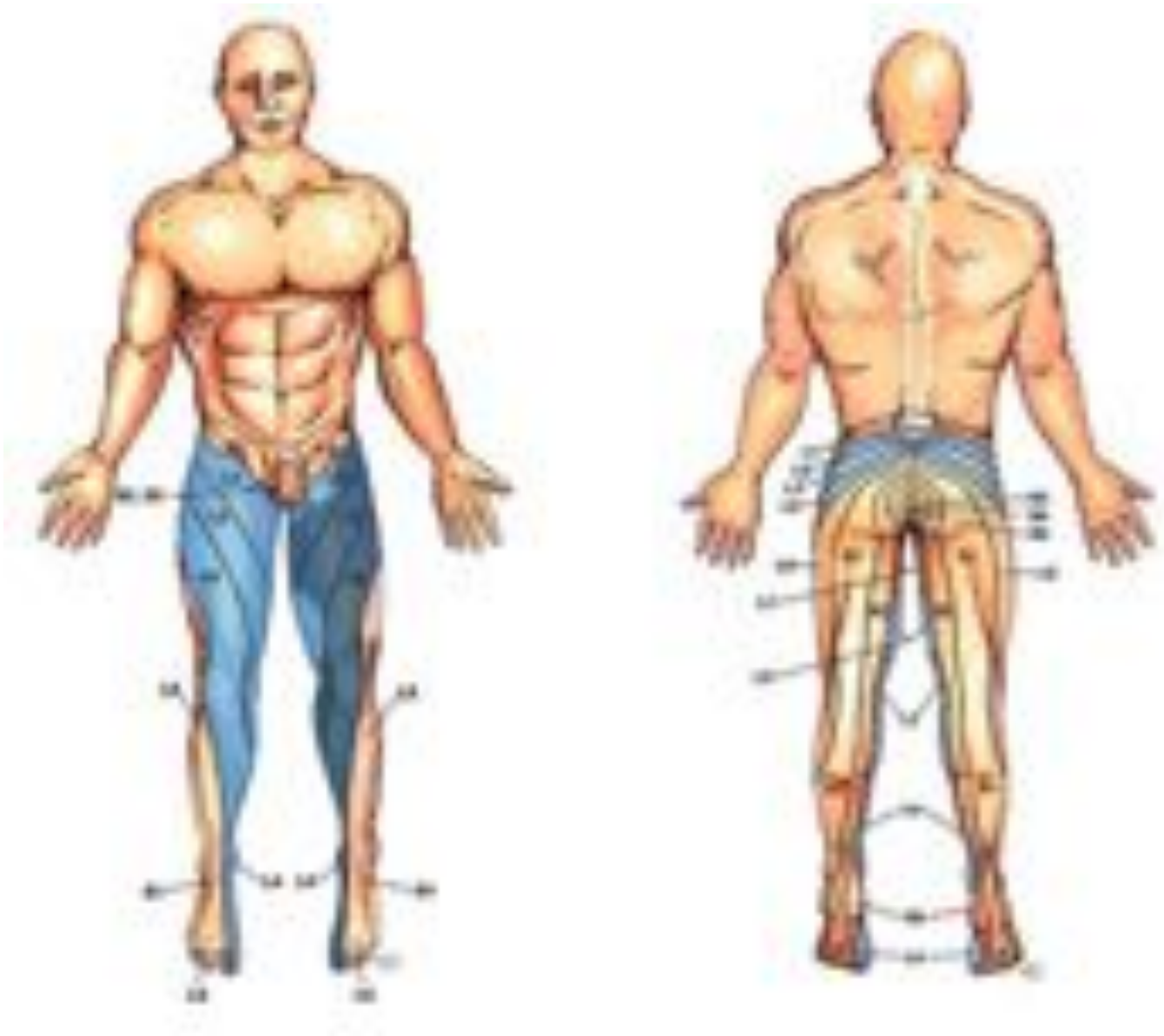
At the level of the inguinal ligament, the femoral nerve passes anterior to the psoas muscle and lateral to the femoral artery, then divides into its superficial and deep branches that innervate parts of the lower extremity.



## **Femoral Block:** The innervation

The superficial and deep branches of the femoral nerve supply sensation to the femur, hip joint, anteromedial thigh (quadriceps muscle), knee, and the medial side of the leg from the knee to the foot (via the saphenous nerve). This means incomplete block of the lower extremity above and below the knee.

- The posterolateral thigh is NOT blocked.
- The lateral and posterior aspects of the lower leg are NOT blocked.
- The foot is NOT blocked.



## The Femoral block: Surface anatomy

1. Anterior superior iliac spine
2. Pubic Symphysis
3. Inguinal Crease



*Military Advanced Regional Anesthesia and Analgesia Handbook, 2008*

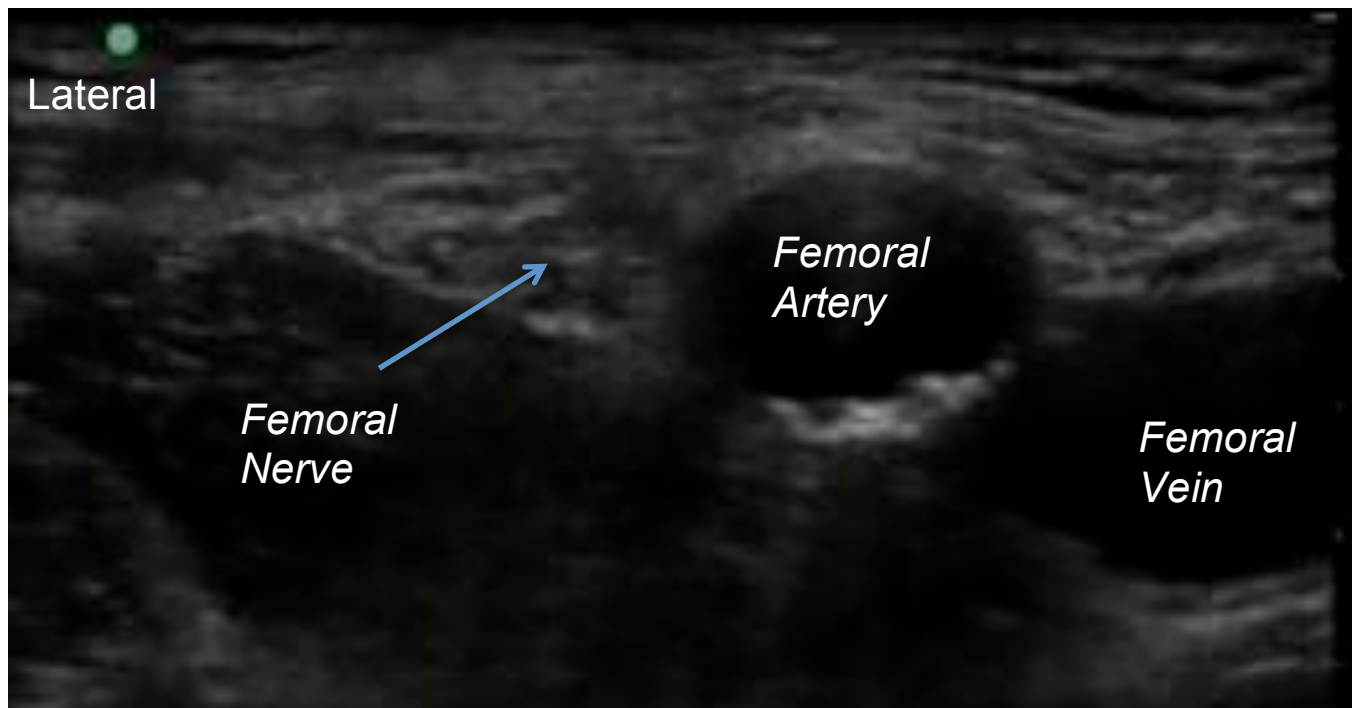
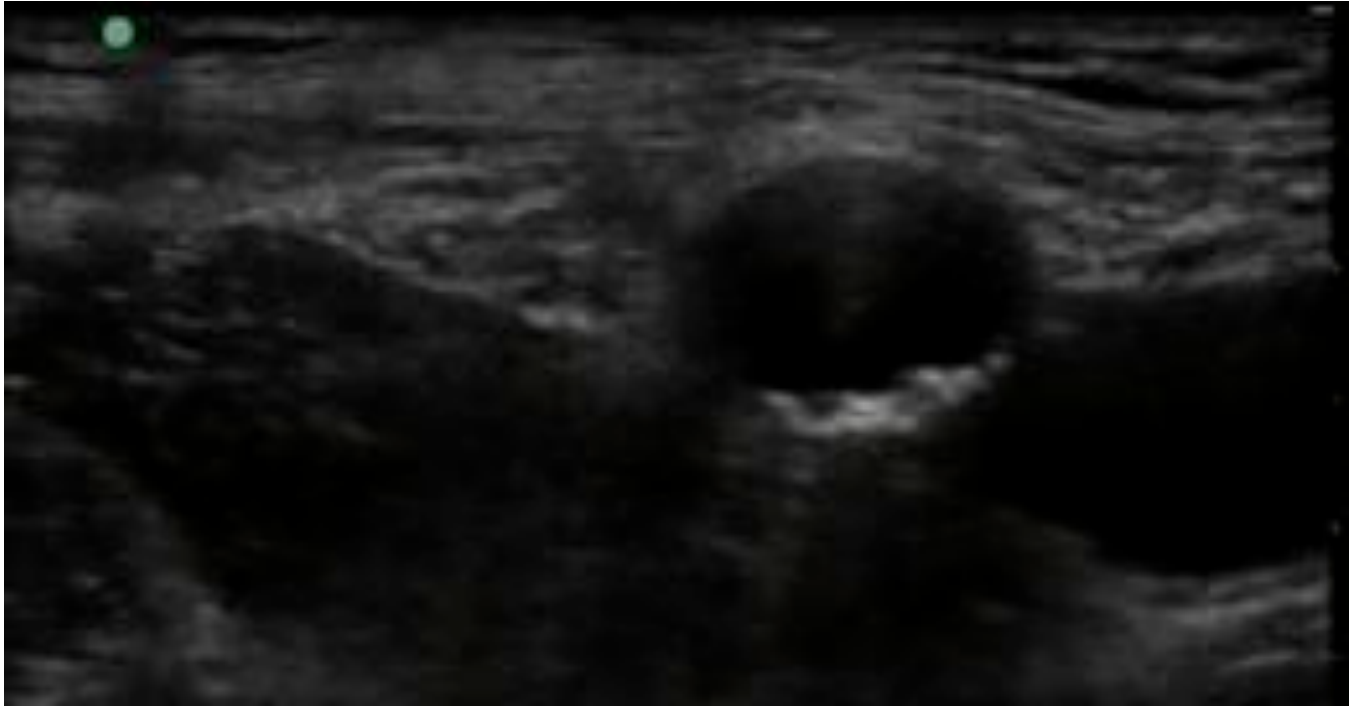
## **Femoral Block: Survey Scan**

With the patient lying supine, expose the groin to identify the anterior superior iliac spine and inguinal crease. Place the probe transversely across the femoral region of the upper thigh roughly parallel to the inguinal crease. The femoral vessels are then identified and centered on screen. Follow the femoral artery proximal to the inguinal ligament and distal to the takeoff of the profunda femoris artery. The femoral nerve will appear just proximal to this bifurcation.



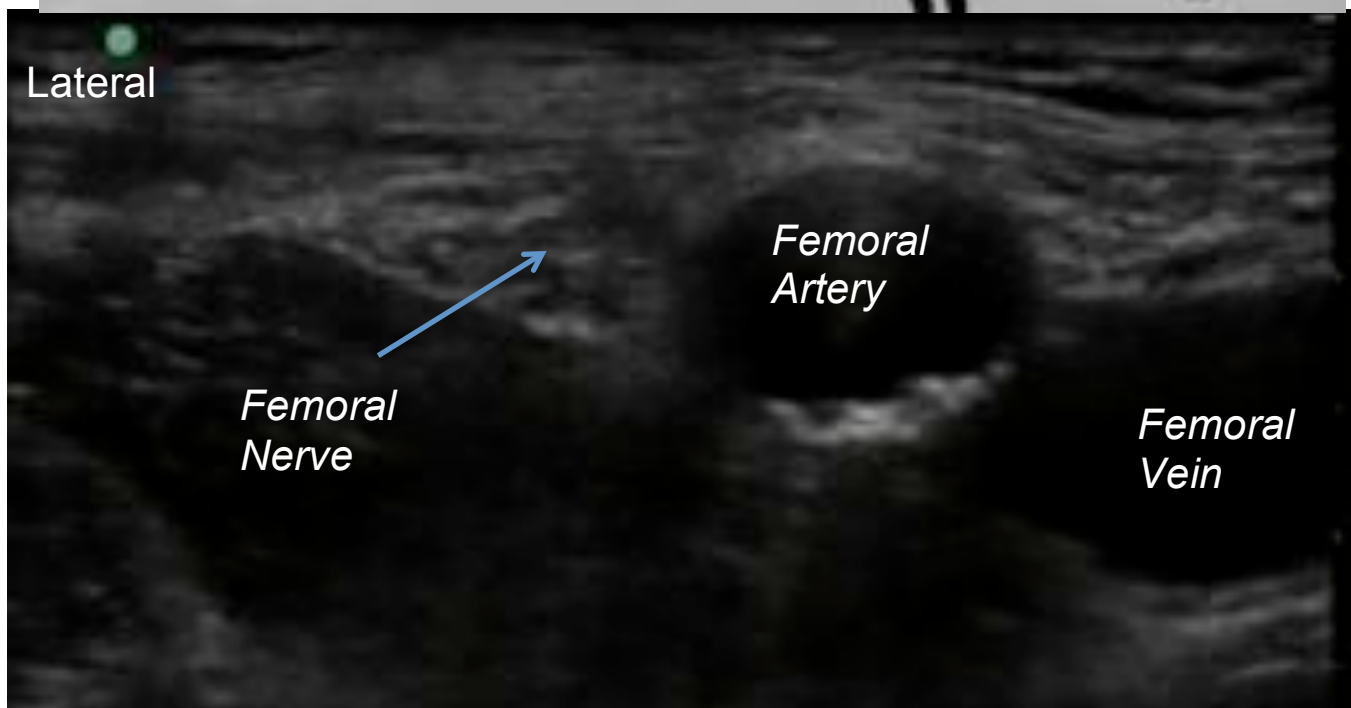
## Femoral Block: Sonographic anatomy

The femoral nerve will appear as a triangular or oval honeycomb structure covered anteriorly by the hyperechoic fascia iliaca.



## **Femoral Block:** Sonographic pattern recognition

1. Femoral vein (medial), collapses more easily than artery
2. Pulsatile femoral artery
3. Femoral nerve: triangular or oval honeycomb structure (3-10 mm in diameter)
4. Anterior hyperechoic fascia iliaca

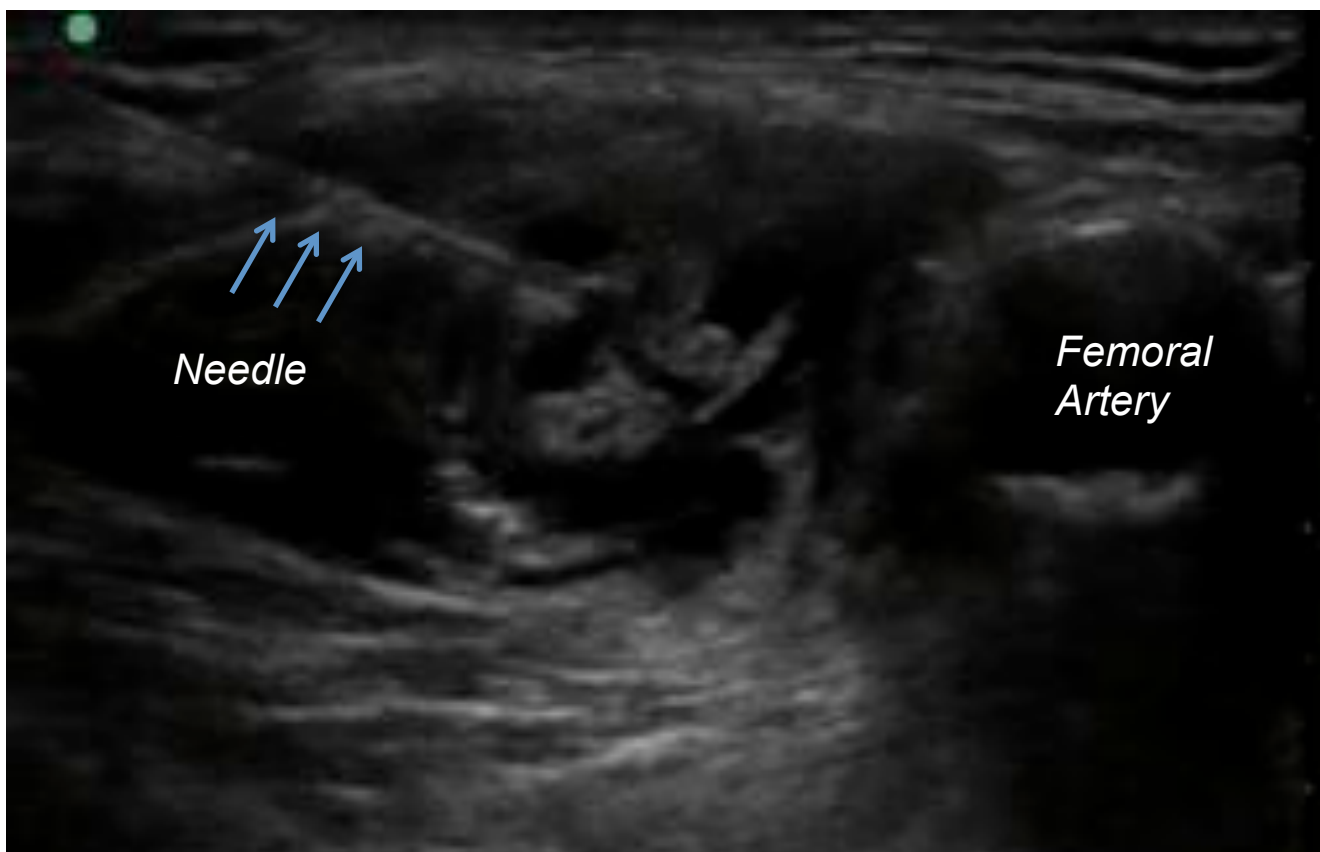
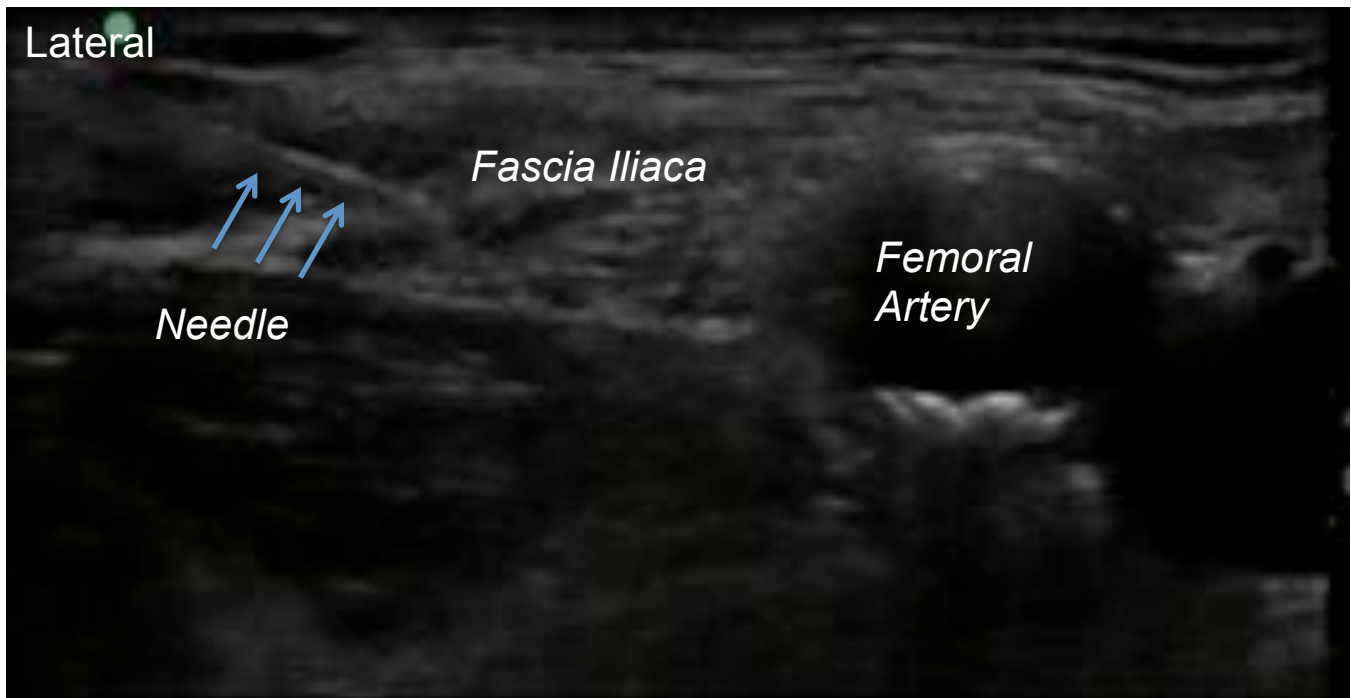




## Femoral Block: Lateral to Medial In-plane injection

### Successful injection

Advance the needle tip beneath the fascia iliaca, and slowly begin to inject. The spread of hypoechoic injectate should be visualized in real time.



## Femoral block

Review: Surface anatomy

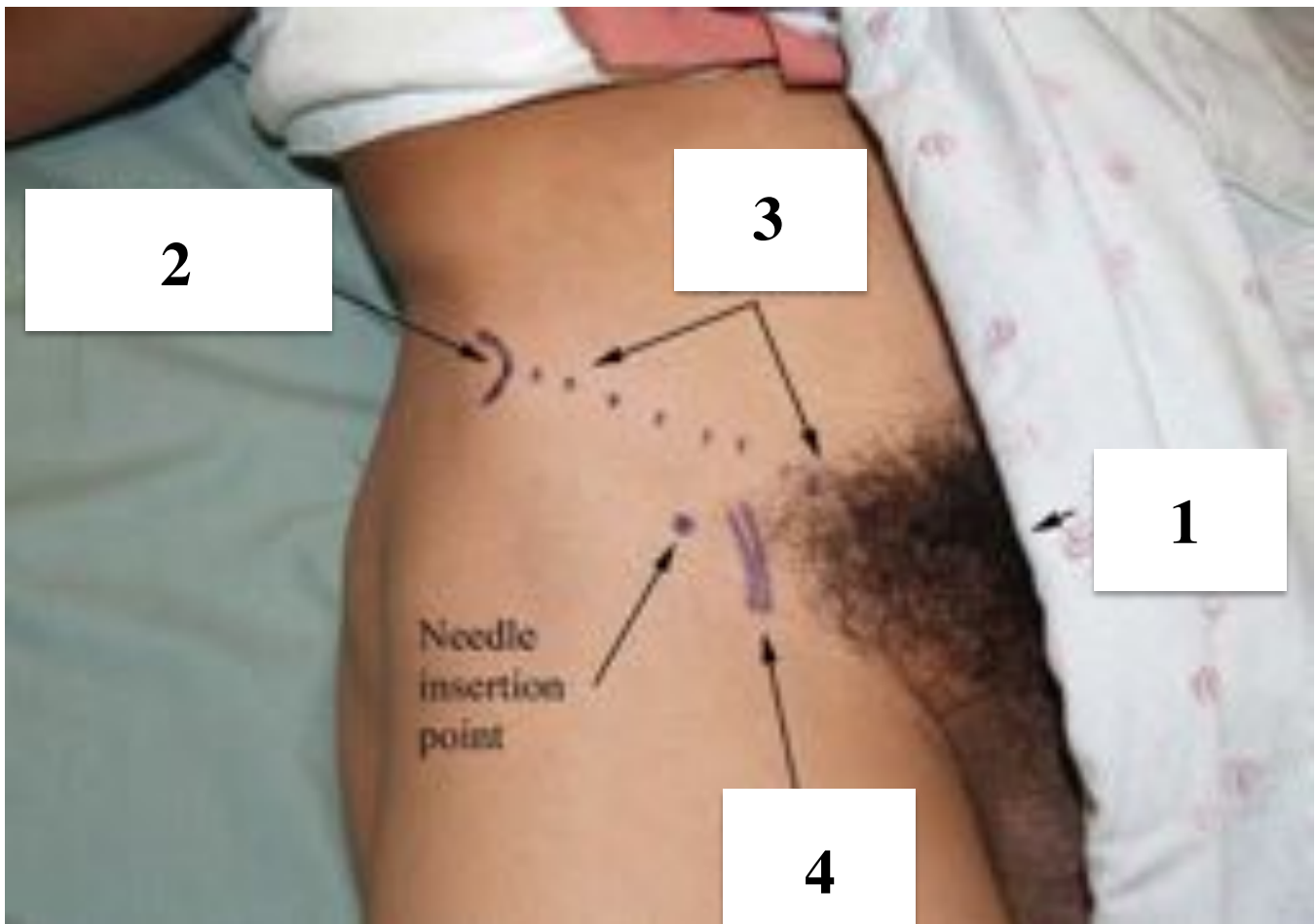
Please list the 4 most important surface landmarks

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_



*Military Advanced Regional Anesthesia and Analgesia Handbook, 2008*

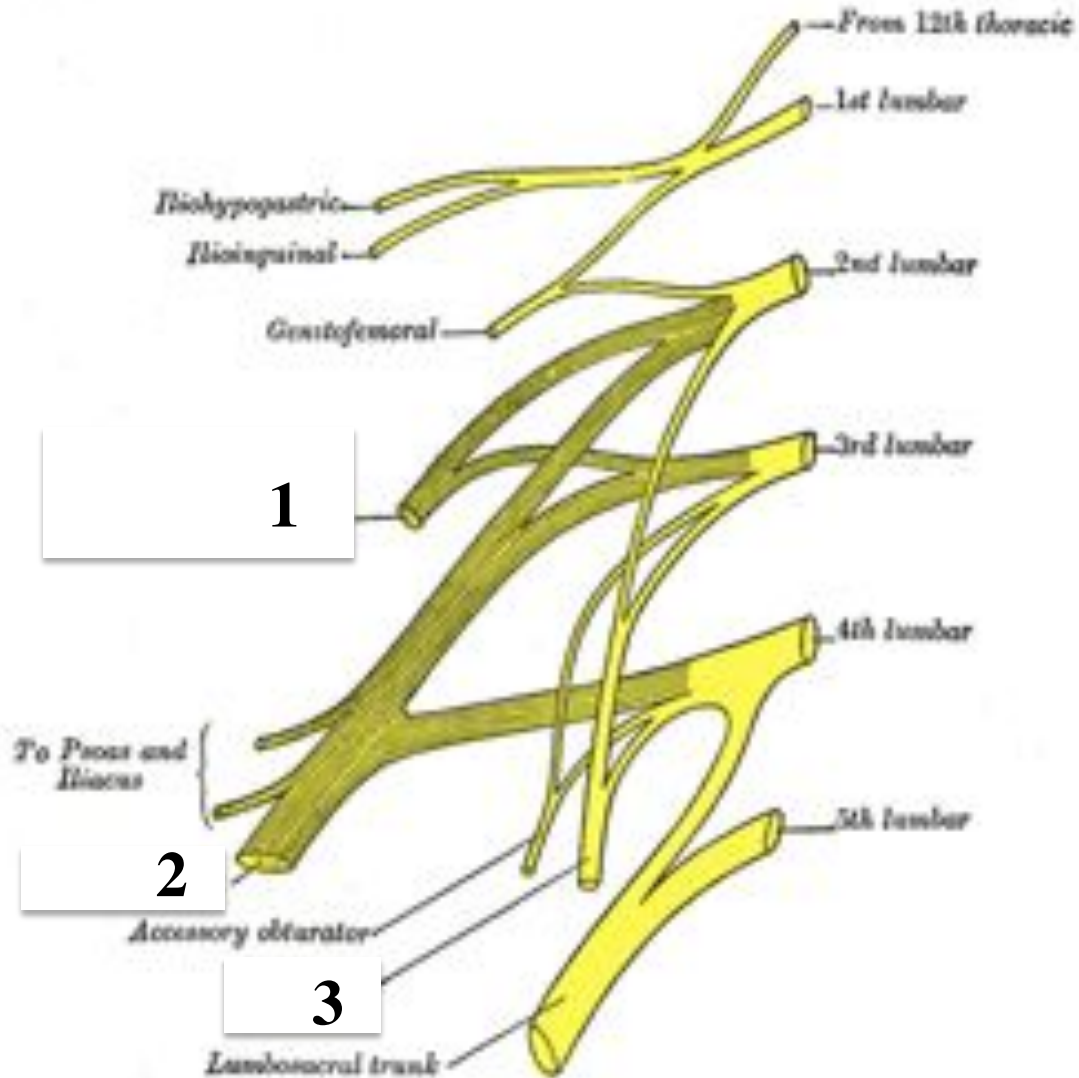
## Femoral block: Anatomy review

Please label the three terminal branches of the lumbar plexus.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_



## Femoral block: Anatomy review

1. Please shade in the cutaneous distribution of the femoral block below.
2. Please indicate if the following injuries will reliably be blocked with the femoral block.
  - a. Hip: Y / N
  - b. Femur fracture: Y / N
  - c. Knee: Y / N
  - d. Foot: Y / N
  - e. Anteromedial thigh: Y / N



## Block 2. The femoral nerve block

Review: sonography

Please label the figure below with the most important sonographic landmarks and then circle the needle tip target.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_



## **Femoral block**

### Review: application

Please list 3 common uses of the femoral block in emergency care

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

### Review: Pitfalls

Please describe the major potential complications associated with this block and how to avoid it. (Top two)

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### Review: Setup

Please briefly describe the needle, local volume and patient positioning for this block.

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