

Ultrasound Guided Femoral Nerve Block

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Disclosures

- No relevant disclosures to lecture

Objectives

- Discuss anatomy of femoral nerve
- Discuss uses of femoral nerve block classically and 3-in-1 variant
- Discuss technique of femoral nerve blockade under ultrasound
- Discuss pitfalls and potential errors

Femoral Nerve Block

Advantages

- Many uses of regional nerve blocks
- Avoid narcotics and their complications
- Allow for longer term pain control
- Can be used in patients unfit for sedation
 - Poor lung health
 - Hypotensive
 - Narcotic dependence or sensitivity

Femoral Nerve Blocks

- Wide variety of potential indications for a femoral nerve block
 - Hip fracture
 - Knee dislocation
 - Femoral fracture
 - Laceration repair
 - Burn
 - Etc.

Nerve Blocks in Community vs. Academic Setting

- Weekend stays
- Night time admissions
- Time to get consult and clear
- Referral and admission patters
- All of these factors can lead to patients spending considerable time prior to OR
- Procedural sedation vs. block

Femoral Nerve Blocks

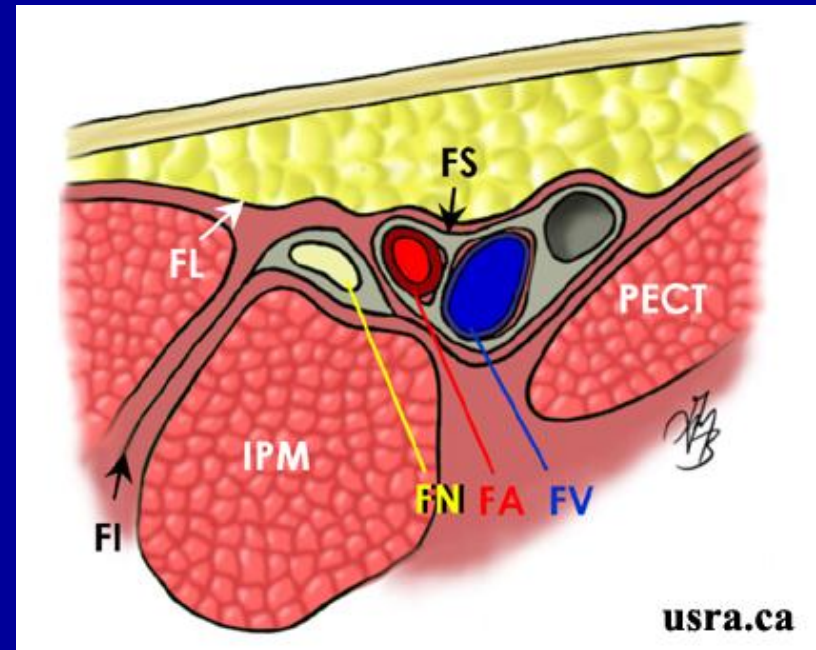
- Several basic principles with US also
- Specialized needles +/-
- No nerve stimulator
- Can see nerve directly and inject directly around target nerve or nerves
- Only in long axis over needle (in-plane)
- Best with short axis over nerve

Femoral Nerve Blocks

- Same principles apply to just about any nerve we may want to block
- Sterile field and prep
- Avoid damaging/lacerating nerve
- Avoid injection into nerve or vessel
- Consider length of anesthesia needed as well as time of onset
- Catheter placement?

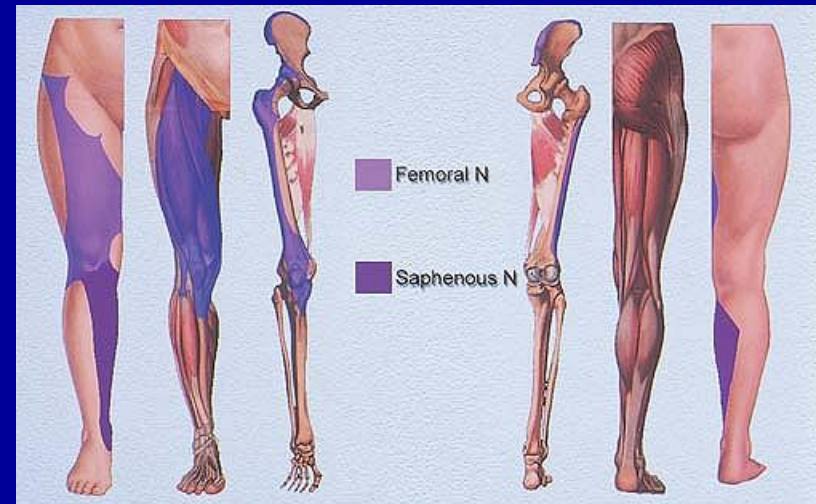
Femoral Nerve Anatomy

- We look in this area all of the time for DVT and Femoral line placement as well as others
- Stick needles here periodically
- Not a totally new concept even if this is your first nerve block



Femoral Nerve Distribution

- Femoral Nerve blockade effects:
 - Anterior and medial portion of the thigh and knee
 - Cutaneous innervation of the medial and lateral portion of the thigh
 - Periosteum of the femur



Common Emergency Femoral Nerve Block Indications

- Hip fracture
- Femoral fracture
- Anterior thigh lacerations/debridement
- Patellar dislocation
- Knee procedures



Quantity of Anesthetic Used

- 20 cc is a commonly reported quantity in point of care setting for femoral block 25 to 30 ml for 3-in-1 block
- Traditional approach (Blind) required higher volumes



Femoral Nerve Block Literature

- Prospectively enrolled 13 patients
- Ultrasound guided femoral block
- Median time to perform 8 minutes
- No complications and no failures
- 67% reduction in pain scores at 30 minutes

Beaudoin FL et al., Ultrasound-guided nerve blocks in elderly patient with hip fractures. *Am J Emerg Med.* 2010 Jan;28(1):76-81

Femoral Nerve Block Literature

- Presented as an abstract
- Decreased pain scores
- Decreased requirement for narcotics
- Mean morphine use in nerve block group was 5.5 mg
- Mean morphine use in control was 15.5 mg

Antonis MS et al., Ultrasound-guided placement of femoral 3-in-1 anesthetic nerve block for hip fractures. *Acad Emerg Med.* 2006; 13: S122-3.

Femoral Nerve 3-in-1 Block

- Anesthetizes femoral nerve, obturator and lateral cutaneous nerves
- Expands indications by adding femoral neck fractures, dislocations, better coverage of knee
- Femoral Nerve Gets:
 - anterior and medial portion of the thigh and knee
 - cutaneous nerves of the medial and lateral portion of the thigh
 - Periosteum of the femur
- Lateral Femoral Cutaneous Nerve Gets:
 - the lateral buttock
 - thigh and knee joint
- Obturator Nerve Gets:
 - medial thigh
 - hip joint
 - adductor muscle.

Femoral Nerve and 3-in-1 Block Differences

- Amount of local anesthetic for femoral nerve blocks is usually 20 ml or less while for 3-in-1 nerve blocks, the volume of local used is 25-30 ml
- The goal is to allow the local anesthetic agent to spread further in the tissue plane giving blockade of the femoral, lateral femoral cutaneous, and obturator nerves (more extensive than with normal femoral nerve block)
- Technique is a bit different. Once needle has reached its target, pressure should be applied 2-4 cm distal to the injection site
- Then inject the anesthetic agent
- Distal pressure (5 to 10 minutes) allows the local anesthetic agent to spread to the obturator and lateral femoral cutaneous nerves (in addition to femoral nerve)

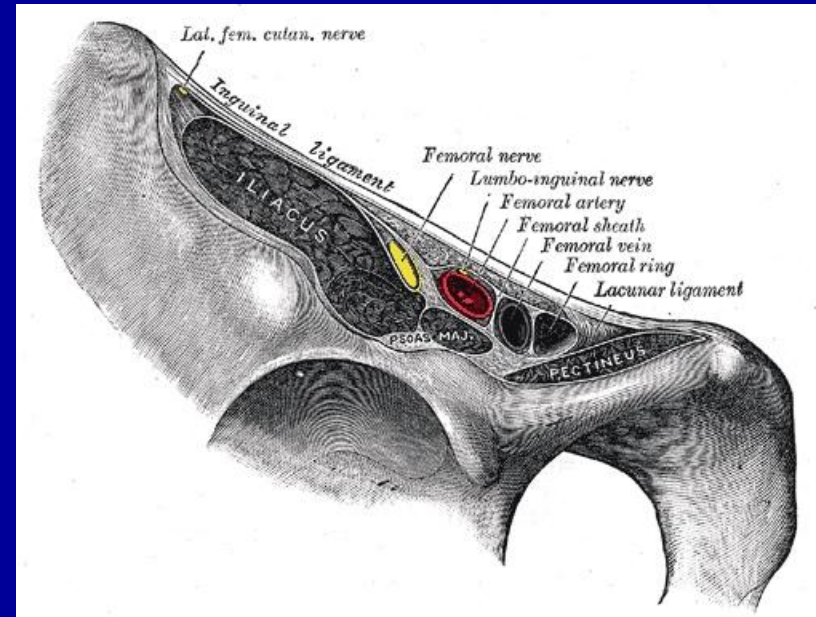
Identify Location

- External probe placement is just a start
- Keep in mind your gross anatomy
- Let the sonographic anatomy seen on the screen guide you



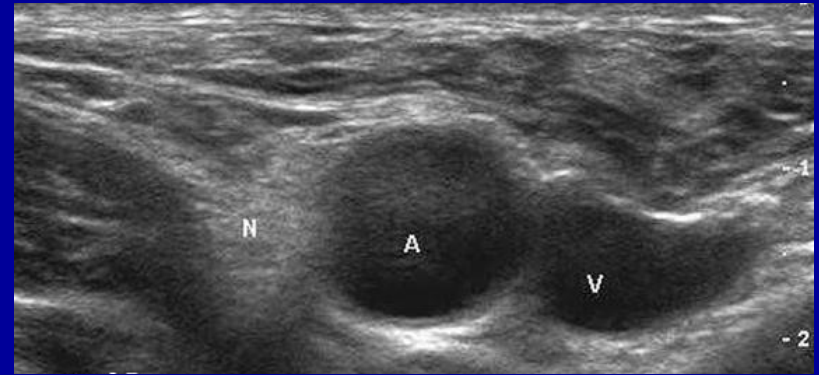
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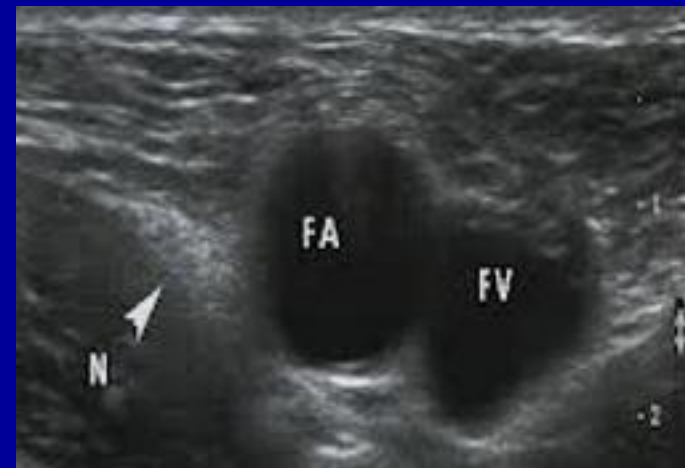
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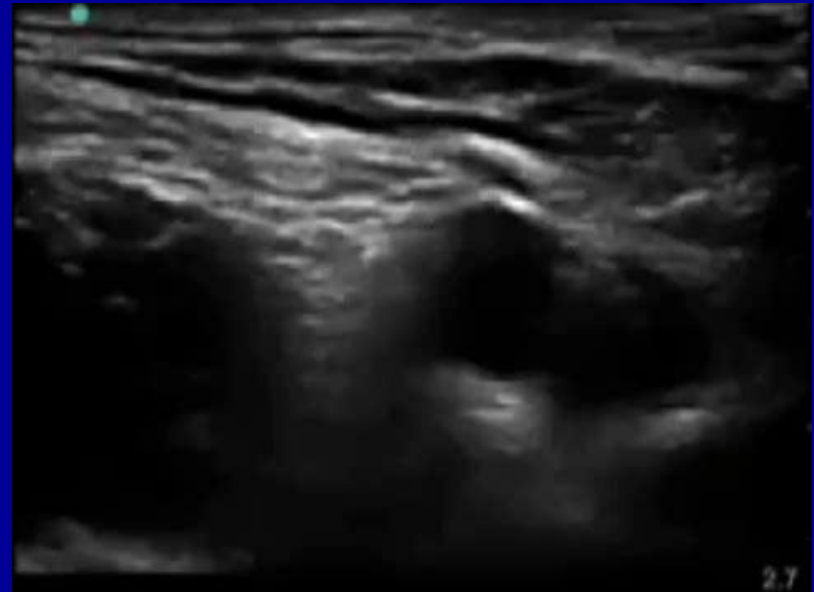
Femoral Nerve Block Technique

- Femoral nerve block location is similar to placing a femoral line
- Set up is similar as well
- Sterile conditions are ideal
- Prep as indicated



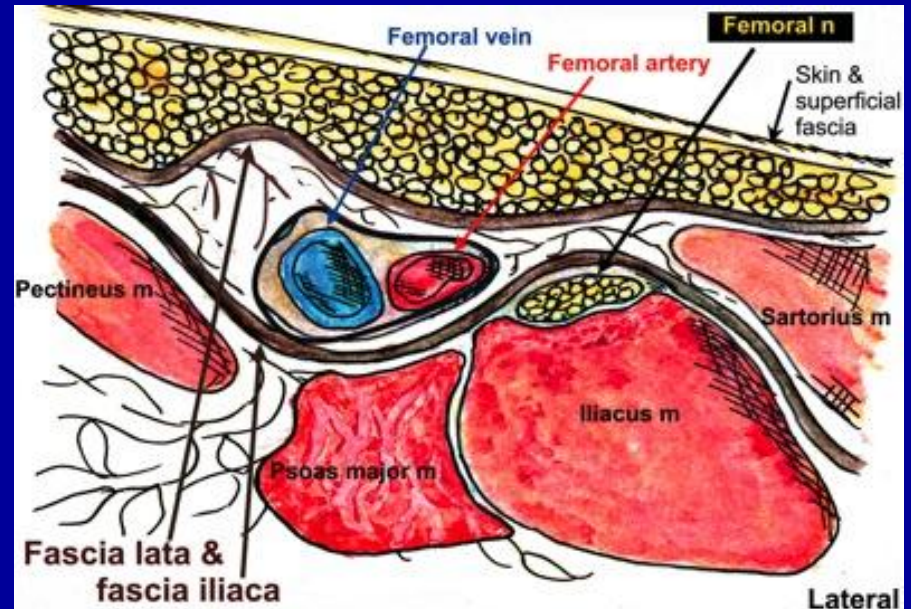
Femoral Nerve Block Anatomy Localization

- Remember femoral nerve location
- Just below the inguinal ligament
- Helpful to locate the anterior superior iliac spine and the pubic tubercle
- Look for key sonographic landmarks
- Help identify nerve and also guide location of injection



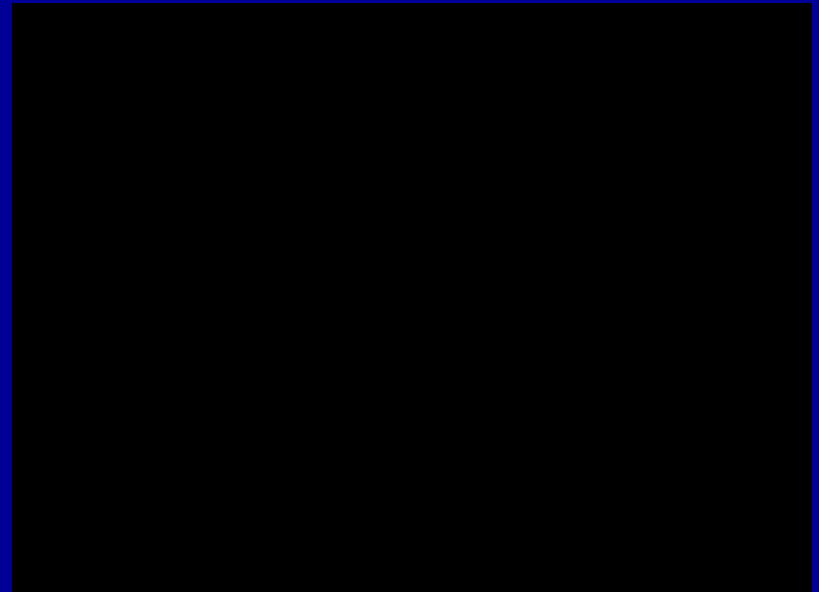
Exact Target Location

- Keep in mind where needle has to be placed
- Common mistake is placing needle between Fascia lata and Fascia iliaca



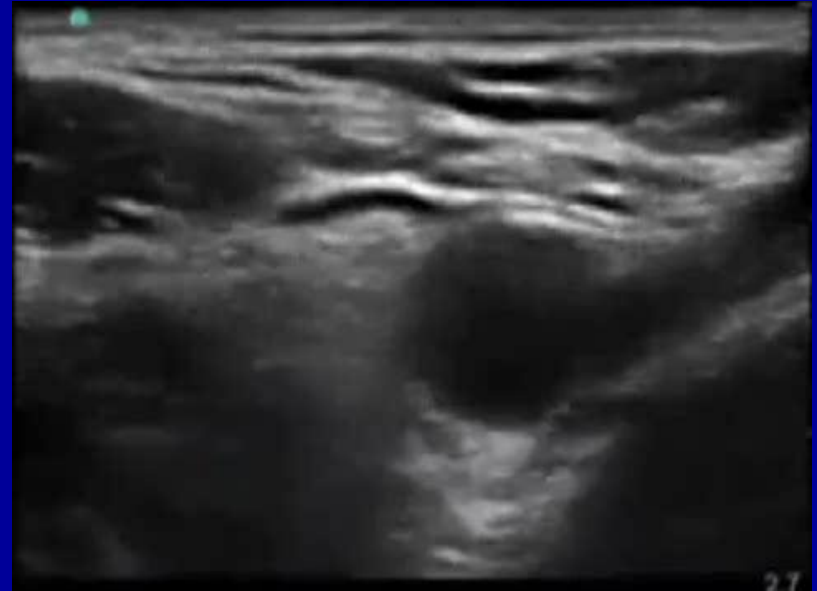
Femoral Nerve Block Anatomy Localization

- Check your sonographic surroundings
- Make sure you identify vessels
- Femoral vein should collapse



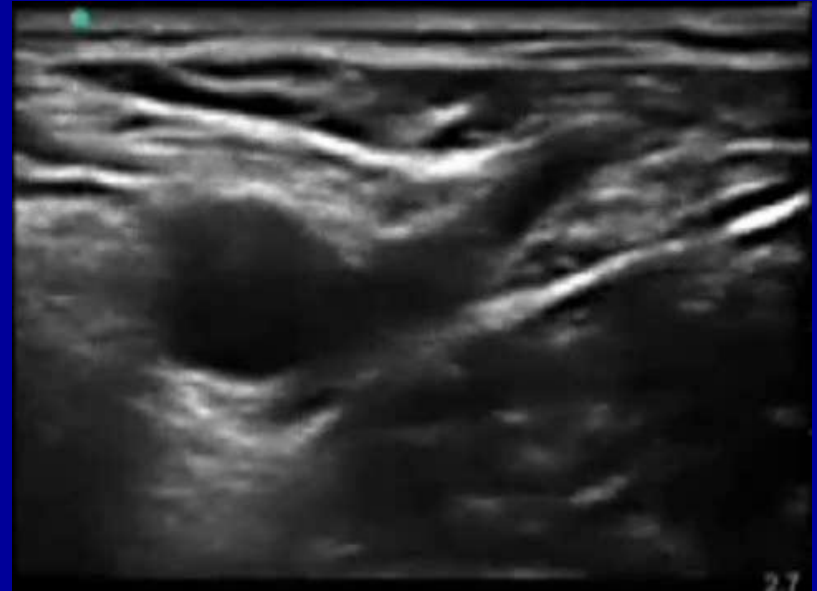
Femoral Nerve Block Anatomy Localization

- Use color Doppler to evaluate vasculature
- Not always necessary
- Turn on labeling feature on machine to labels pop up if confused...



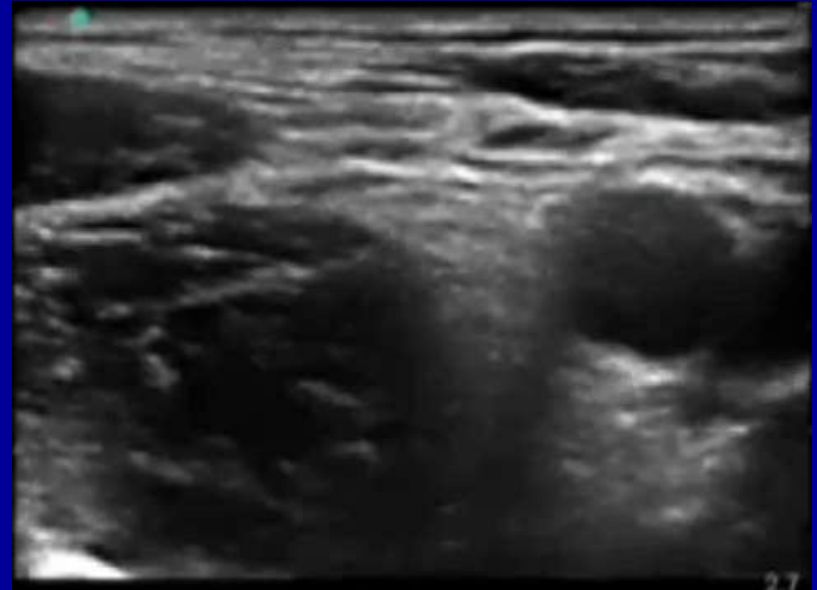
Femoral Nerve Block Anatomy Localization

- Again, visualize your target, the femoral nerve
- Make sure you are proximal enough
- As high as possible and still have good visualization of your targets and landmarks



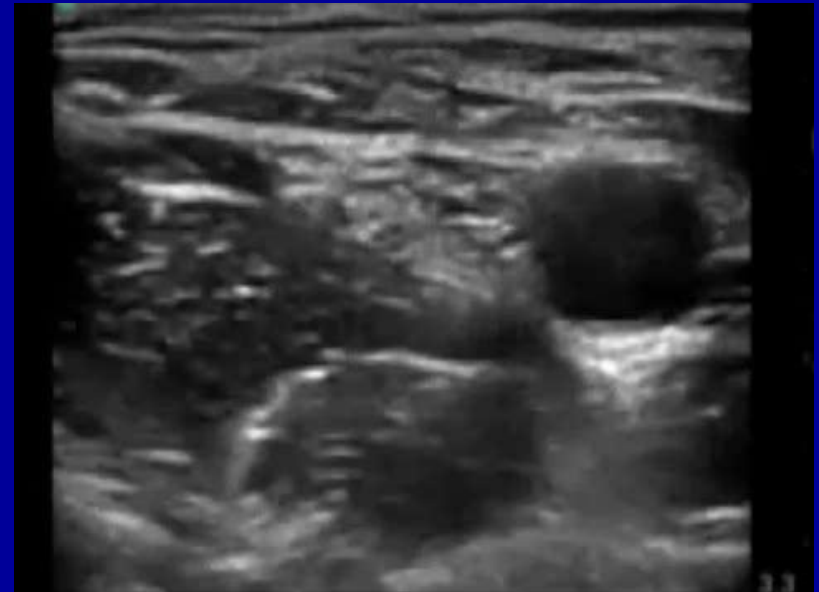
Femoral Nerve Block Path

- Mentally plot out your needle path
- Use in plane approach
- Make sure your external set up is complete
 - Syringe, medication, assistant?



Femoral Nerve Injection

- Inject slowly
- Infiltrate entire area and watch anesthetic surround structures
- Remember amounts, use less with risk of inadequate block
- Try recommended amounts first before skimping



Complications

- Failure of block
- Bleeding and hematoma formation
- Accidental intravascular injection of local
- Toxic effects of local from absorption CNS and cardiovascular
- Injury from trauma to femoral nerve such as laceration
- Unexpectedly long blockage of motor function
- Not letting your patient know expected duration and results

Summary

- Nerve blocks work great in ED
- 3-in-1 block is really the idea method over traditional femoral nerve block for acute setting
- Studies from academic setting, but greater use in community practice
- A number of indications for injuries and procedures in the thigh, knee, femur and femoral neck