

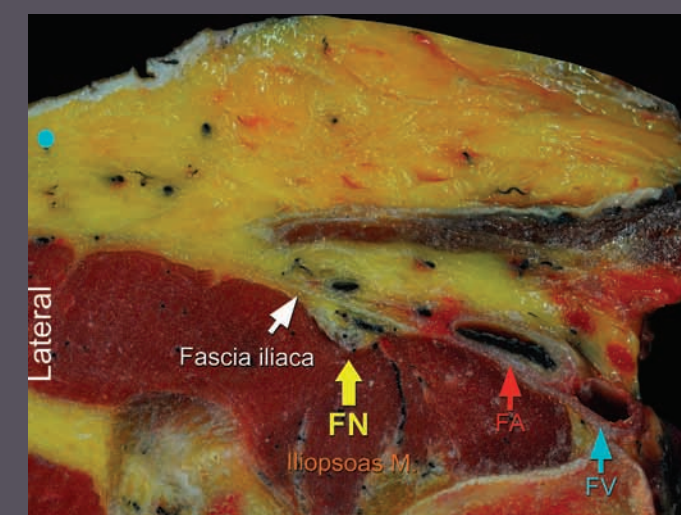
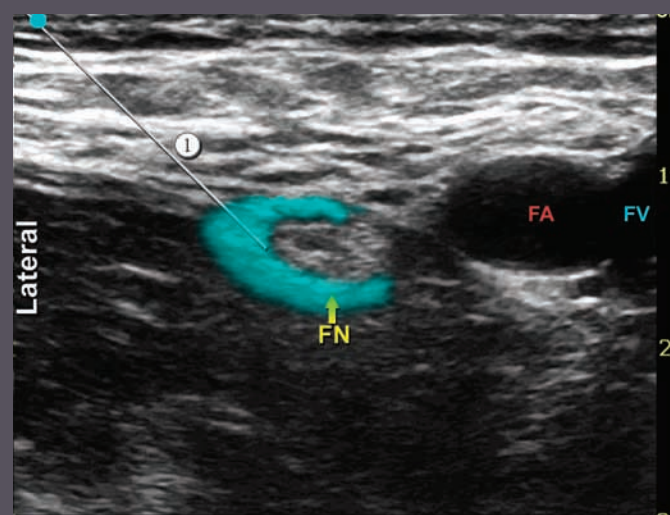
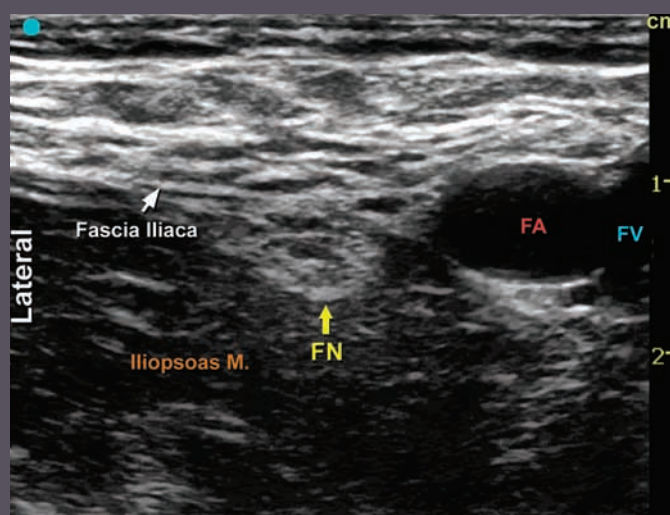
Transducer Placement

Ultrasound imaging

Cross-sectional Anatomy

Femoral Nerve Block

Indications:
Surgery on femur, anterior thigh, and knee



ABBREVIATIONS
FA Femoral Artery
FN Femoral Nerve
FV Femoral Vein

Patient Position: Supine
Transducer: 8-16MHz, linear array
Transducer Placement: Femoral crease, parallel and inferior to inguinal ligament
Needle: 22G 5cm short bevel needle (8-10cm for obese patients)
Nerve stimulation response: Quadriceps muscle contraction

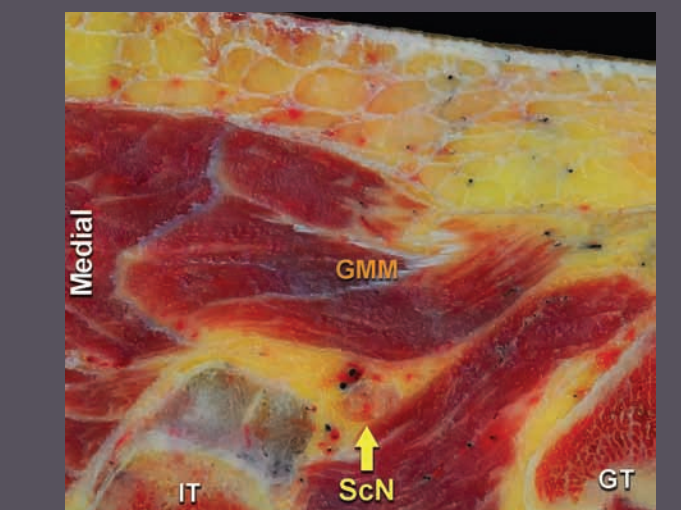
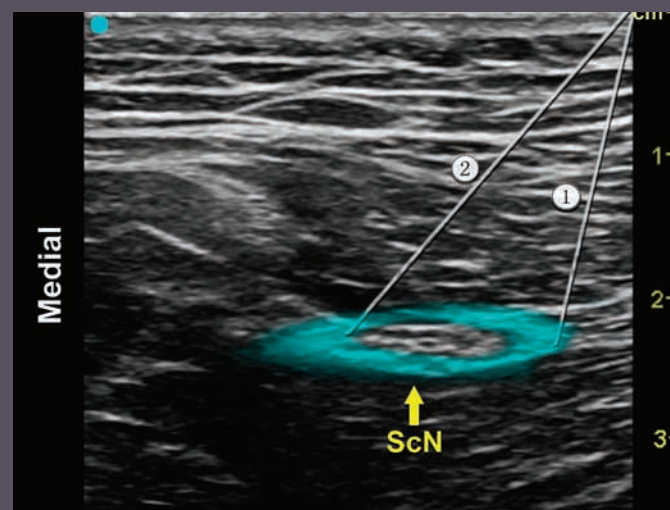
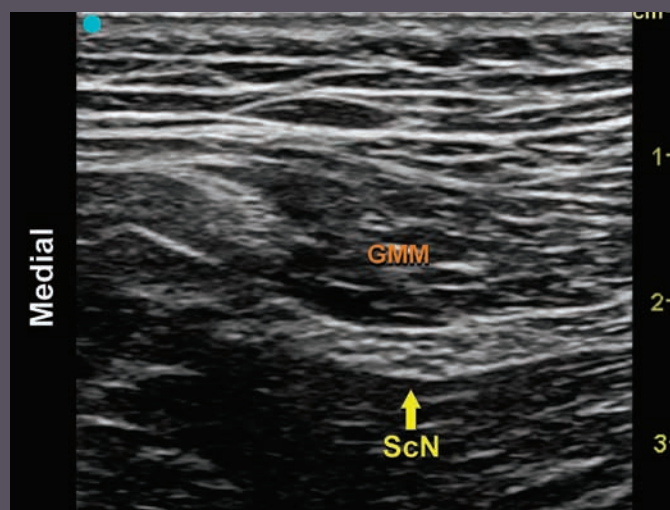
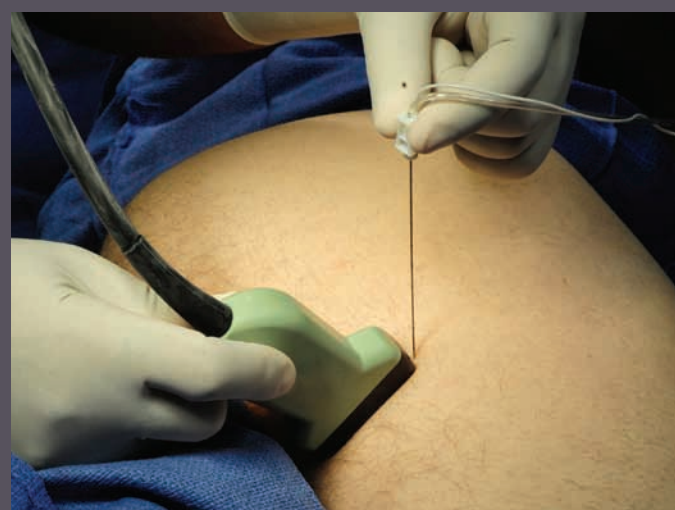
Initial depth setting: 4cm
Local Anesthetic (LA): 15-20mL
Ideal view: Fascia iliaca and FN
Key anatomy: Femoral nerve lateral to femoral artery, below fascia iliaca

Technique:
Needle insertion: In plane, lateral to medial, (out of plane less common)
Ideal spread of LA: Beneath fascia iliaca around femoral nerve
Number of injections: One

Tips:
• When FN is not seen, track fascia iliaca medially towards FA to identify FN
• For analgesia, catheters may be placed underneath fascia iliaca
• Beware: Risk of falls due to motor weakness of quadriceps muscle

Sciatic Nerve Block (Subgluteal level)

Indications:
Surgery at and below the knee



ABBREVIATIONS
GMM Gluteus Maximus Muscle
ScN Sciatic Nerve
IT Ischial Tubercle
GT Greater Trochanter

Patient Position: Prone, lateral or oblique (shown)
Transducer: 4-14MHz, Linear (shown) or curved in larger patients
Transducer Placement: Gluteal crease, the highest crease if more than one
Needle: 21G 10cm short bevel needle
Nerve stimulation response: Twitch of foot or calf

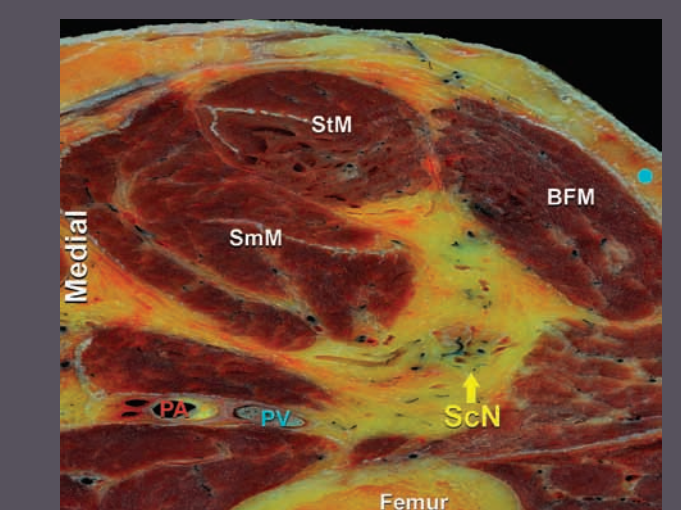
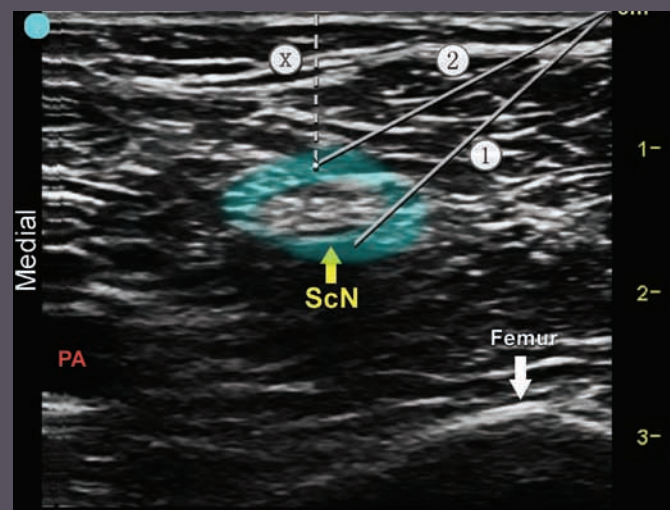
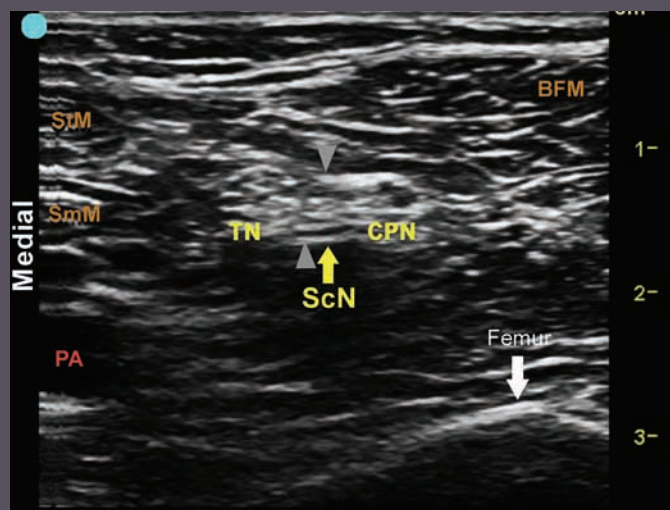
Initial depth setting: 5cm (highly dependent on patient size)
Local Anesthetic (LA): 15-25mL
Ideal view: Sciatic nerve in epineural sheath
Key anatomy: Sciatic nerve, gluteus maximus muscle

Technique:
Needle insertion: In plane, lateral to medial, (out of plane in larger patients)
Ideal spread of LA: Around the nerve
Number of injections: One or two

Tips:
• Needle should enter the sheath of the ScN either at the lateral or medial aspect of nerve.
• Significant amount of transducer pressure may be required to image ScN
• The cross-sectional anatomy shown can be used as a reference for both transgluteal and subgluteal techniques.

Popliteal Block

Indications:
Surgery on ankle, achilles tendon, and foot



ABBREVIATIONS
BFM Biceps Femoris Muscle
CPN Common Peroneal Nerve
PA Popliteal Artery
PV Popliteal Vein
ScN Sciatic Nerve
SmM Semimembranosus Muscle
SIM Semitendinosus Muscle
TN Tibial Nerve

Patient Position: Prone, oblique (shown) or supine.
Transducer: 8-14MHz, linear array
Transducer Placement: Transverse at the base of the popliteal fossa 4-5cm above popliteal crease
Needle: 22G 5-8cm short bevel needle
Nerve stimulation response: Twitch of foot or toes

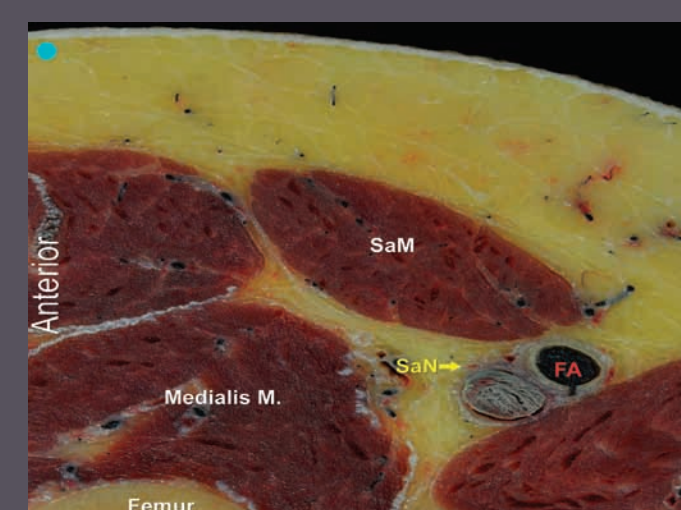
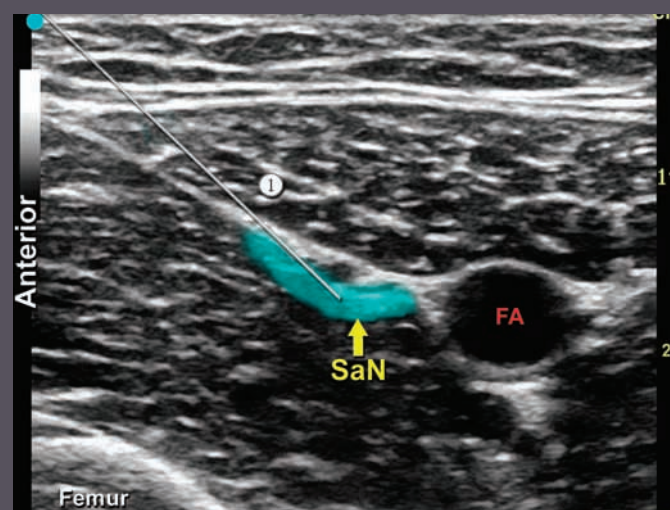
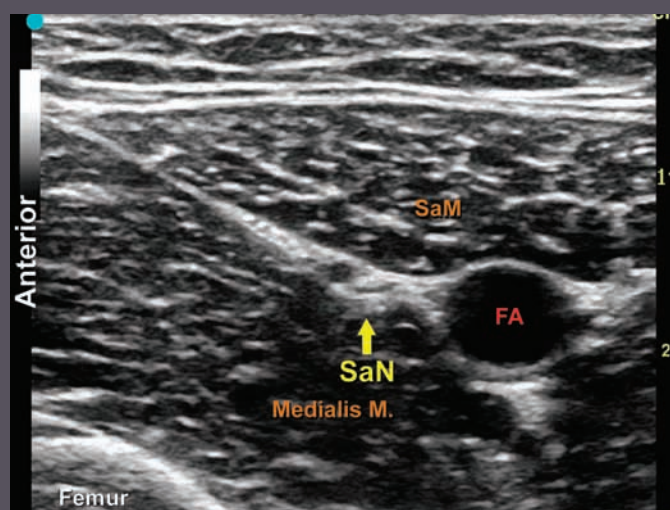
Initial depth setting: 4cm
Local Anesthetic (LA): 15-25 ml
Ideal view: Where ScN starts diverging into TN and CPN
Key anatomy: Popliteal artery, sciatic nerve superficial and lateral to it, femur, common epineural sheath of ScN
Note: Gray arrows indicate common epineural sheath

Technique:
Needle insertion: In plane or out of plane
Ideal spread of LA: Around ScN, or between TN and CPN
Number of injections: One or two
X- Needle path for out of plane approach

Tips:
• Injection can be made also more proximally at either medial or lateral edge of ScN under epineural sheath
• After injection, scan proximally-distally to assure the LA spread around TN and CPN
• Catheter best placed within epineural sheath

Saphenous Nerve Block

Indications:
Supplement to popliteal or sciatic blocks for surgery below the knee



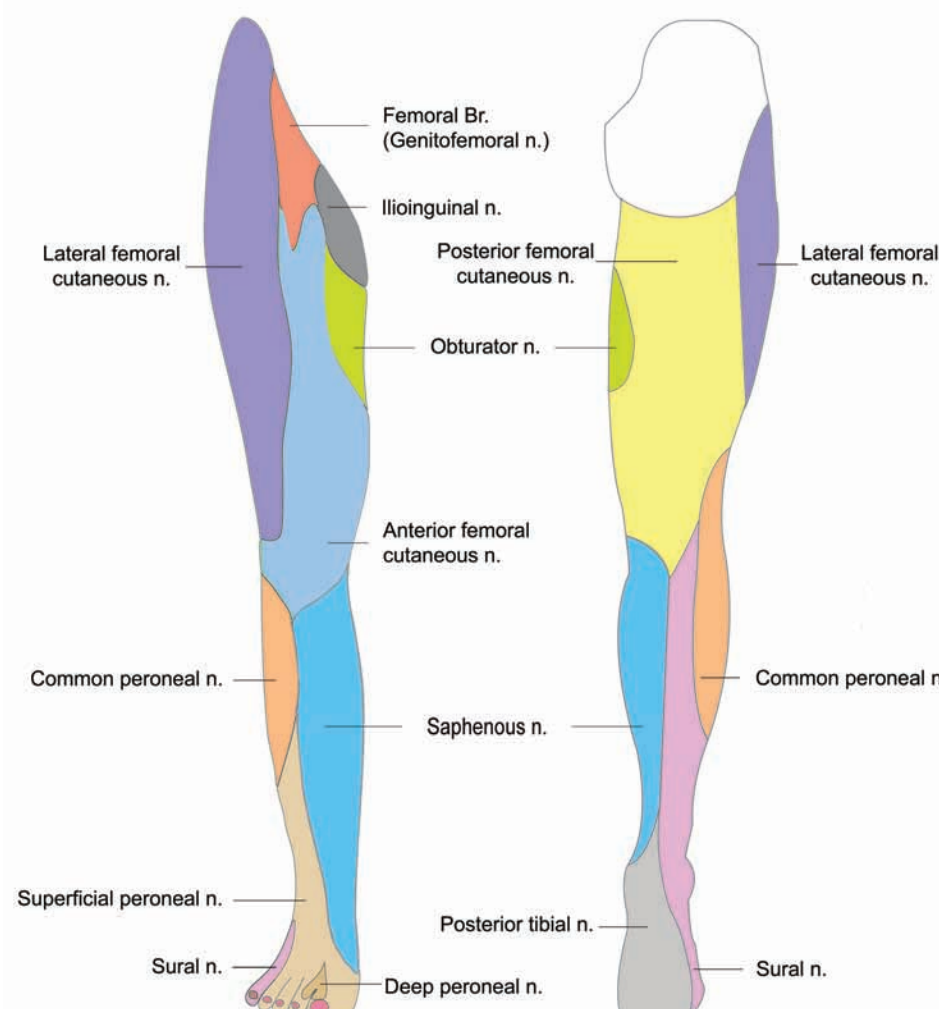
ABBREVIATIONS
FA Femoral Artery
Medialis M. (Vastus)
SaM Sartorius Muscle
SaN Saphenous Nerve

Patient Position: Supine with leg abducted and externally rotated
Transducer: 10-14MHz, linear array
Transducer Placement: Transverse view at medial aspect of lower thigh to mid-thigh level
Needle: 22G 5-8cm short bevel needle
Nerve stimulation response: If used, paresthesia of medial aspect of lower leg can be elicited

Initial depth setting: 3cm
Local Anesthetic (LA): 10-15mL
Ideal view: Artery below the sartorius muscle
Key anatomy: Femoral artery below sartorius muscle, nerve often not visualized

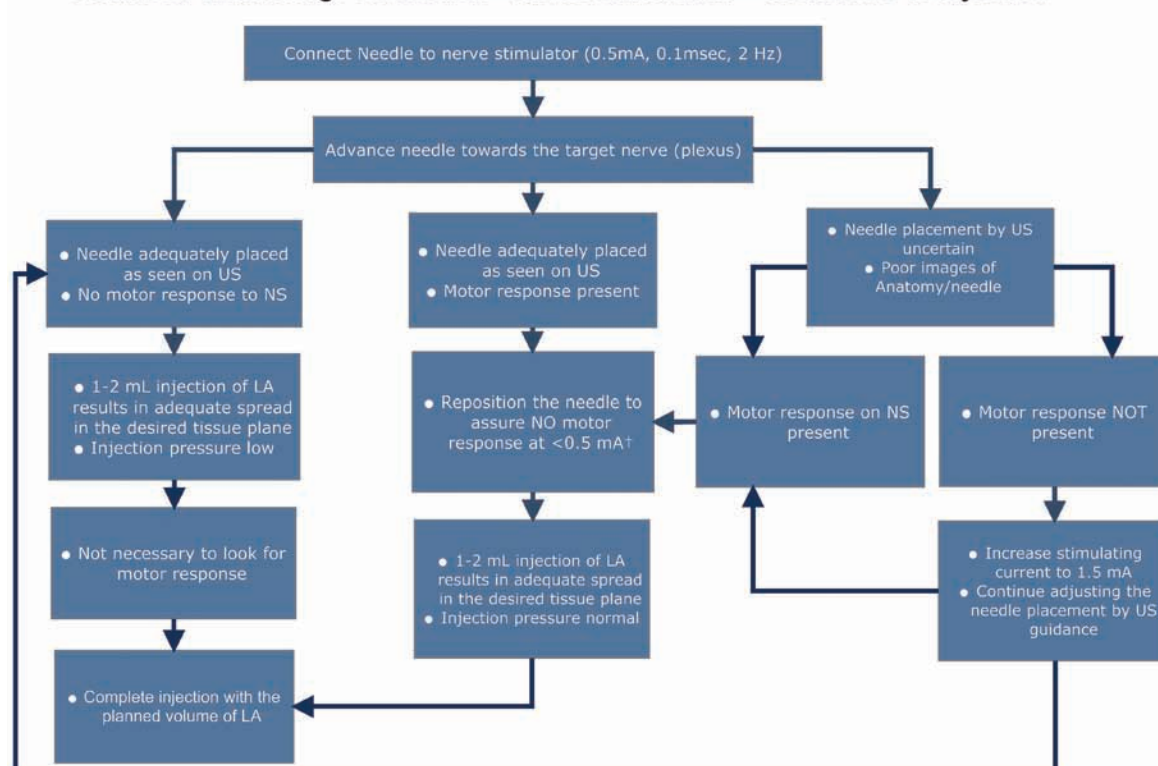
Technique:
Needle insertion: In plane
Ideal spread of LA: Around or underneath the artery, between vastus medialis and sartorius muscle
Number of injections: One or two

Tips:
• When localization of FA proves difficult, start scanning more proximally and trace FA to mid-thigh
• Consider out of plane approach in larger patients
• Consider simple local anesthetic infiltration at the site of incision instead, for distal surgery (foot, ankle)



Suggested Standard Monitoring For Nerve Blocks

Combined Monitoring: Ultrasound + Nerve Stimulation + Resistance to Injection



Legend: US-ultrasound, NS-nerve stimulator, Low Injection Pressure <15 psi*.
* Experimental studies in large models/human cadavers suggest that opening pressure for intrafascicular injection requires >15 psi
† Experimental studies suggest that EMR at < 0.2 mA (0.1 ms) indicates intraneural needle placement; For additional safety margin, 0.5 mA is recommended in the guidelines by the collaborative group. EMR-Evoked Motor Response

- TREATMENT OF LOCAL ANESTHETIC TOXICITY**
- 1) Airway, hyperventilation, 100% O₂
 - 2) Abolish convulsions (Diazepam, Midazolam, Propofol)
 - 3) Intralipids (1.5 mL/kg over 1 minute (~100mL), then continuous infusion 0.25 mL/kg/min (~500 mL over 30 minutes)
 - 4) CPR/ACLS, consider cardiopulmonary bypass

DOCUMENTATION AND MONITORING CHECK-LIST

- Patient consent obtained
- Laterality checked
- Resuscitative equipment present
- Patient monitoring applied (EKG, BP, Pulse Oxymetry)
- Skin disinfection
- Premedication: Medication(s), dose(s)
- Local anesthetic: type, volume(ml), concentration %
- Injection monitoring:
 - Motor response at <0.5 mA: NO YES
 - Motor response _____ (specify type and mA)
 - High resistance to injection: NO YES
 - Injection pressure (if monitored): _____ (psi)
 - Pain/Paresthesia on injection: NO YES Not applicable
 - Aspiration before injection

