Lower Extremity Nerve Blocks

International Standardized Techniques, 2nd Edition 2015©

NYSORA CONTINUING MEDICAL EDUCATION

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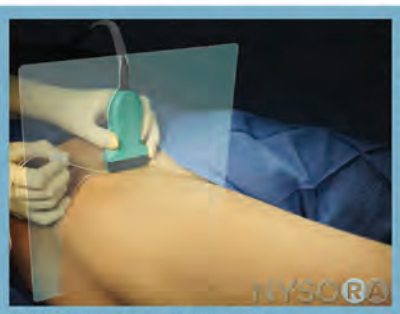
Nerve Block	Transducer Placement	Ultrasound Image	Reverse Ultrasound Anatomy™	Anatomy

Femoral

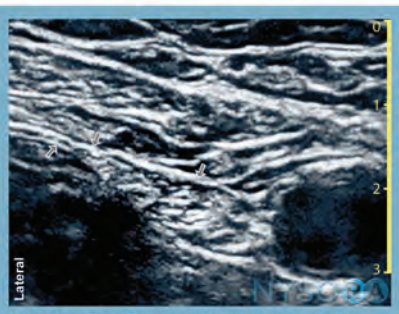
Indications: Surgery on femur, anterior thigh and knee, patella fracture, quadriceps tendon repair.
Analgesia for hip and femur fractures.
Patient position: Supine.
Transducer: Linear.
Needle: 22G, 5-10cm short bevel.
Common EMR obtained: Quadriceps muscle contraction.
LA: 10-20 ml.

ABBREVIATIONS

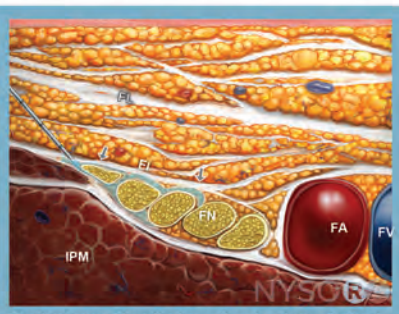
ASIS Anterior Superior Iliac Spine
BORe Bolus Observe Reposition
EMR Evoked Motor Response
FA Femoral Artery
FI Fascia Iliaca
FN Fascia Iata
FL Femoral Nerve
FV Femoral Vein
IPM Iliopsoas Muscle
LA Local Anesthetic
LFCN Lateral Femoral Cutaneous Nerve
SaM Sartorious Muscle
SAIS Superior Anterior Iliac Spine
SCA Superficial Circumflex Artery
TFL Tensor Fascia Lata



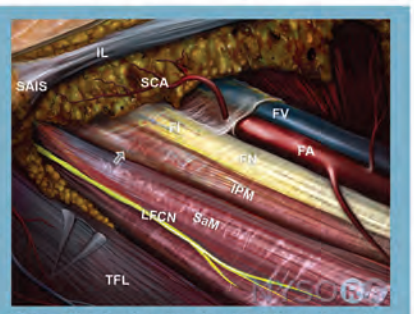
Initial transducer placement:
Femoral crease, parallel and inferior to inguinal ligament, must find the common FA
Initial depth setting: 4 cm.



Landmarks: Common femoral artery and fascia iliaca (arrows).
Ideal view: Femoral nerve lateral to femoral artery, below fascia iliaca, above departure of profunda femoris artery.



Technique: Needle Insertion in plane, lateral to medial, alternatively out of plane.
Ideal spread of LA: Under the fascia iliaca around the femoral nerve.
Number of injections: One. BORe.



Tips: Obtain view proximal to bifurcation of the FA. Tilt the probe cranially/caudally to optimize the image of the nerve. Puncture the FI lateral to the edge of the FN.
Beware: motor weakness of quadriceps muscles can occur; risk of falls.

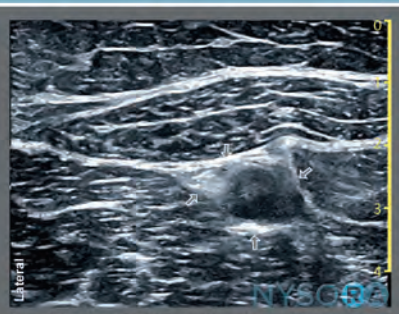
Saphenous

Indications: Analgesia for knee surgery as a component of multimodal analgesia. In combination with sciatic nerve block for surgery below the knee.
Patient position: supine with leg abducted and externally rotated.
Transducer: Linear.
Needle: 22G, 5-10 cm short bevel.
Common EMR obtained: If used, paresthesia of medial aspect of lower leg or vastus medialis twitch can be elicited.
LA: 10-15 ml

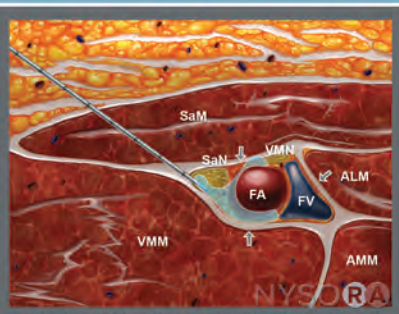
ABBREVIATIONS

ALM Adductor Longus Muscle
AMM Adductor Magnus Muscle
FA Femoral Artery
SaM Sartorious Muscle
SaN Saphenous Nerve
PD Power Doppler
RFM Rectus Femoris Muscle
VMM Vastus Medialis Muscle
VMN Vastus Medialis Nerve

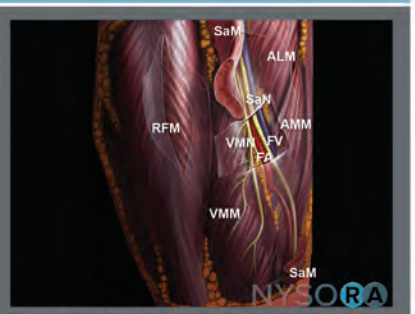
Initial transducer placement:
Transverse view at medial aspect of lower thigh to mid-thigh level.
Initial depth setting: 4 cm.



Landmarks: Sartorius muscle and femoral artery
Ideal view: Femoral artery in the subsartorius plane at the medial edge of the vastus medialis.



Technique: Needle insertion in plane, lateral to medial, alternatively out of plane.
Ideal spread of LA: In the fascial plane (arrows) underneath sartorius muscle on both sides of the artery
Number of injections: One. BORe



Tips: When localization of femoral artery proves difficult, use PD and/or start scanning at the level of the femoral crease and follow the course of the femoral artery distally into the canal.

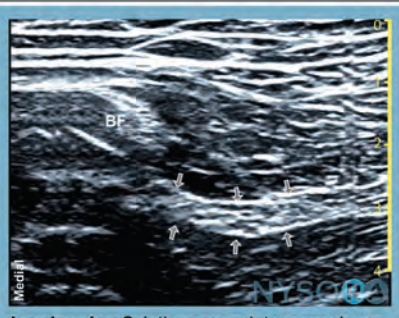
Sciatic Subgluteal level

Indications: Anesthesia and analgesia for surgery on femur, at and below the knee.
Patient position: Prone, lateral or oblique (shown).
Transducer: Linear or curved in larger patients
Needle: 22G, 8-10cm short bevel.
Common EMR obtained: Twitch of calf or foot
LA: 15-20 ml.

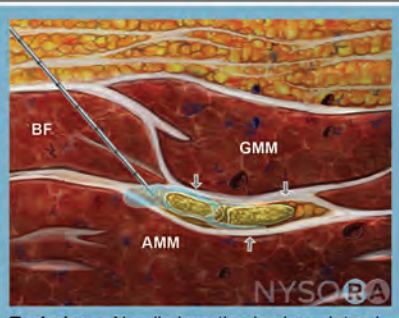
ABBREVIATIONS

AMM Adductor Magnus Muscle
BORe Bolus Observe Reposition
EMR Evoked Motor Response
GMM Gluteus Maximus Muscle
GT Great Trochanter
IGA Inferior Gluteal Artery
IT Ischial Tubercle
LCnN Lateral cluneal Nerves
LA Local Anesthetic
ScN Sciatic Nerve
STM Semitendinosus Muscle

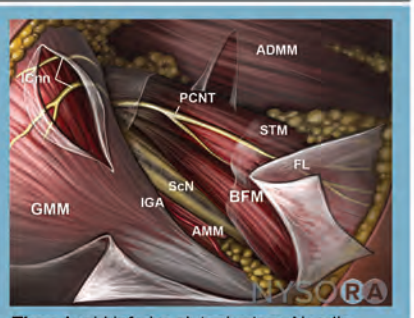
Initial transducer placement:
Gluteal crease, scan cephalad-caudad until the best view of the oval-shaped sciatic nerve and the muscular tunnel in which it travels are visualized regardless of the level.
Initial depth setting: 4-5 cm.



Landmarks: Sciatic nerve, gluteus maximus, fascia underneath gluteus maximus.
Ideal view: Sciatic nerve in common connective tissue sheath (intermuscular tunnel).



Technique: Needle insertion in plane, lateral to medial, alternatively out of plane.
Ideal spread of LA: Around the nerve, within the common connective tissue sheath.
Number of injections: One. BORe.



Tips: Avoid inferior gluteal artery. Needle should enter the sheath of the ScN either at the lateral or medial aspect of the nerve. Transducer pressure and tilt often required to obtain the adequate view.

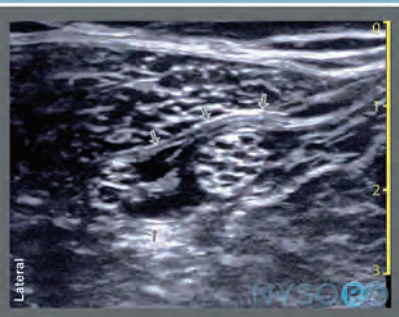
Sciatic Popliteal level

Indications: Anesthesia and analgesia for surgery below the knee.
Patient position: Prone, oblique (shown) or supine with the knee flexed.
Transducer: Linear or curved in larger patients
Needle: 22G, 5-10 cm short bevel.
Common EMR obtained: Twitch of calf, foot or toes
LA: 20 ml.

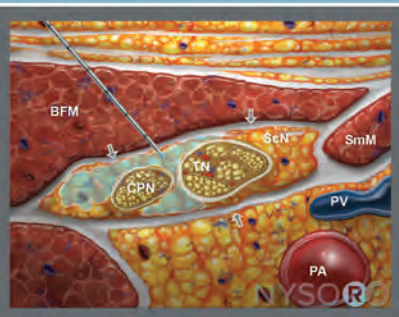
ABBREVIATIONS

BFM Biceps Femoris Muscle
BORe Bolus Observe Reposition
CPN Common Peroneal Nerve
EMR Evoked Motor Response
LA Local Anesthetic
PA Popliteal Artery
PV Popliteal Vein
ScN Sciatic Nerve
SmM Semimembranosus Muscle
StM Semitendinosus Muscle
TN Tibial Nerve

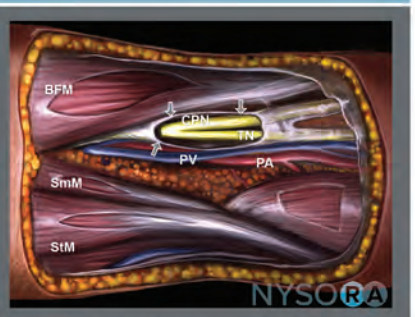
Initial transducer placement:
Transverse, 4-5 cm above the popliteal crease
Initial depth setting: 4-5 cm.



Landmarks: Popliteal artery and vein, femur, BFM. **Ideal view:** Sciatic nerve with TN and CPN slightly diverged within common connective tissue sheath of SN (arrows).
Note: This image demonstrates separation of TN and CPN after succesful injection.



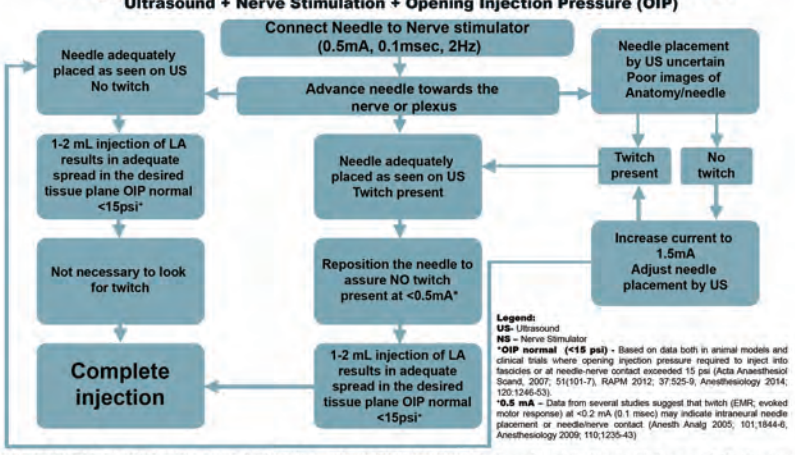
Technique: Needle insertion in plane, lateral to medial, or out of plane.
Needle tip position: Inside the common connective tissue sheath, between TN and CPN. **Ideal spread of LA**: In between and around TN and CPN.
Number of injections: One. BORe.



Tips: If imaging the division of the ScN proves difficult, start scanning at the popliteal crease, where the tibial nerve is located postero lateral to the popliteal vein. After injection, scan proximally – distally to assure the LA spread around TN and CPN. Catheter is placed within the sheath.

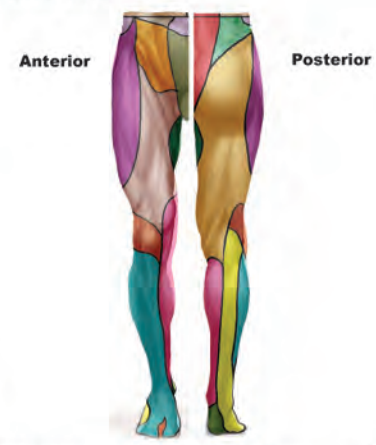
Suggested Standard Monitoring For Nerve Blocks

Ultrasound + Nerve Stimulation + Opening Injection Pressure (OIP)



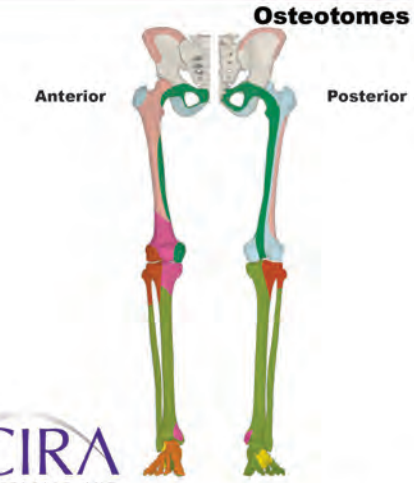
Legend:
US- Ultrasound
NS – Nerve Stimulator
***OIP normal (<15 psi) -** Based on data both in animal models and clinical trials where opening injection pressure required to inject into fascicles or at needle-nerve contact exceeded 15 psi (Acta Anaesthesiol Scand, 2007; 51(101-7), RAPM 2012; 37:525-9, Anesthesiology 2014; 120:1246-53).
***0.5 mA –** Data from several studies suggest that twitch (EMR; evoked motor response) at <0.2 mA (0.1 msec) may indicate intraneural needle placement or needle/nerve contact (Anesth Analg 2005; 101;1844-6, Anesthesiology 2009; 110;1235-43)

Dermatomes



- Subcostal T12
- Ilioinguinal L1
- Iliohypogastric T12-L1
- Lateral cutaneous nerve of the thigh L2-L3
- Genitofemoral L1-L2
- Obturator div post L2-L4
- Femoral div ant de L2-L4
- Saphenous L2-L4
- Posterior cutaneous nerve of the thigh S1-S3
- Sciatic L4-S3
- Tibial L4-S3
- Common peroneal L4-S3
- Superficial peroneal L4-S2
- Deep peroneal L4-S2
- Sural S1

Osteotomes



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