Lower Extremity Anatomy for Blocks

Regional/APS Rotations

Slides by Randall J. Malchow, MD
Anatomy for LE Blocks

- Lumbar Plexus Anatomy:
  - Lumbar Plexus Block
  - Femoral Nerve Block
  - Fascia Iliaca Block
  - Lateral Femoral Cutaneous Block
  - Obturator Block
  - Saphenous Nerve Block

- Lumbosacral Plexus Anatomy:
  - Parasacral Plexus Block
  - Sciatic Block -
Lower Extremity Sensory Exam

- Cutaneous only (not deep)
- Colors:
  - LP: multi
  - Sciatic: Yellow
LE Motor Exam

(Motor onset before sens)

A. Sciatic

B. Obturator

C. Lat Fem Cut (sensory only)

D. Femoral
Lumbar Plexus

- Formed fr. L1-4 ventral rami

Lat Fem Cut N
L2,3 post

Fem N, L2,3,4 post

Obt N
L,2,3,4 ant
Lumbar Plexus

Lat Fem Cut N.
Exits m. laterally

Femoral N.
Exits m. lat 2/3\textsuperscript{rd} way
down psoas

Obturator:
Exits m. medially at S1,
Lat bladder wall to
obturator foramen

Psoas
Fem N.
Lat Fem Cut
Obturator
Psoas Compartment/ Lumbar Plexus Block

- N. Stim Pattern:
  - Quad’s only = target
  - Pelvic tilt = Quad Lumb, too lateral
  - Hamstrings = L4/5 roots, too medial (risk epidural)
- LFCN 97%; Obt 77%
Femoral Nerve Anatomy

- L2,3,4 nerve roots
- 80% motor
- Exits lat body of psoas, runs in groove between psoas/iliacus m.s.
- Exits under ing lig, lat fem.a.
- 2 Fascia: Lata & Iliacus
- Divides 2 Branches:
  - Anterior:
    - Sensory: ant thigh
    - Motor: Sartorius, Pectineus
  - Posterior:
    - Sensory: hip/knee; saphenous (sens ant/medial leg/foot)
    - Motor: quad's
Femoral Nerve Block

Inguinal crease ideally
1 cm lateral to femoral artery
22 gu x 2in stimuplex (paresthesias are unlikely)
Patellar snap - critical
30cc of local anesthesia
Unreliable method for other:
- LFCN: 60%
- Obturator: Ant 13-50%
  Motor-0%
Redirection Clues:
Sartorius = too medial
and/or
superficial
Adduction = Pectineus:
stim ant
  div or too deep
Fascia Iliaca

- Alternative to “3 in 1” block
- Useful in fracture pt’s and kids
- No paresthesia/n.stim 22gu x 1.5in adv at junction of lateral and med two-thirds of inguinal ligament, 1-3 cm below, aim 45 deg rostral
- “Pop” thru fascia lata, then fascia iliaca, then adv another 2mm
- Femoral 100%
- LFCN 92%
- Obturator <50%

Iliopsoas
Lateral

**Anatomy:**
sensory only
atop iliacus m., medial to ASIS, under ing. lig
Pierces fascia lata below ing lig
Branches into ant and post branches

**Block:**
1 cm med, 1 cm inf to ASIS
22 gu x 1.5 in adv
5-10 ml vol infiltrate
N.stim useful
Obturator Nerve Anatomy:
L2,3,4

Anterior branch:
- **motor**: add long /brev, gracilis
- **sensory**: med.thigh, hip joint

Posterior branch:
- **motor**: add.brev & magnus, obt.ext.
- **sensory**: knee joint
Obturator
Saphenous Nerve

(could stim v.med)
Saphenous Nerve Block Trans-sartorial

- Supine pos’n; active hip flexion with knee extended
- 18/20 gu Touhy needle w/ LOR
- Depth 1.5-3.0cm
- 10-20 cc’s of local anesthesia
- No quadricep weakness
Saphenous Nerve Anatomy

- Tibial Tuberosity (50% success)
- Medial Malleolus (high success)
- Tech:
  - SQ
  - U/S, tourniquet
History of Sciatic Block

- George W. Crile:
  - 1897, Clev Cl
  - 7yo boy cut-down

- Gaston Labat
  - 1923, classic
  - paresthesia

- Alon Winnie’s mod, 1974

- P.P. Raj, 1975

- Popliteal:
  - 1980, Rorie, Post, Mayo
  - 1993, Collum, Lateral
L4-S3
2cm width

ComPer N (post div of ventral rami)

Tib N (ant div of ventral rami)

S1,2,3 (not a branch of sciatic)
Sciatic Anatomy

- 1/3 rule betw GrTr and Isch Tub.
- Gl.Max-Hip Ext
- Gl.Med/Min- Abd
- Piriformis, Gem. Obt Int., Quad Fem= Ext Rotation/Abd
- N.s. to Hamstrings: med aspect of prox sciatic n.
Sciatic Nerve Block - Indications

- **Single Shot:**
  - Total Knee Arthroplasty +/-
  - Knee Ligament (if primary tech)
  - Femur ORIF

- **CPNB:**
  - Tibial Plateau ORIF
  - Complex Ankle ORIF
  - Calcaneal ORIF
  - AKA/ BKA
Sciatic

PSIS

Gr Tr

Isch.Tub.

10cm
Sciatic Nerve Block-Mod. Labat (Winnie)

Sims Position
21gu x 4in insulated, adv thru gl.max., +/- piriformis
7-10cm depth
Ankle twitch (dorsi/plant)
20-30ml volume
Sciatic Nerve Block

- Supine Position, with hip/knee flexed at 90 deg
- Midpt between Gr.Tr.-Isch.Tub
- Adv 21gu x 4in, thru glut.max.
- Ave depth 2-2.5in
- Ankle twitch
- 20-30ml volume
Anterior Sciatic

BECK (1963):
Sciatic Nerve Block Anterior

- Adv 21gu x 6in insulated
- Obs for fem n.
- Adv to lesser troch, then 4-5cm post/med;
- 10.5cm ave total depth
- Hip rotation may help (eg. Int rot above l.t.)
- Ankle twitch
- 20-30 ml volume
Subgluteal Block (Infragluteal)

- Position: Sims
- Indication: CPNB
- Needle placement:
  - Intersection of gluteal fold and lateral border of the biceps femoris muscle (still thru glut max)
  - Insertion point is 1 cm distal to the intersection
  - Slight cranial angulation of needle
  - Ave 7cm depth
- Accepted stimulation: Plantar flexion or inversion
- Will miss Post cut N of
Popliteal Block - Indications

- Single Shot:
  - Ankle arthroscopy
  - Metatarsal ORIF
  - Excision of mass, feet
- CPNB:
  - Ankle Fractures
  - Ankle Reconstruction
  - Hallux Valgus Correction
- Combine with Saphenous Nerve Block (unless thigh tourniquet)
- Both divisions can have separate epineurium fascia, and be separate in buttocks
- Typically divide 4-13 cm above crease (ave 6cm)
- Lat to med: cpn, tn, pv, then pa.
- Post to ant: cpn, tn, pv, then pa
- Sural: contributions fr both sci branches
**Popliteal**

- 22gu x 2in at 7cm above crease and 1cm lat midline
- Advanced at 45 deg cephalad
- Dorsi/plantar flexion of ankle
- 35-40 ml single injection or
- 15ml x 2 separate injections
- >95% w/ high volumes
Popliteal Block - Lateral

- Vertical line at superior edge of patella
- 21gu x 4in adv between vastus lateralis & biceps femoris
- Adv horiz to femur, then 30 deg
- Add’l 1-2cm
- Ave depth 4.5cm
Deep Peroneal Nerve Blocks

- Adv 22gu-25gu lat to EHL and either side of Dor.Ped.A.
- Deep to Ext Retic
- To bone, back 2mm
- 5ml volume
Blockade of Sural and Superficial

- **Sural:**
  - Adv 22gu SQ achilles tdn to lat mal. 5ml
- **Sup. Per. :**
  - Adv 22gu x SQ lat mal to T.A.
  - Just above lateral mal. w/ 5ml each
Posterior Tibial Nerve Block

- Midpoint achilles tdn. to med.mall.
- 22 x 2in
- Just post to post.tib.art.
- Paresthesia, stim, U/S
- To bone, back 2mm
- 5ml volume
Questions?