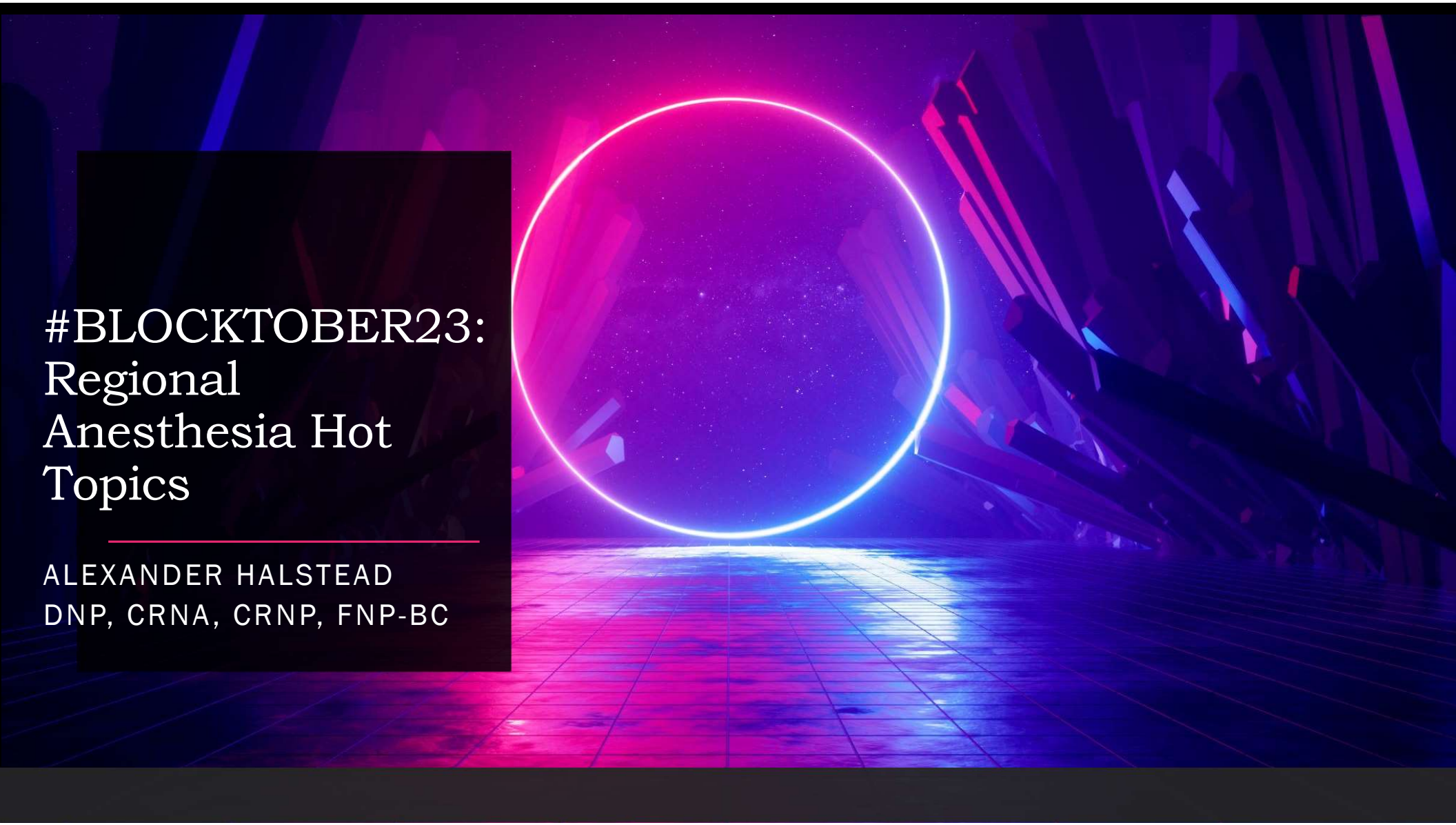


#BLOCKTOBER23: Regional Anesthesia Hot Topics

ALEXANDER HALSTEAD
DNP, CRNA, CRNP, FNP-BC

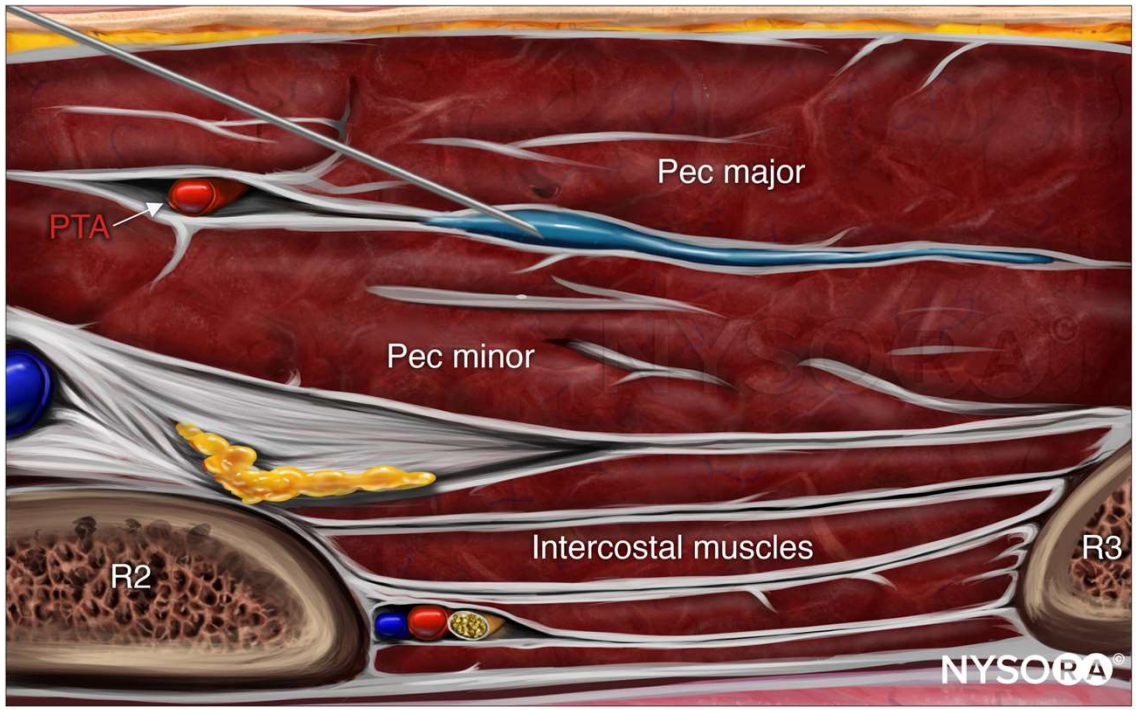
Objectives

1. Review the inherent benefits and drawbacks of using regional anesthesia.
2. Review recent publications in the field of regional anesthesiology.
3. Discuss how the recent evidence in this field is changing clinical practice and/or improving patient outcomes.
4. Discuss evidence based recommendations for the use of regional anesthesia during obstetric, pediatric, orthopedic, gynecologic and oncologic surgeries.
5. Discuss future implications for the use of regional anesthesia and emerging technologies in this field.

Financial Disclosures

None

What is a nerve block?



Benefits

- Better pain control
- Less Postoperative Nausea and Vomiting
- Improved patient satisfaction
- Potential Cognitive benefits for elderly patients
- Immunomodulatory Effects
- Reduced Bleeding
- Potential for improved surgical exposure

Risks

- Bleeding
- Infection
- Nerve Injury
- Persistent parasthesia / motor impairment

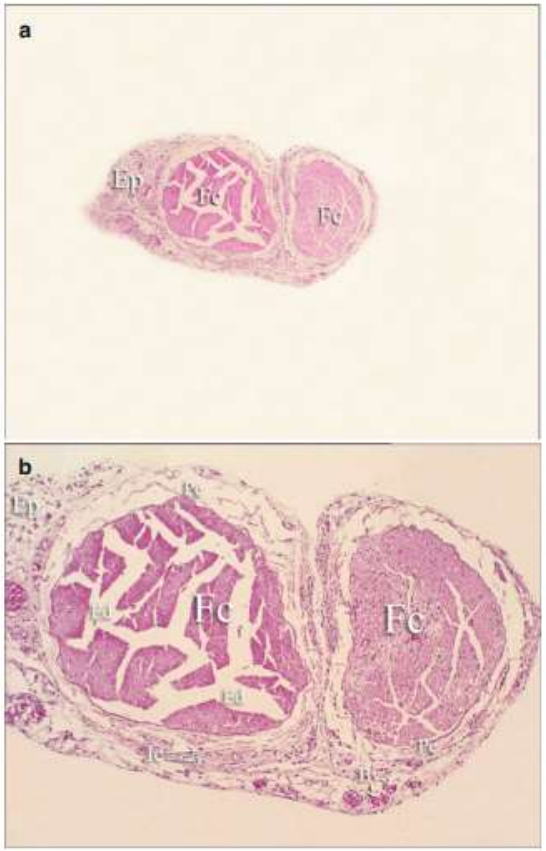
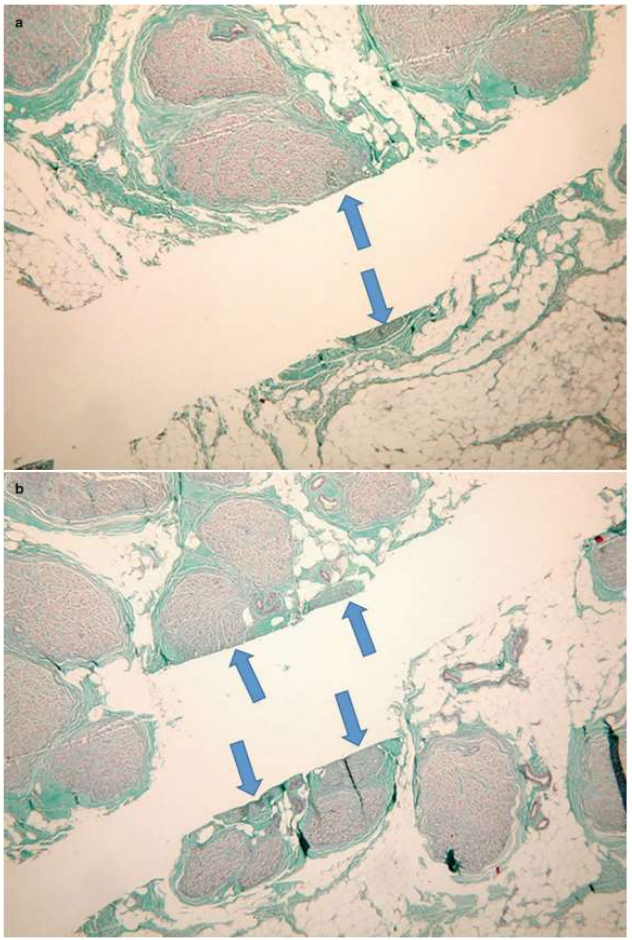
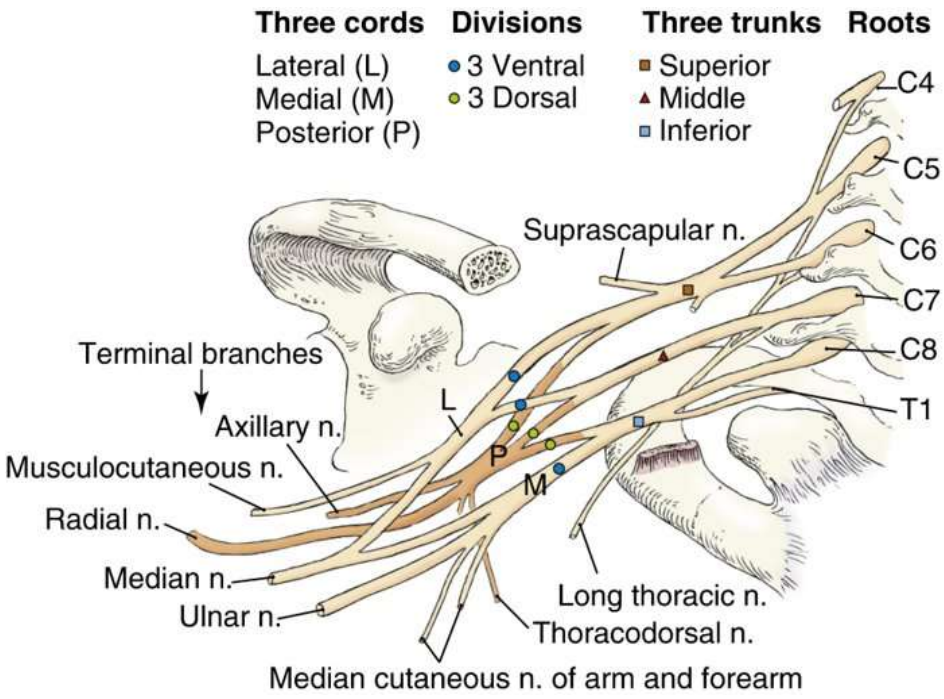


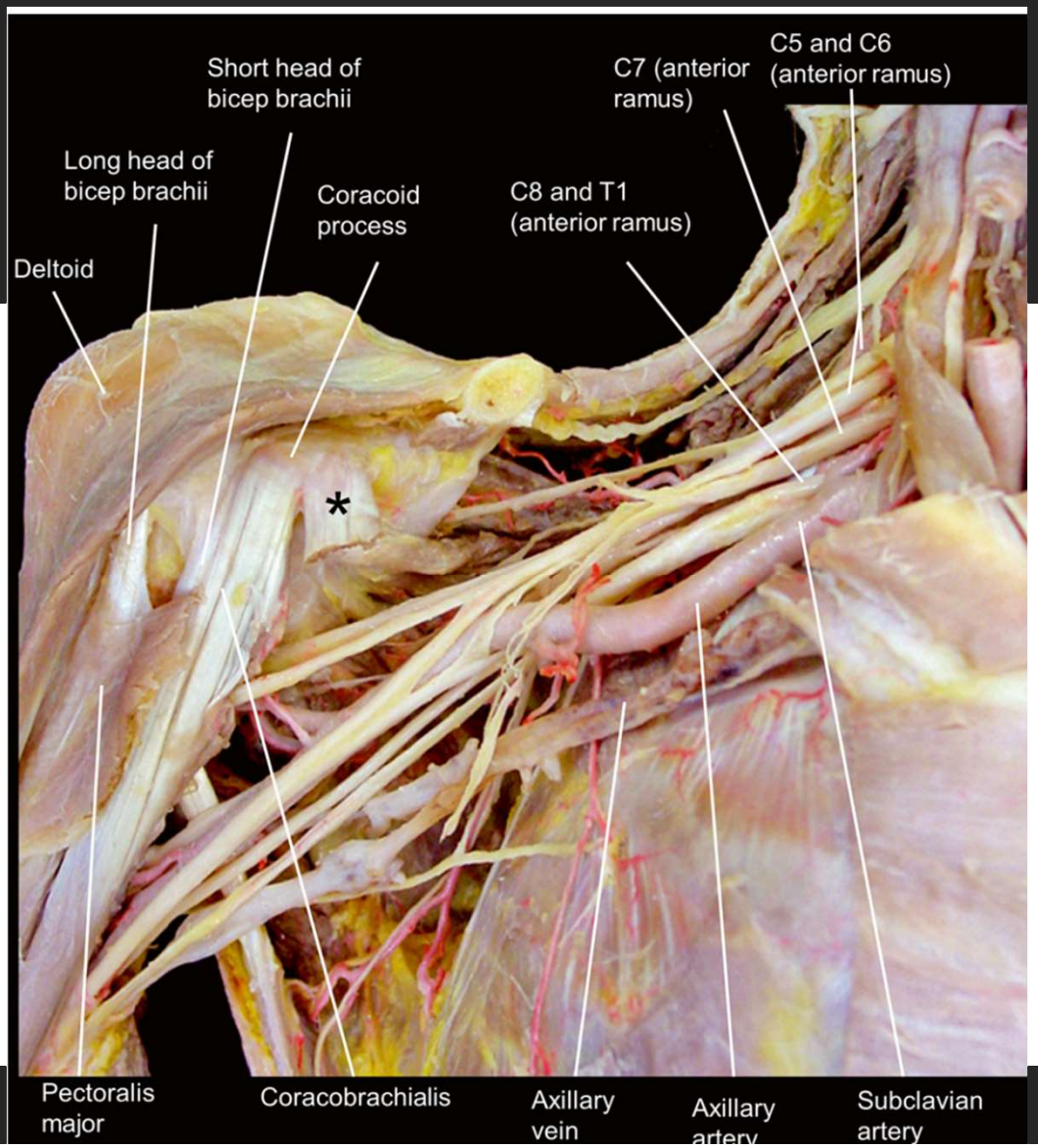
Fig. 14.6 Intraneural intrafascicular application of 2 % lidocaine with high (>20 psi) injection pressure. (**a**) Rat sciatic nerve composed of two nerve fasciculi. (**b**) Detail of panel **a**. The epineurium is edematous, with infiltration of inflammatory elements and hyperemic blood vessels. The perineurium appears delaminated. Subperineural edema is present in the deeper area of the fasciculus. *Bv* blood vessels, *Ed* edema, *Ep* epineurium, *Fc* fascicle, *Ic* inflammatory cells, *Pe* perineurium. H&E stain. Magnification: ×10 (**a**); ×40 (**b**)



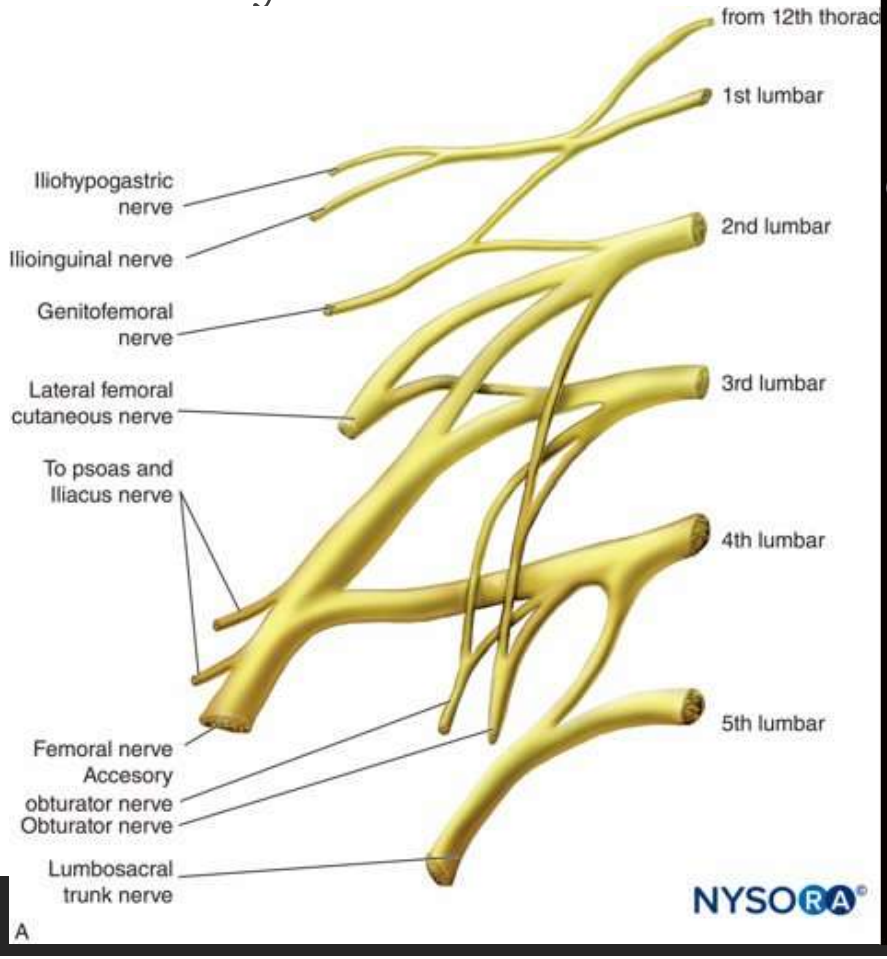
5.20 (**a**, **b**) If the needle transfixes the sciatic nerve, injury to the marginal fascicles sometimes occurs (*blue arrows*)

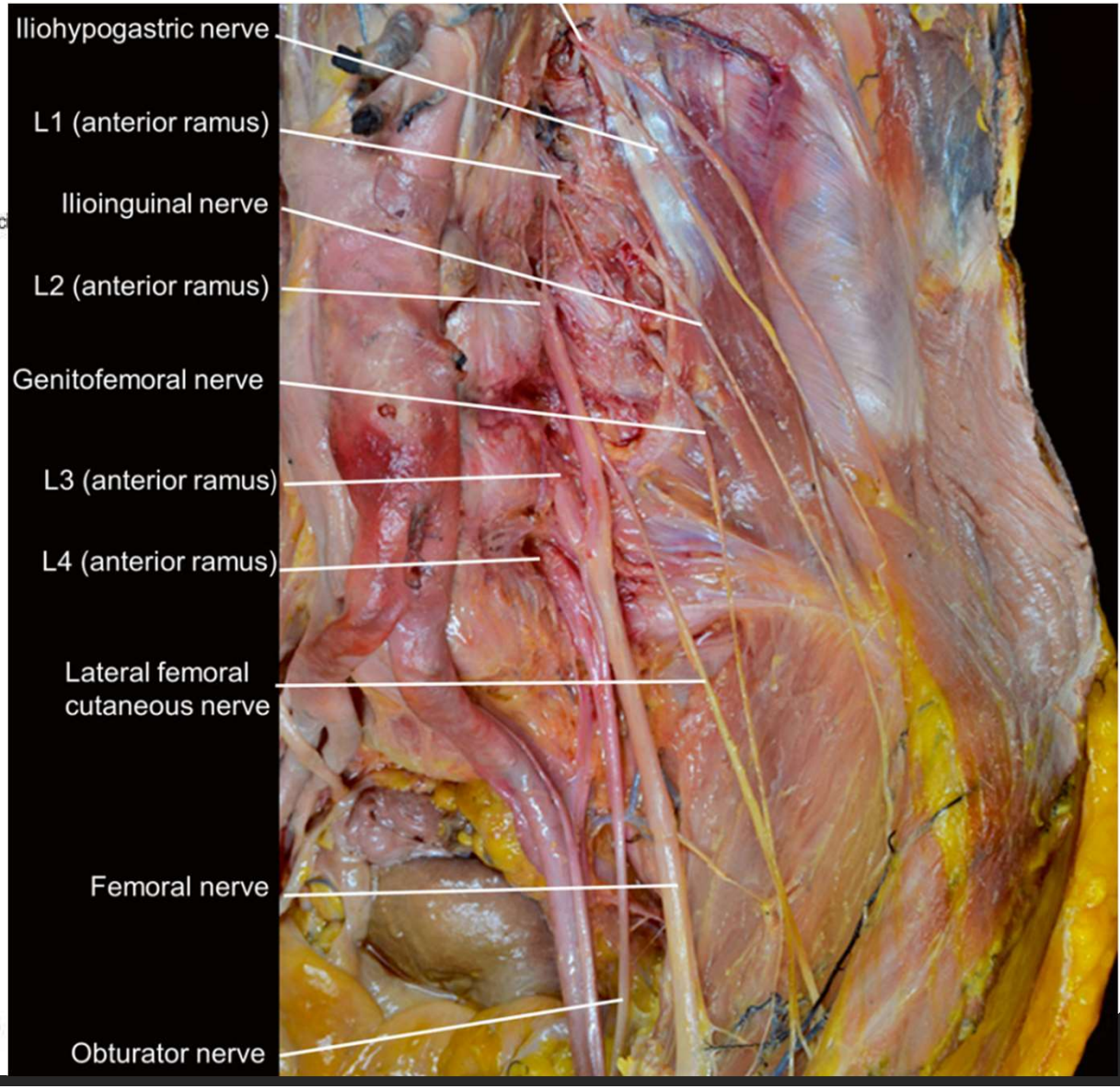
Anatomy: Brachial Plexus

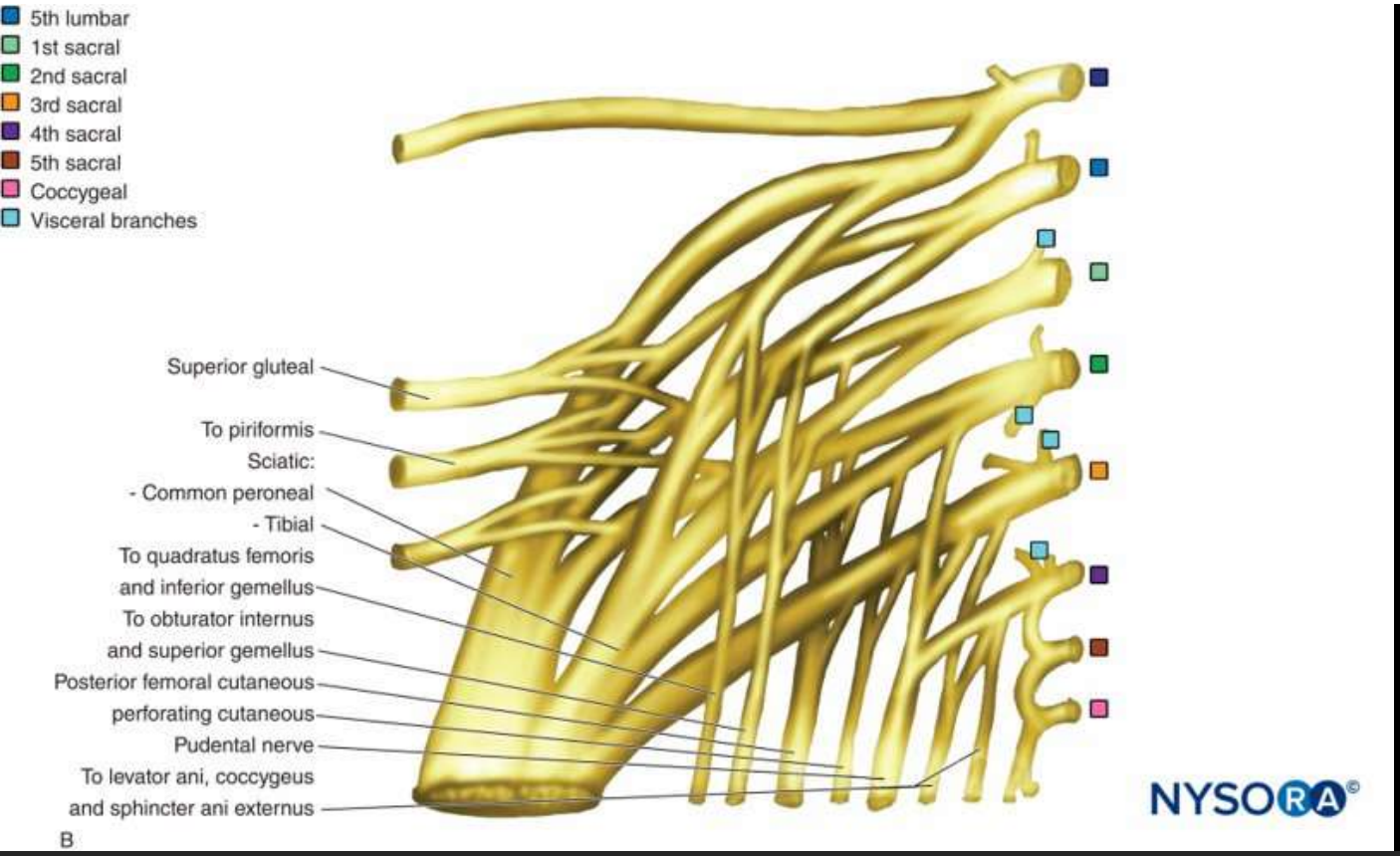


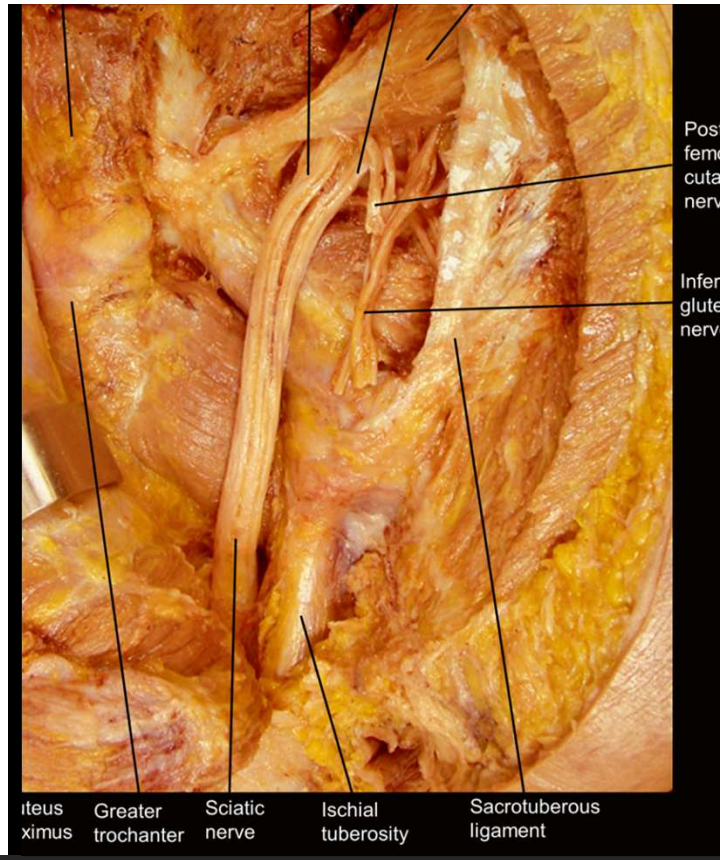


Anatomy: Lumbar Plexus



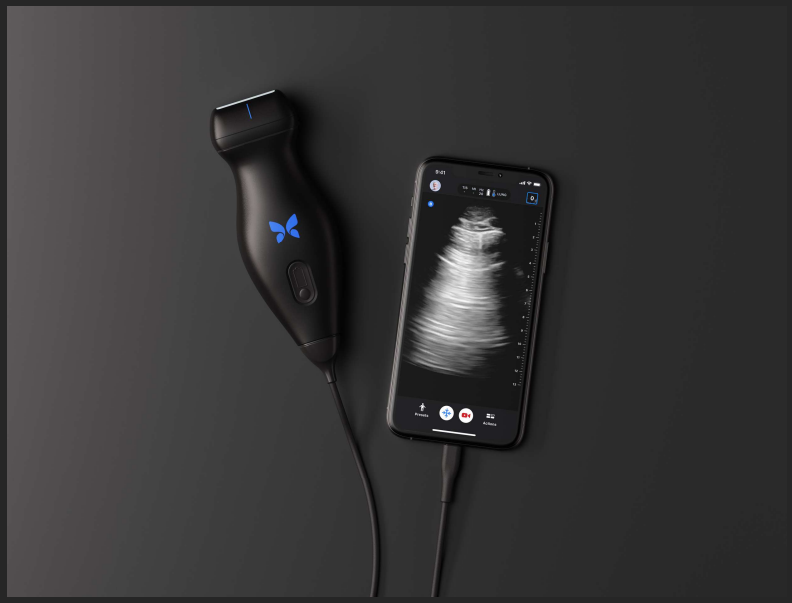




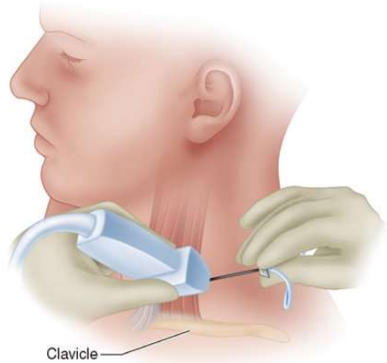


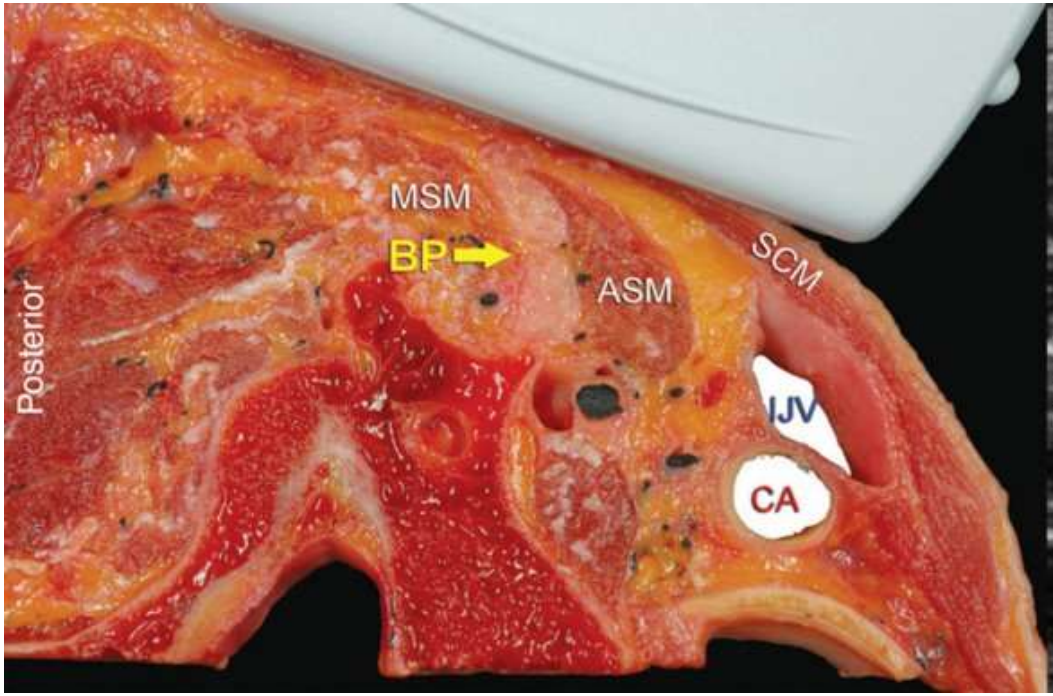
Anatomy: Lumbosacral Plexus

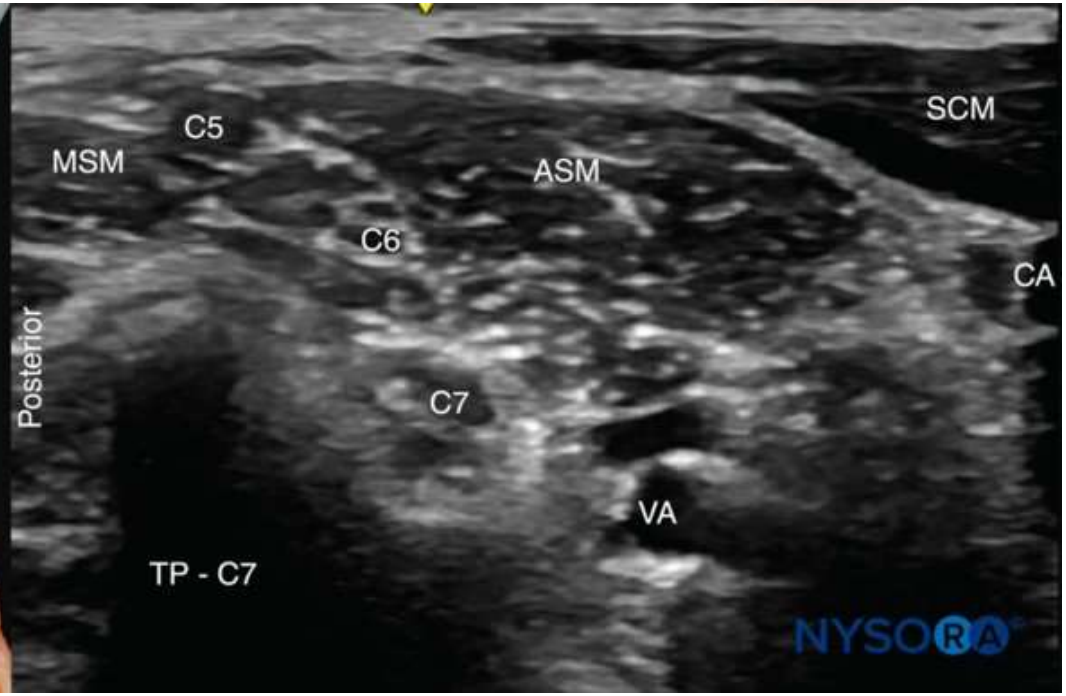
Equipment



Interscalene BP Block







Interscalene Block

Surgeries involving the shoulder

Risks:

100% unilateral phrenic nerve block

Horners syndrome (miosis, anhidrosis, ptosis)

Reoccurrent laryngeal nerve block

Verterbral Artery injection

Epidural/subarachnoid injection

A randomised controlled trial in patients undergoing arthroscopic shoulder surgery comparing interscalene block with either 10 ml or 20 ml levobupivacaine 0.25%

We randomly allocated 48 adults to 10 ml or 20 ml levobupivacaine 0.25% before arthroscopic shoulder surgery. The primary outcome was hemidiaphragmatic paralysis, defined as inspiratory thickness < 1.2 times expiratory thickness, measured by ultrasound 4 h after block. Hemidiaphragmatic paralysis was recorded for 6/24 vs. 23/24 supine participants after 10 ml vs. 20 ml levobupivacaine 0.25%, respectively, and for 4/24 vs. 23/24 sitting participants, respectively, $p < 0.001$ for both. Pain scores after 10 ml injectate were not worse than after 20 ml injectate. Median (IQR [range]) morphine doses in the first 24 postoperative hours after 10 ml and 20 ml levobupivacaine 0.25% were 2 (0–6 [0–23]) mg vs. 1 (0–2 [0–11]) mg, respectively, $p = 0.12$. No participant had a complication after 10 ml interscalene levobupivacaine, whereas seven had complications after 20 ml levobupivacaine, $p = 0.009$. Hemidiaphragmatic function was better after 10 ml vs. 20 ml interscalene levobupivacaine 0.25% without impairing analgesia for 24 postoperative hours.

Oliver-Fornies et al., 2022

ANESTHESIOLOGY

Interscalene Brachial Plexus Block with Liposomal Bupivacaine *versus* Standard Bupivacaine with Perineural Dexamethasone: A Noninferiority Trial

David H. Kim, M.D., Jiabin Liu, M.D., Ph.D., Jonathan C. Beathe, M.D., Yi Lin, M.D., Ph.D., Douglas S. Wetmore, M.D., Sang J. Kim, M.D., Stephen C. Haskins, M.D., Sean Garvin, M.D., Joseph A. Oxendine, M.D., Michael C. Ho, M.D., Answorth A. Allen, M.D., Marko Popovic, B.S., Ejiro Gbaje, M.P.H., Christopher L. Wu, M.D., Stavros G. Memtsoudis, M.D., Ph.D., M.B.A.

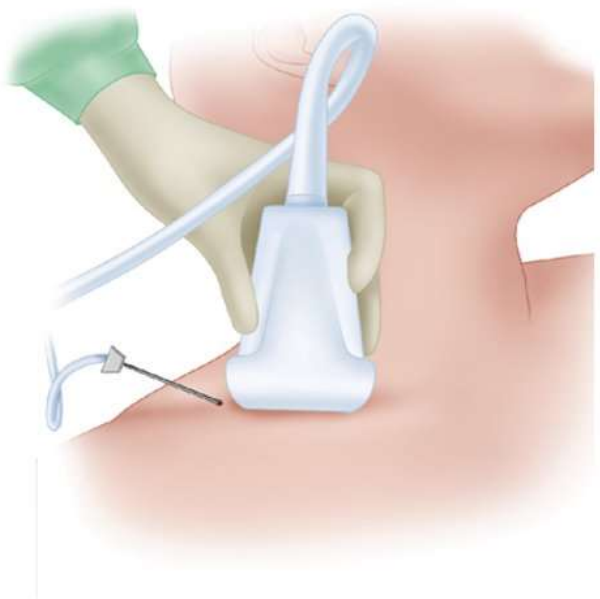
ANESTHESIOLOGY 2022; 136:434–47

Results: A liposomal bupivacaine group average numerical rating scale pain score over 72 h was not inferior to the bupivacaine with dexamethasone group (mean [SD], 2.4 [1.9] *vs.* 3.4 [1.9]; mean difference [95% CI], –1.1 [–1.8, –0.4]; $P < 0.001$ for noninferiority). There was no significant difference in duration of analgesia between the groups (26 [20, 42] h *vs.* 27 [20, 39] h; $P = 0.851$). Motor and sensory resolutions were similar in both groups: 27 (21, 48) h *versus* 27 (19, 40) h ($P = 0.436$) and 27 [21, 44] h *versus* 31 (20, 42) h ($P = 0.862$), respectively. There was no difference in opioid consumption, readiness for postanesthesia care unit discharge, or adverse events.

Conclusions: Interscalene nerve blocks with perineural liposomal bupivacaine provided effective analgesia similar to the perineural standard bupivacaine with dexamethasone. The results show that bupivacaine with dexamethasone can be used interchangeably with liposomal bupivacaine for analgesia after shoulder surgery.

(ANESTHESIOLOGY 2022; 136:434–47)

Supraclavicular Block



Source: Butterworth JF, Mackey DC, Wasnick JD: *Morgan & Mikhail's Clinical Anesthesiology*, 5th Edition: www.accessmedicine.com

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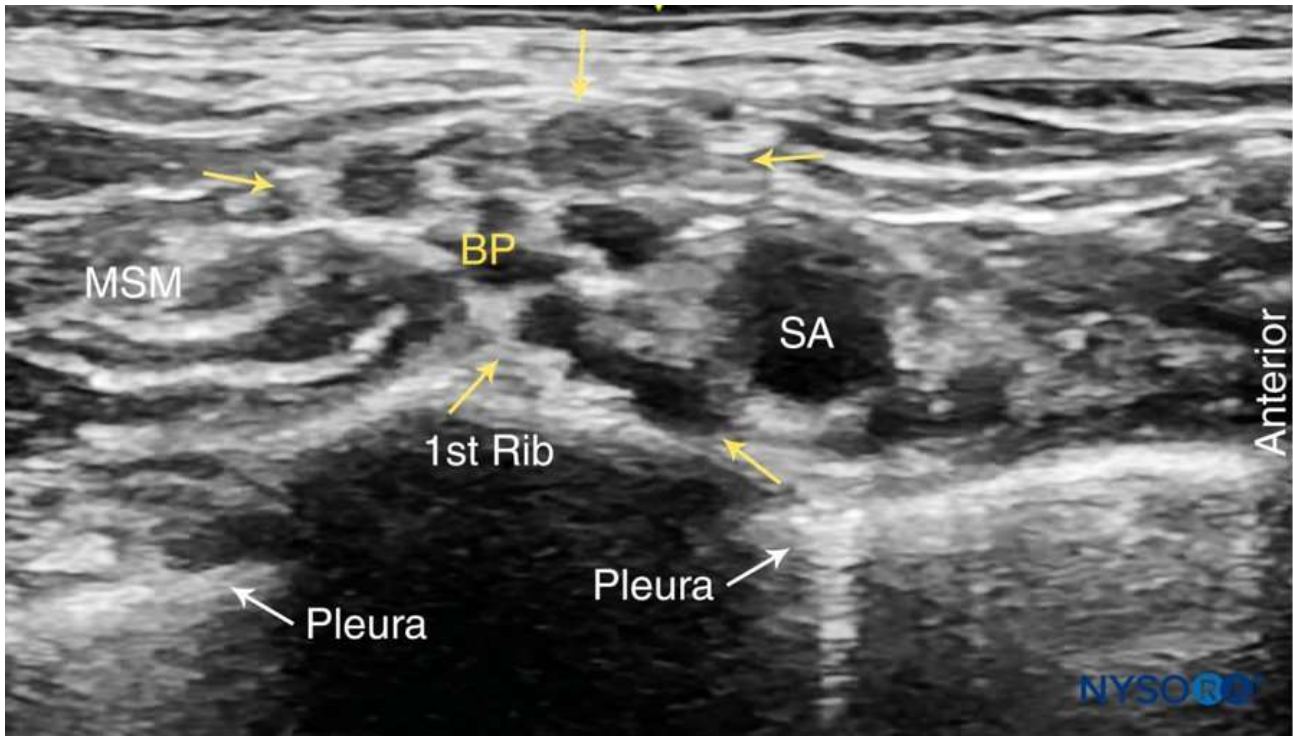


Supraclavicular Block

"spinal" of the arm

Risks:

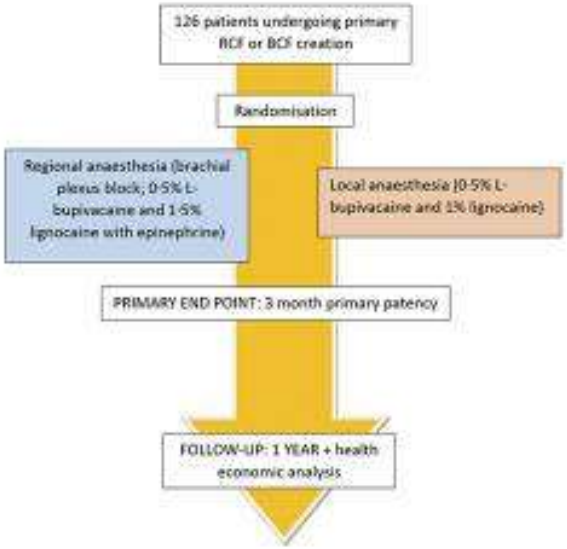
Pneumothorax

50% phrenic nerve block

Spares proximal underarm

Long-term functional patency and cost-effectiveness of arteriovenous fistula creation under regional anaesthesia: a randomized clinical trial

METHODS



RESULTS

PRIMARY PATENCY AT 1-YR: 79% (RA) vs 59% (LA); OR 2.7; P=0.02

FUNCTIONAL PATENCY AT 1-YR: 68% (RA) vs 49% (LA); OR 2.1; P<0.01

21 revisional procedures, 53 new AVFs, and 50 central venous catheters were required in 12 months.

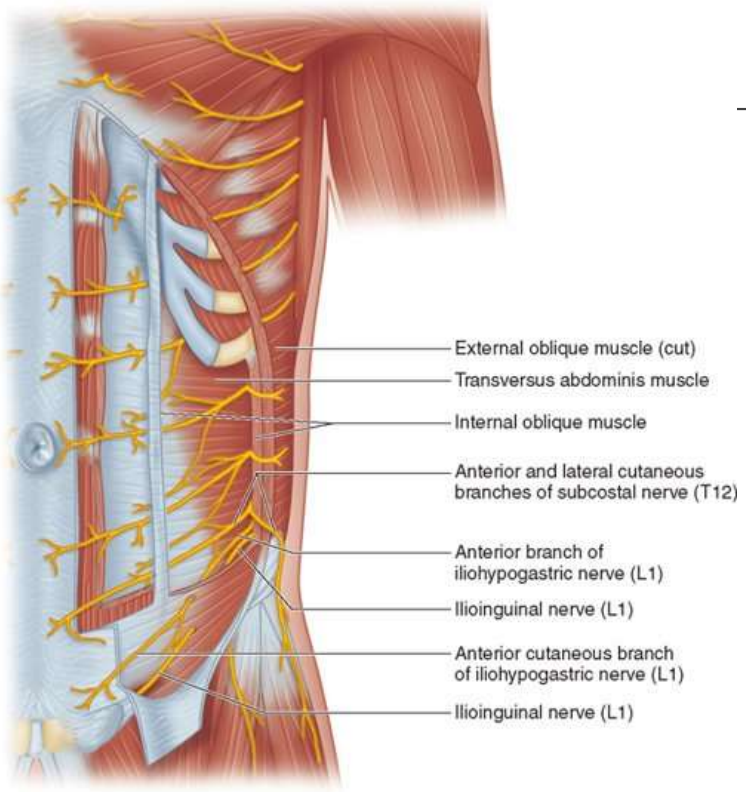
COST EFFECTIVENESS ANALYSIS: RA resulted in net savings of £195·10/patient at one year, and an ICER of £12,900 per QALY gained over a five-year time horizon.

CONCLUSION: Compared to local anaesthesia, regional anaesthesia significantly improved both primary and functional AVF patency at one year and proved cost-effective.

doi: 10.1681/ASN.2019111209

JASN

Tranversus Abdominus Plane (TAP) Block



Source: Butterworth JF, Mackey DC, Wasnick JD: *Morgan & Mikhail's Clinical Anesthesiology*, 5th Edition: www.accessmedicine.com

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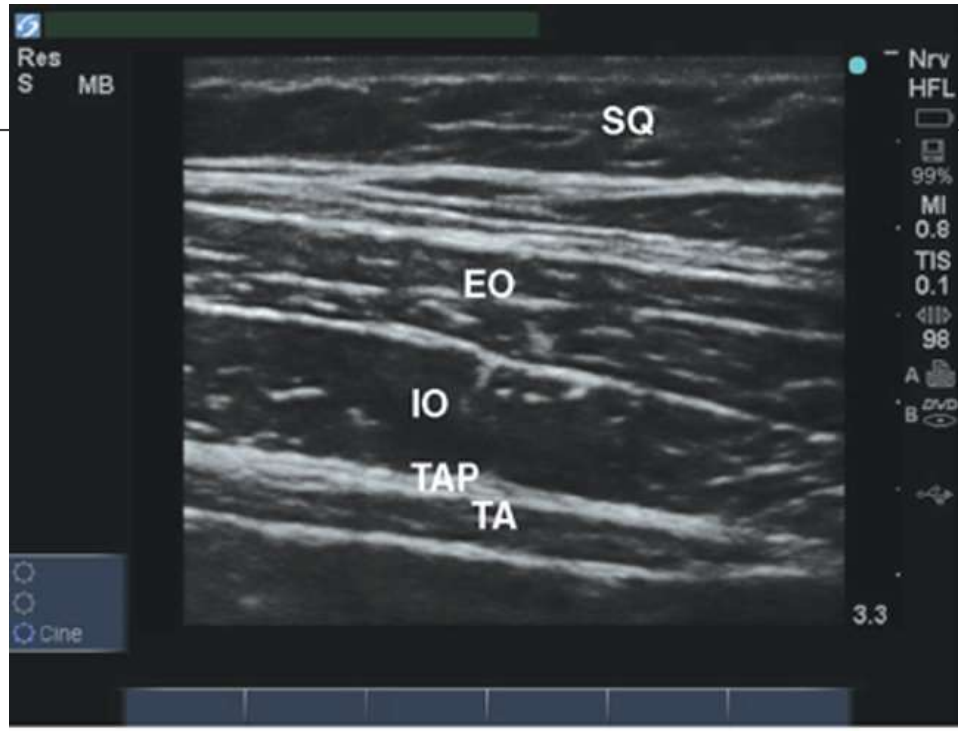

Source: Butterworth JF, Mackey DC, Wasnick JD: *Morgan & Mikhail's Clinical* 5th Edition: www.accessmedicine.com

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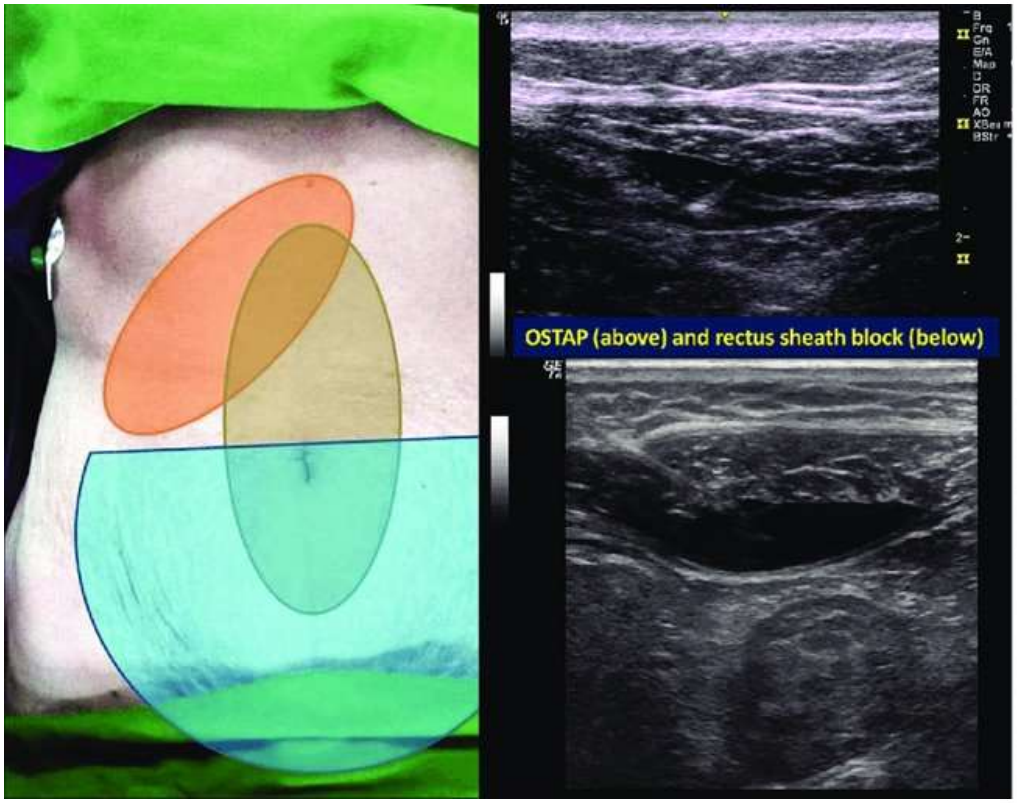
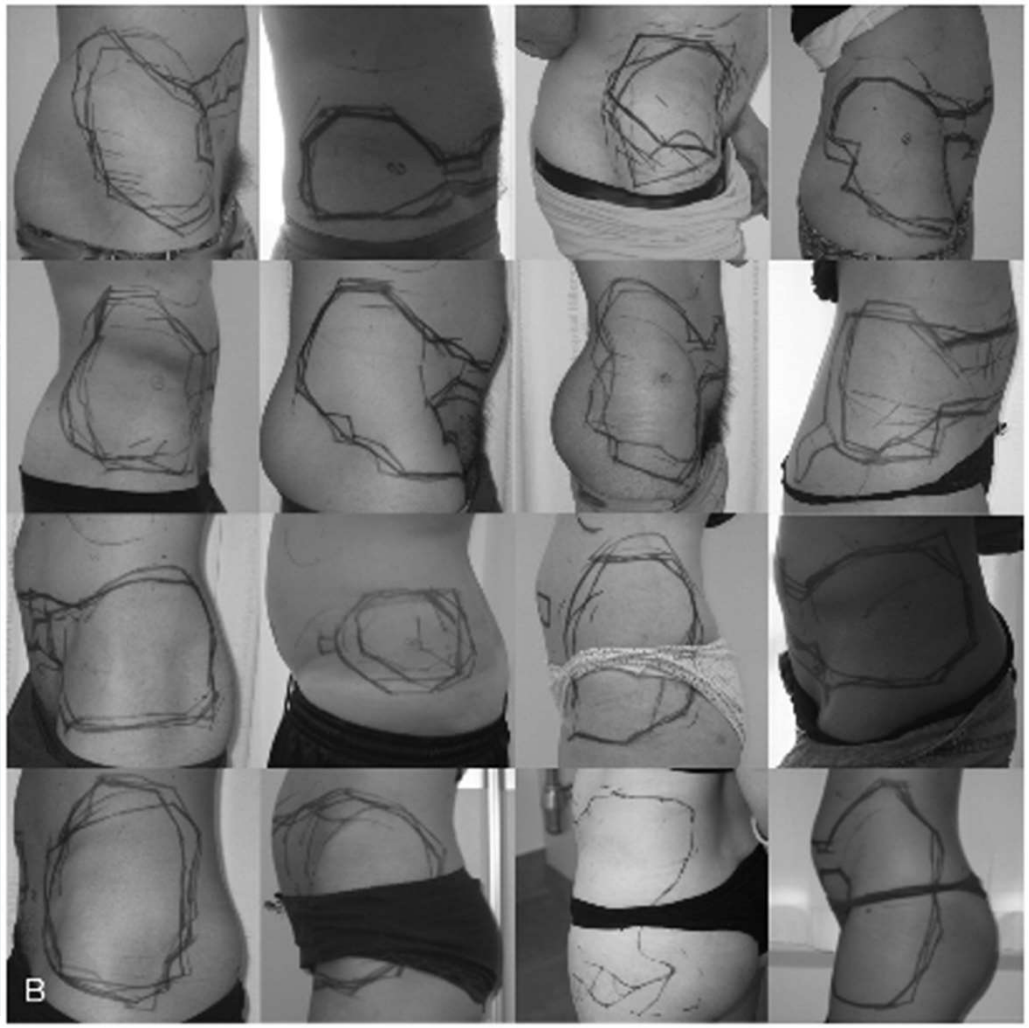
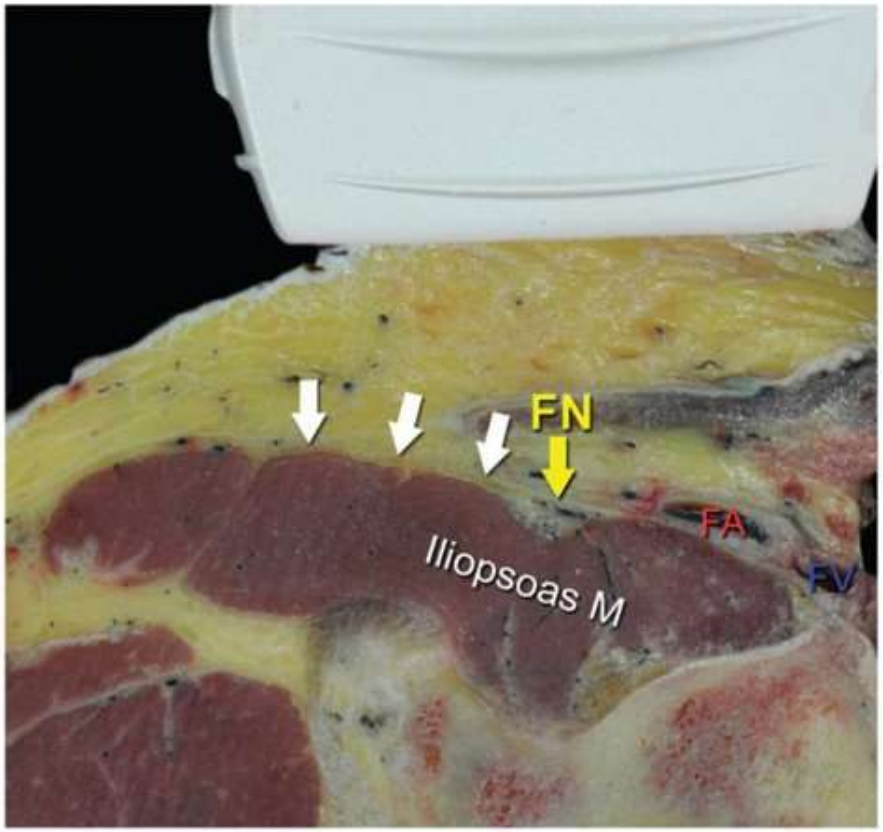
TAP Block

Stoving et al., 2015



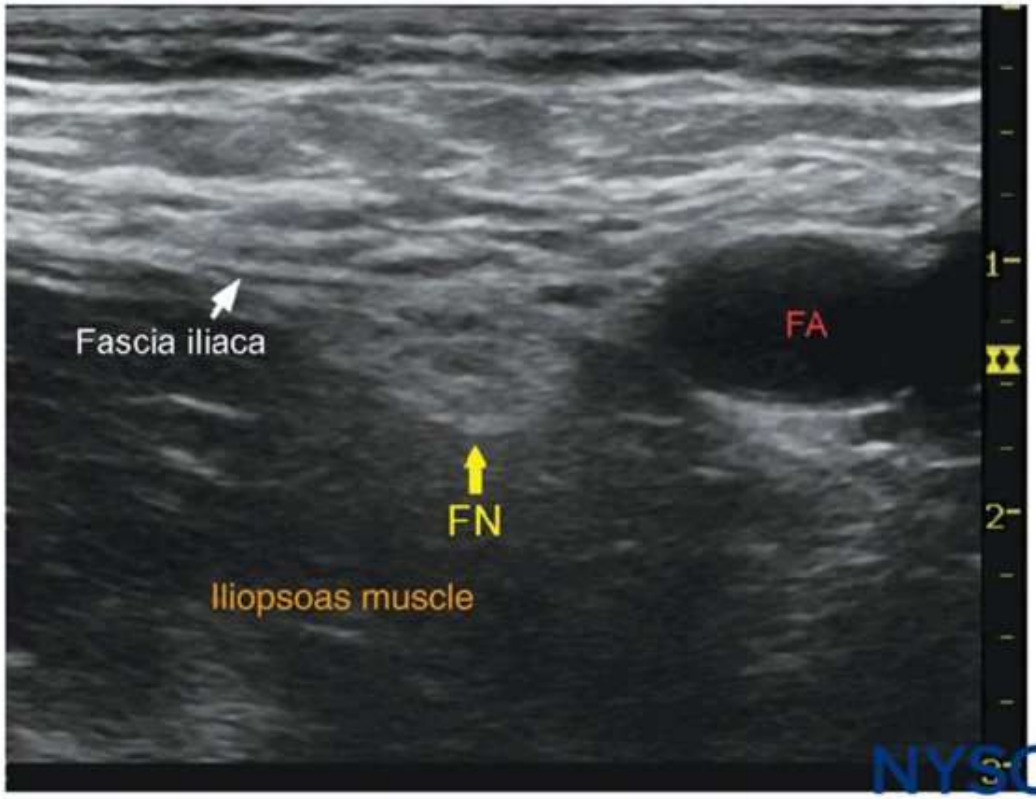


Femoral Nerve Block



A

Lateral

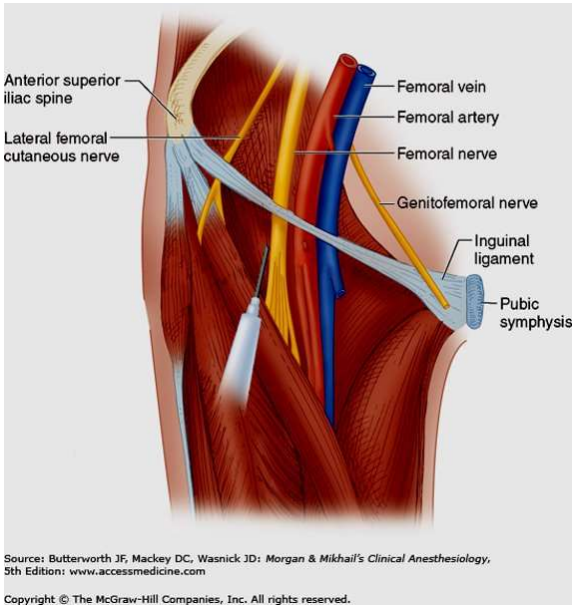


B

Femoral nerve block

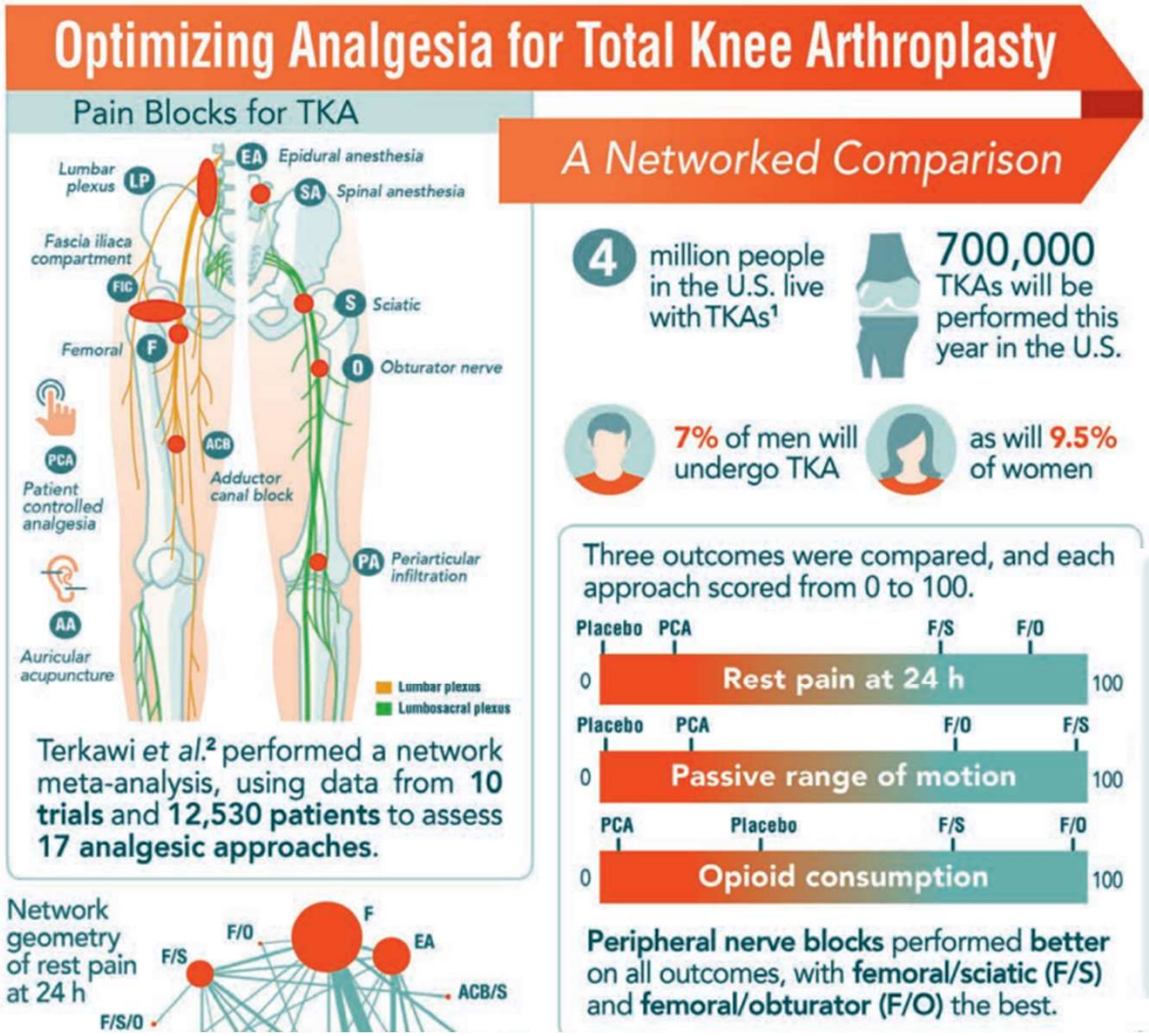
Femoral Nerve Block

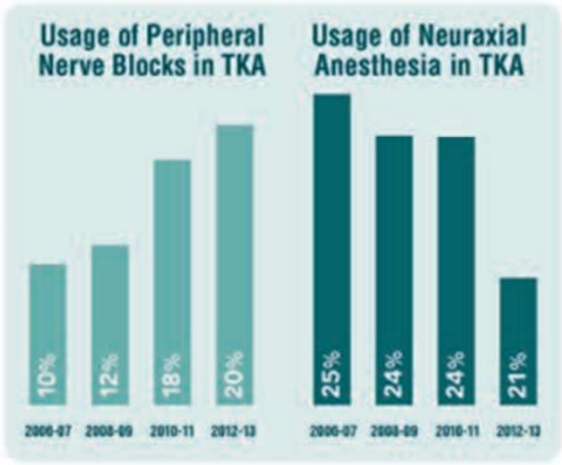
Quadricep weakness



Total Knee Arthroplasty

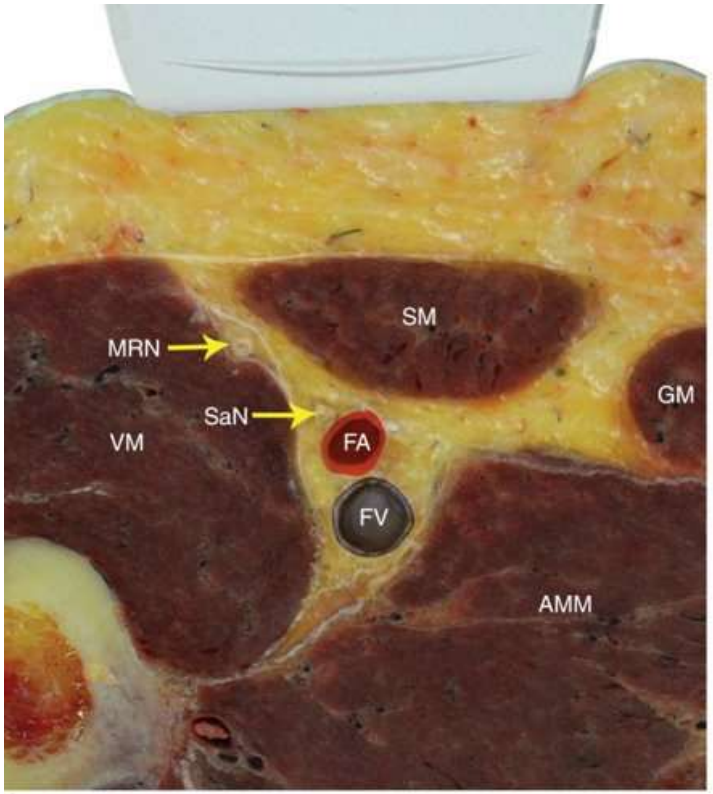
Terkawi et al., 2017





...80% of patients do not have regional anesthesia for TKAs.[3]

Adductor Canal Block



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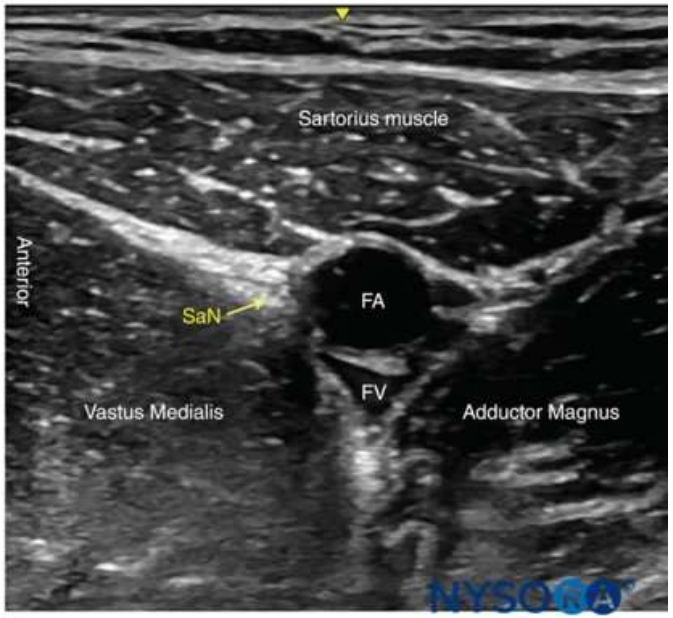

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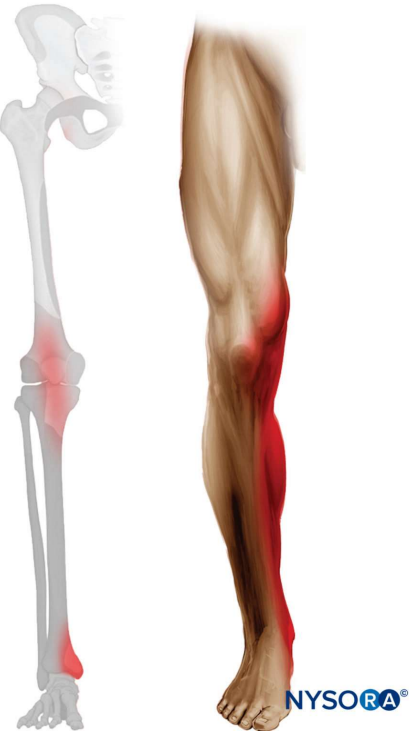


ANESTHESIOLOGY NEWS

Clinical Anesthesiology

JULY 21, 2023

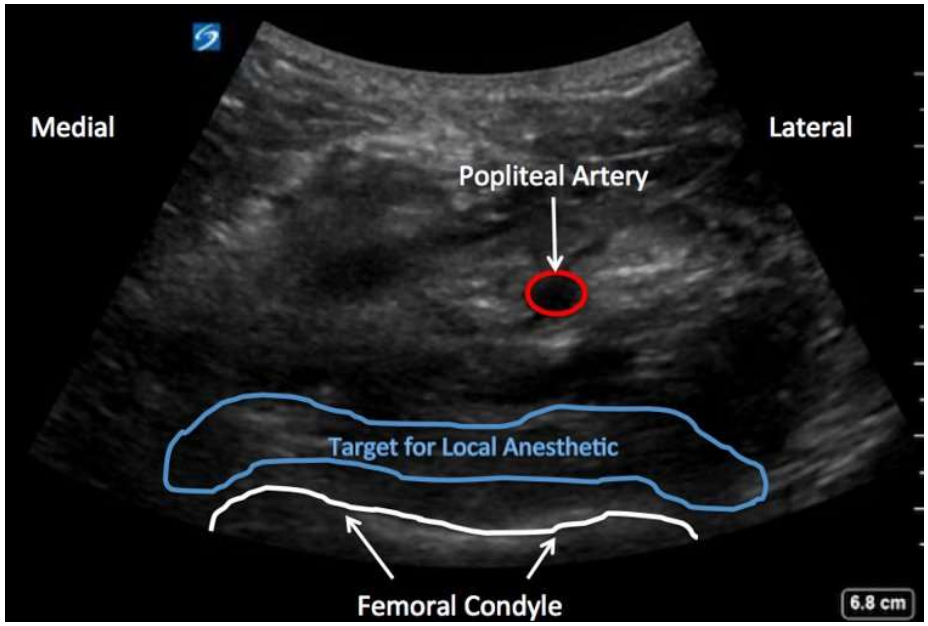
Periarterial Approach in Adductor Canal Block May Damage Nerve To Vastus Medialis

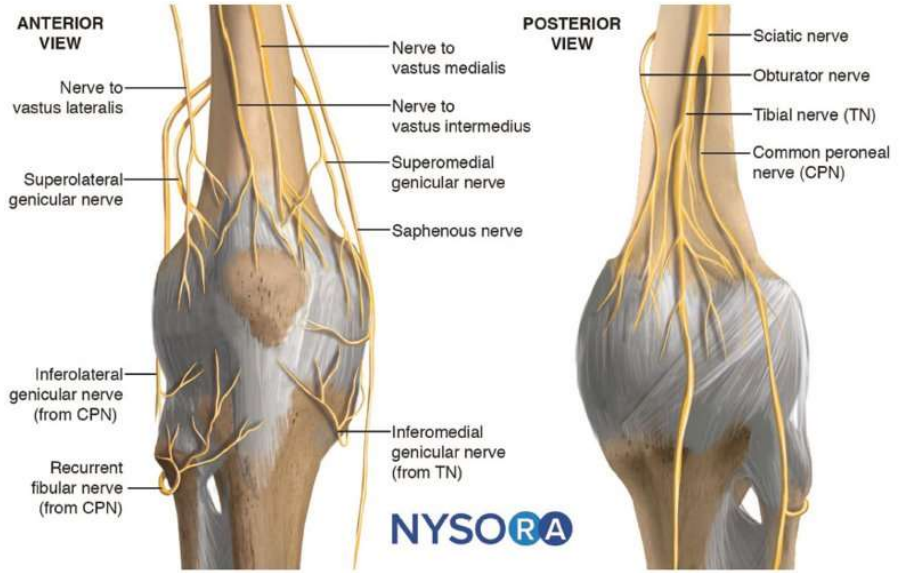
HOLLYWOOD, Fla.—A periarterial approach to the adductor canal may increase the risk for injury to the nerve to vastus medialis (NVM), according to a novel cadaver study.

Researchers at the Duke University School of Medicine, in Durham, N.C., found that this approach led to direct impalement of the NVM in one-third of cases, plus direct contact with the nerve in another 22%. Although the investigators were unsure of the clinical implications of such contact, they said the finding should strike a cautionary note for other regional anesthesiologists.

"We use the adductor canal block to provide analgesia for a variety of lower limb procedures," said Emily Barney Hall, MD, a resident at the institution. "Although we've traditionally thought of the saphenous nerve as being the primary or sole target, recently there have been studies demonstrating the importance of blocking the nerve to vastus medialis, to ensure the best analgesia from the technique.

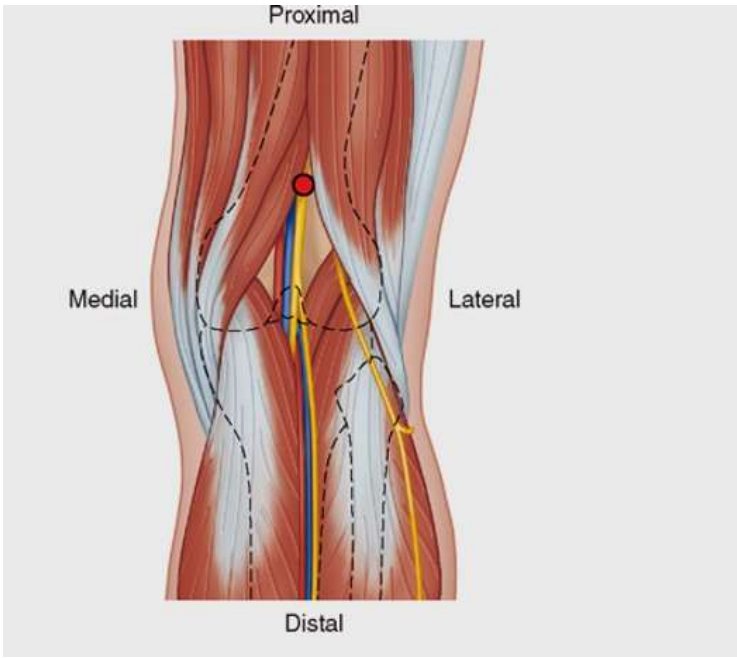
"At the same time, we also know that we aren't very good at identifying the NVM on ultrasound," she added. "It's not particularly reliable in terms of location, and sometimes is tricky to visualize. On top of that, based on the trajectory of the adductor canal block and the approximate location of the NVM in that subsartorial plane, there is a risk that the needle may get quite close or contact the nerve in the course of doing the block."

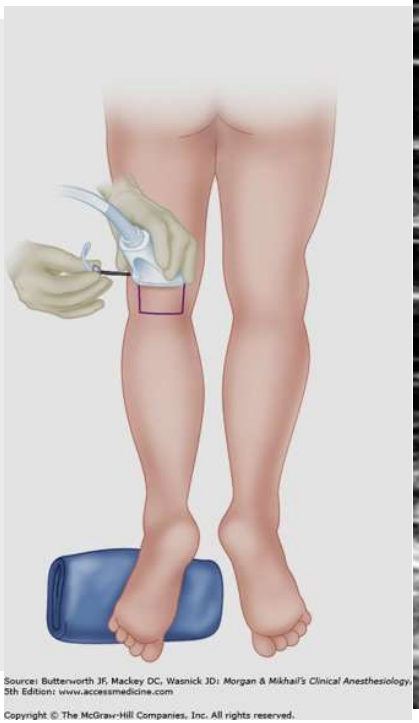


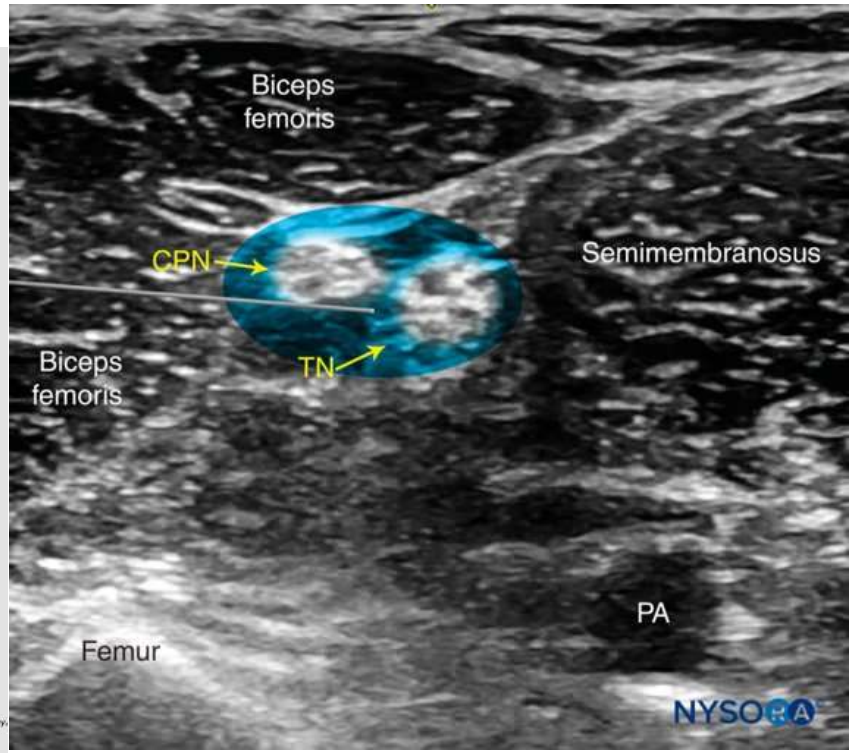


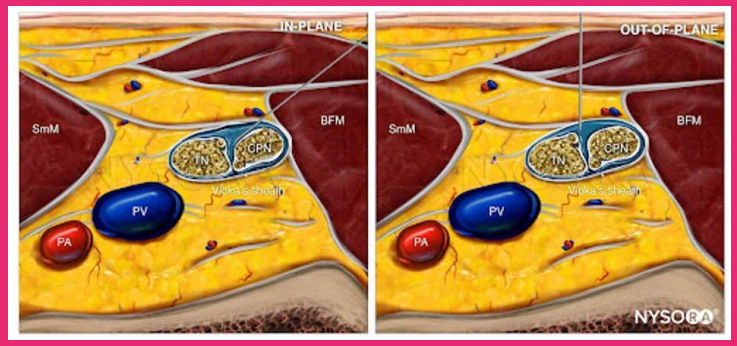
IPACK/Genicular

Popliteal Sciatic Nerve Block









Pop-Sci Nerve Block

Foot drop expected

Great for foot/ankle and surgeries below the knee

Spares the medial malleolus of the ankle

May hide compartment syndrome in LE compartments

Pro-Con Debate: Peripheral Nerve Blockade Should Be Provided Routinely in Extremity Trauma, Including in Patients At Risk for Acute Compartment Syndrome

Ron E. Samet, MD,* Arissa M. Torrie, MD,* Svetlana V. Chembrovich, MD,† and Barys V. Ihnatsenka, MD†

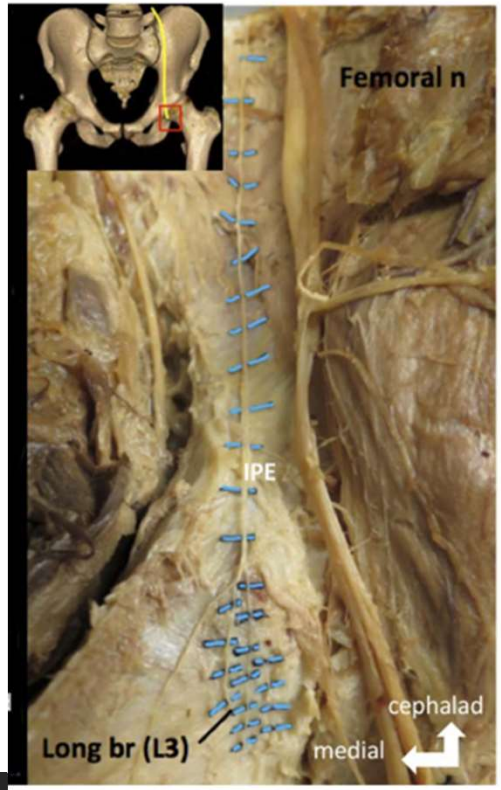
See Article, page 852

In this Pro-Con commentary article, we discuss the controversial debate of whether to provide peripheral nerve blockade (PNB) to patients at risk of acute extremity compartment syndrome (ACS). Traditionally, most practitioners adopt the conservative approach and withhold regional anesthetics for fear of masking an ACS (Con). Recent case reports and new scientific theory, however, demonstrate that modified PNB can be safe and advantageous in these patients (Pro). This article elucidates the arguments based on a better understanding of relevant pathophysiology, neural pathways, personnel and institutional limitations, and PNB adaptations in these patients. (Anesth Analg 2023;136:855–60)

GLOSSARY

ACS = acute compartment syndrome; **APS** = acute pain service; **CPNB** = continuous peripheral nerve blockade; **ERAS** = enhanced recovery after surgery; **LA** = local anesthetic; **PNB** = peripheral nerve blockade

PENG Block



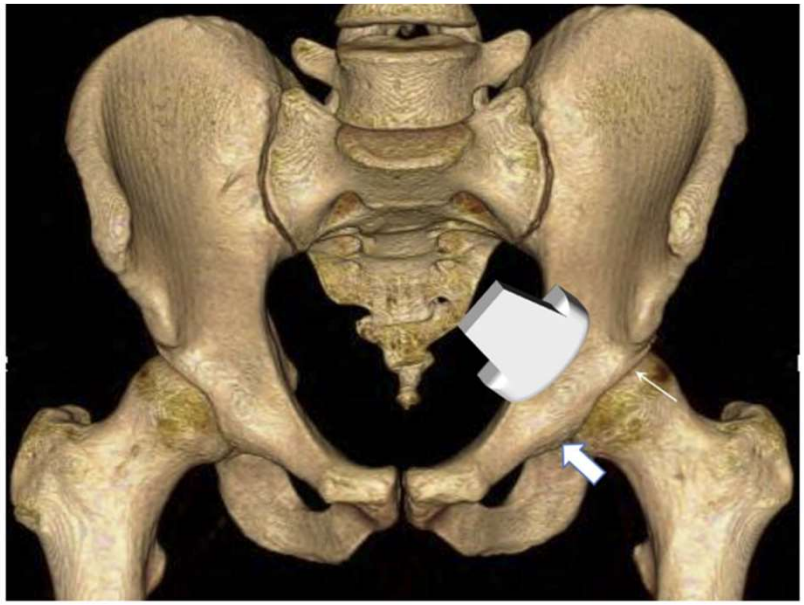
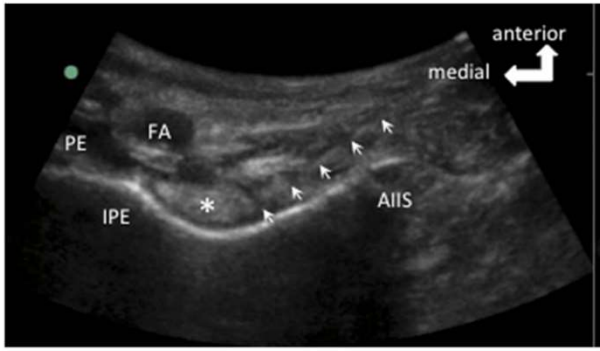
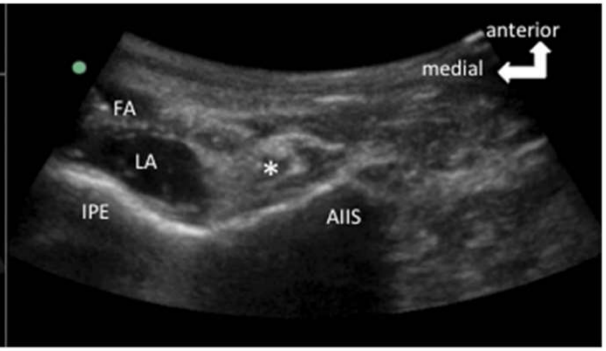


FIGURE 3. The area revealed by ultrasound in Fig. 2 is demonstrated in this figure. Line arrow: AIIS, block arrow: IPE. Reproduced with permission from Philip Peng Educational Series.





The pericapsular nerve group block: a step towards outpatient total hip arthroplasty?

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Ethan A Remily, Steven R Hochstein, Wayne A Wilkie, Nequesha S Mohamed, John V Thompson, Matthew W Kluk, James Nace and Ronald E Delanois

Abstract

Introduction: A new regional anaesthetic technique, coined the pericapsular nerve group (PENG) block, targets the anterior hip capsule by blocking the articular branches of the femoral nerve and accessory obturator nerve. In this study, we evaluated: (1) patient outcomes; (2) postoperative pain scores; and (3) postoperative opioid consumption in total hip arthroplasty (THA) patients who received a PENG block in comparison to a control group.

Methods: A retrospective chart review was performed for patients who underwent primary THA and met criteria at a single institution ($n = 48$), with an additional cohort of patients collected as controls ($n = 48$). Postoperative pain scores were measured by obtaining the cumulative visual analogue scores (VAS) at 12-hour intervals until the 48-hour benchmark. All administered opioids were collected from postoperative day (POD) 0 to POD2 and converted to morphine milligram equivalents (MME).

Results: In the PENG group, length of stay was significantly shorter ($p < 0.001$) and the initial postoperative distance walked was significantly farther ($p = 0.001$). The PENG group consistently demonstrated significantly lower mean cumulative pain scores until the 48-hour mark ($p < 0.001$ for all). Patients receiving the PENG block also experienced a significantly longer therapeutic window before requiring their first opioid ($p < 0.002$). The PENG group required significantly less opioid MMEs on POD1, POD2, and cumulatively over the entire stay ($p < 0.022$ for all).

Conclusions: Our findings suggest that the PENG block has the potential of impacting THA recovery pathways and contributing to cost savings. Thus, its use further supports the transition to the outpatient setting and drives us towards achieving value-driven healthcare.

RESEARCH SUMMARY

Spinal Anesthesia or General Anesthesia for Hip Surgery in Older Adults

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CLINICAL PROBLEM

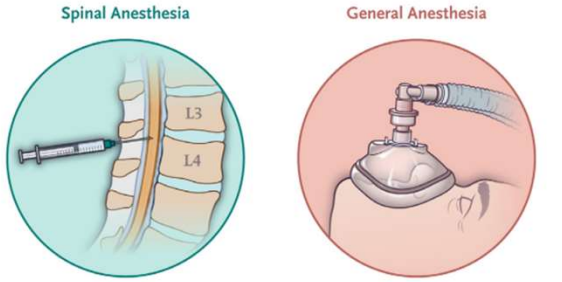
Observational studies suggest that spinal anesthesia may be associated with lower risk of adverse outcomes than general anesthesia in adults undergoing surgery for hip fracture. However, randomized trials comparing the effects of the two techniques on postdischarge outcomes, including walking ability, are lacking.

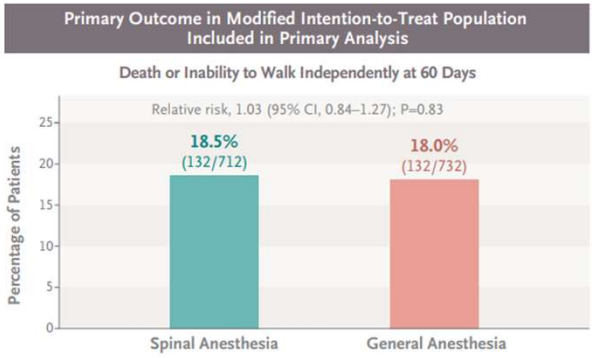
CLINICAL TRIAL

Design: A multicenter, pragmatic, randomized, superiority trial examined whether spinal anesthesia conferred better postdischarge outcomes than general anesthesia in adults undergoing hip-fracture surgery.

Intervention: 1600 patients 50 years of age or older who were scheduled for hip-fracture repair were randomly assigned to receive spinal or general anesthesia during the procedure. All patients had been able to walk independently before the fracture. The primary outcome was the composite of death or an inability to walk roughly 10 ft (3 m), either independently or with a walker or cane, at 60 days after randomization. New-onset delirium was also assessed.

RESULTS





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