Local Anesthesia Techniques

These injections are commonly used in podiatric surgery.

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Objectives

After completing this CME, the reader should be able to:

1) Define the term local anesthesia

2) Know the pharmacokinetics and mode of action of local anesthetics.

3) Distinguish the different types of local anesthetics commonly used in foot and ankle surgery.

4) Recognize the indication for different types of anesthesia technique

5) Perform local anesthesia techniques of the digits, hallux, medial column, lateral column, and ankle.

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*Following this article, an answer sheet and full set of instructions are provided (pg. 160).—**Editor***

A Look at the Basics

Local anesthesia history followed general anesthesia by approximately 40 years.

1860—Cocaine isolated from erythroxylum coca

1884—Koller used cocaine for topical anesthesia of the eye

1885—Halsted used cocaine as peripheral nerve block

1905—First synthetic local—procaine

1943—Lidocaine synthesized

Local anesthesia is defined as any technique that renders part of the body insensitive to pain without affecting consciousness. The technique can be used for relief of non-surgical pain and to enable diagnosis of the cause of some chronic pain conditions.

Peripheral nerve blocks occur when injecting local anesthetic near the course of a named nerve. They are used for surgical procedures involving the distribution of the blocked nerve. The advantage over general anesthesia is that a relatively small dose of local anesthetic can cover a large area. The disadvantage is that placement of a tourniquet may be limited by the area of the block and/or the block may not work properly.

Local anesthetics medications produce a reversible loss of sensation in a localized part of the body when applied directly onto nerve tissues or mucous membranes. This limits propagation of the action potential.

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Some of the desirable characteristics include rapid onset of action, reversible block of nerve conduction, low degree of systemic toxicity, and effectiveness on all parts of the nervous system, all types of nerve and muscle fibers.

The local anesthetic mechanism of action occurs by binding to sodium channels, which slows or prevents axonal conduction. These medications have a lipophilic and hydrophilic end (they are ionizable). If there is a low pH state, the anesthetic is in an ionized state and unable to cross the membrane, so adding some sodium bicarbonate to the solution creates a more non-ionized state.

The question asked by many is if buffering reduces pain. This issue was addressed in a 1997 paper in *JAMA* by HE Friedman, KT Jules, K Springer, and M Jennings titled "Buffered Lidocaine Decreases the Pain of Digital Anesthesia in the Foot". A randomized, double-blind study demonstrated that 24 out of 30 participants indicated on a visual analogue scale that buffered lidocaine is less painful than plain lidocaine. The pain decreased by 50% or more for almost half of the participants.

There are two categories of local anesthetics

Esters
- Cocaine
- Chloroprocaine
- Procaine
- Benzocaine
- Tetracaine

Amides
- Bupivacaine
- Lidocaine
- Ropivacaine
- Etidocaine
- Mepivacaine
- Prilocaine

Figure 1: Vapocoolant spray after a neuroma injection with residual frostbite injury.

Esters

Cocaine, which is a Schedule II substance, has medical use limited to surface or topical anesthesia (corneal or nasopharyngeal). Benzocaine (americaine) is available in many OTC preps for relief of pain and irritation for surface anesthesia (topical), only ointments, sprays, etc.

Vasoconstrictors such as epinephrine decrease the rate of systemic absorption and decrease systemic toxicity.

Absorption Factors

Factors that affect local anesthetic absorption factors influencing peak plasma concentration include the site of injection (vascularity), total dose, specific drug characteristics, and the presence of vasoconstrictors (e.g., epinephrine, phenylephrine). Vasoconstrictors decrease the rate of systemic absorption and decrease systemic toxicity. They increase the local drug concentration and increase neuronal uptake of the local anesthetics, which increases the local duration of action (e.g. lidocaine's duration may increase two-fold with the addition of epinepherine).

Procaine (Novocaine) is topically ineffective and is used for infiltration because of low potency and short duration. It produces significant vasodilation so epinephrine is used to prolong its effect.

Tetracaine (Pentocaine) is used for infiltration and spinal anesthesia as well as being frequently used for topical ophthalmological anesthesia because of its slow onset and more prolonged effect than procaine. Tetracaine has the longest duration of the esters.

Amides

Lidocaine (Xylocaine) is the most widely used local anesthetic and is effective by all routes. It has a faster onset, is more intense, and longer-lasting than procaine. It's one of the most widely used local anesthetics in podiatry.

Mepivacaine (Carbocaine) has a similar onset and duration as lidocaine, but is toxic to neonates so it is not used in obstetrical anesthesia (the fetus poorly metabolizes mepivacaine).

Bupivacaine (Marcaine) has no topical effects so it is used as an infiltrate with a slower onset and is one of the longer duration agents. It also provides sensory and motor dissociation, which means it provides sensory analgesia with a minimal motor block.

Ropivacaine is an enantiomer of bupivacaine and clinically equivalent. It has similar sensory versus motor selectivity as bupivacaine with significantly less cardiovascular toxicity.

Prilocaine has a similar clinical profile to that of lidocaine but causes significantly less vasodilation than lidocaine, so less vasoconstrictor needs to be added. Its most popular clinical application is for topical anesthesia as in combo with lidocaine in a eutectic mixture combination product such as EMLA (eutectic mixture of local analgesics).

EMLA is a mixture of local anesthetics, the most common form of which is lidocaine and prilocaine (this becomes an oily mixture). The lidocaine/prilocaine combination is indicated for dermal anesthesia. Specifically, it is applied to prevent pain associated with intravenous catheter insertion, blood sampling, superficial surgical procedures, and topical anaesthesia of leg ulcers for cleansing or debridement.

Dosages—Local Anesthetic Toxicity

- Cardiovascular myocardial depression and vasodilation can cause hypotension and circulatory collapse.
- Allergic reactions are rare (less than 1%) and usually are due to preservatives or metabolites of esters: rash, bronchospasm.

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Toxicity occurs primarily from intravascular injection or an excessive dose. There are ways to prevent and treat toxicity which include aspirating, often with slow injection. Always ask about previous CNS toxicity and have monitoring available, including resuscitative equipment, CNS-depressant drugs, and cardiovascular drugs.

Before you begin the injection, always explain the procedure, benefits, risks, and complications to the patient and/or patient's representative, and inform the patient of the possibility of paresthesia during the procedure. Obtain informed consent in accordance with hospital protocol, and perform and document neurovascular and musculoskeletal examinations prior to the procedure.

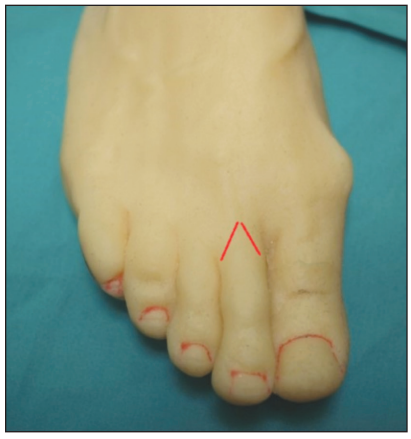

Figure 2: Digital Block Technique—V Block—One poke dorsally at the central aspect of digit, and proceed plantarly at an oblique angle.

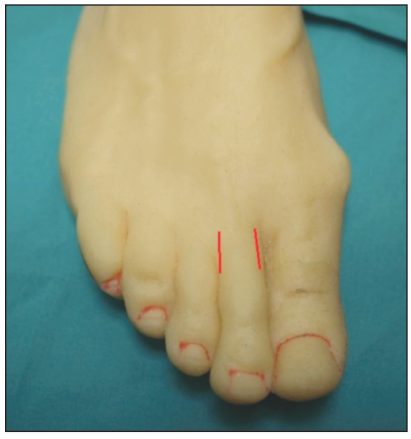

Figure 3: Digital Block Technique—H Block—2 poke injection from adjacent sides and proceed directly plantarly.

Always palpate for landmarks, and prepare the site with an antiseptic solution. While maintaining sterile technique, place a wheal of local anesthetic using a 25 gauge needle or smaller.

Decrease the perceived pain of injections by using a vapocoolant spray, distracting the patient, pinching the skin, and using a smaller gauge needle (27,30) and a smaller cc syringe. One must be careful with vapocoolant spray as it can cause a temporary inflammatory reaction days after the injection (Figure 1).

If EMLA cream is used, remember it needs to be applied under occlusion for at least one hour, and it only numbs the skin. Thus, it may not penetrate as deep as the injection needs to go.

Procaine (Novocaine) is topically ineffective and is used for infiltration because of low potency and short duration.

Is EMLA Effective in Hallux Blocks?

Serour, et al., in *Acta Anaesthesiologica Scandinavica* Mar 2002, did a study to evaluate the efficacy of EMLA cream application prior to digital ring block for surgery for ingrown big toenails. It was a prospective, double-blinded, placebo-controlled, randomized clinical trial with 81 patients, and showed no clinical benefit in using EMLA during digital nerve block ($P < 0.005$).

What About EMLA in Children?

Cohen Reis, et al. *Pediatrics*, 1997 performed a randomized, controlled clinical trial of a eutectic mixture of local anesthetics (EMLA) cream and vapocoolant spray. They concluded that when combined with distraction, vapocoolant spray significantly reduces immediate injection pain compared with distraction alone, and is equally effective, and less expensive and faster-acting, than EMLA cream.

To Mix or Not to Mix?

Ribotsky, et al., in *JAPMA* 1996—suggests no clinical advantage with respect to onset and duration of local blockade, when using a 50/50 mixture of plain lidocaine and plain bupivacaine in place of their independent use. Oka, et al.,in *Anesth Prog* 1997, ststed that no difference was found in the time until onset of anesthetic; however, the duration of anesthetic effect was longer with both lidocaine and bupivacaine than with lidocaine alone.

Types of Blocks

Digital blocks are performed when anesthetizing the individual digits. Uses include ingrown nail removal, biopsy of toes, closed reduction of toe fractures, and debridement of non-neuropathic distal ulcers. Some of the disadvantages of digital blocks are that they are contra-indicated in patients with severe PVD, especially with the addition of epinephrine.

The Nerves Anesthetized for Digital Blocks

Dorsally

The medial dorsal cutaneous nerve (internal dorsal cutaneous branch) divides into three dorsal digital branches, supplying the medial side of the great toe, and the adjacent sides of the second and third toes.

The intermediate dorsal cutaneous nerve divides into four dorsal digital branches, which supply the medial and lateral sides of the third and fourth toes, and the medial side of the fifth toe.

The lateral dorsal cutaneous nerve from the sural nerve turns into a dorsal digital nerve and supplies the lateral side of the fifth toe.

Plantar Medial—The proper digital branches from the common digital branch off the medial plantar nerve and supply the second, third, and medial aspect of fourth digits.

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Plantar Lateral—The proper digital nerve branches from the common digital branch off the lateral plantar nerve and supply the lateral aspect for the fourth and both aspects of fifth toe plantarly.

Each proper digital nerve gives off cutaneous and articular filaments, and the last phalanx sends upward a dorsal branch, which supplies the structures around the nail. The continuation of the nerve is distributed to the ball of the toe.

Digital Block Technique

V Block—1 poke. Start dorsally at the central aspect of digit, aspirate, and raise a wheal. Inject and proceed plantarly at an oblique angle (Figure 2).

H Block—2 pokes. Start on adjacent sides, aspirate and raise a wheal, and proceed directly plantarly (Figure 3).

Hallux Block—Anesthetize the hallux only distal to the 1st MPJ.

Uses include onychocryptosis, paronychia skin biopsy, and closed reduction of toe fractures. Disadvantages include the loss of proprioception if the patient is allowed to ambulate after the procedure.

Hallux Block—Nerves

Dorsally

The medial dorsal cutaneous nerve divides into two dorsal digital branches, one of which supplies the medial side of the great toe dorsally.

Plantarly

The proper digital nerve of the great toe from the medial plantar nerve supplies the skin on the medial side of the great toe.

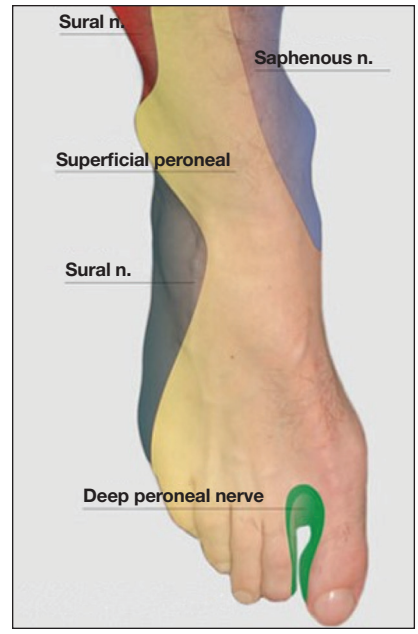

Figure 4: First Interspace—The medial terminal branch of the deep peroneal nerve divides into two dorsal digital nerves which supply the adjacent sides of the great and second toes. *Pictures courtesy of Admir Hadzic, MD, Professor of Anesthesiology, College of Physicians and Surgeons, Columbia University, New York, NY.*

1st Interspace

The medial terminal branch of the deep peroneal nerve divides into two dorsal digital nerves which supply the adjacent sides of the great and second toes (Figure 4).

Hallux Block—"H" Technique

Think of the hallux as a square. The goal is to deposit anesthetics in all four corners. Begin at the dorsal medial aspect of the hallux just distal to the metatarso-phalangeal joint and aspirate and raise a wheal. Proceed plantarly to the plantar medial aspect of the hallux, injecting as you proceed (Figure 5).

Next, begin at the dorsal medial aspect of the hallux just distal to the metatarso-phalangeal joint. Aspirate and raise a wheal. Proceed along the dorsal aspect laterally to the dorsal lateral aspect of the hallux. You may be able to achieve this without having to remove the needle from the first injection (Figure 6).

Next, Begin at the dorsal lateral aspect of the hallux just distal to the metatarso-phalangeal joint. Aspirate and raise a wheal. Proceed plantarly and slightly obliquely to the plantar lateral aspect of the hallux (Figure 7).

To ensure anesthesia, you may perform an extra step. Begin at the plantar medial aspect of the hallux, just distal to the metatarso-phalangeal joint. Aspirate and raise a wheal. Proceed along the plantar aspect laterally to the plantar lateral aspect of the hallux.

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Figure 5: Hallux Block Technique—Start at the dorsal medial aspect of the hallux just distal to the metatarso-phalangeal; proceed plantarly to the plantar medial aspect of the hallux. *Courtesy of Dr. Lawrence Harkless*

Figure 6: Hallux Block Technique—Start at the dorsal medial aspect of the hallux just distal to the metatarso-phalangeal joint. Proceed along the dorsal aspect laterally to the dorsal lateral aspect of the hallux. *Courtesy of Dr. Lawrence Harkless*

Figure 7: Hallux Block Technique—Start at the dorsal lateral aspect of the hallux just distal to the metatarso-phalangeal joint. Proceed plantarly and slightly obliquely to the plantar lateral aspect of the hallux. *Courtesy of Dr. Lawrence Harkless*

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Inter-Metatarsal Block—Nerves

Uses of an inter-metatarsal block include lesser metatarsophalangeal joint work, lesser metatarsal osteotomies, and single digit hammertoe correction.

Nerves—Dorsally

The medial dorsal cutaneous nerve (internal dorsal cutaneous branch) divides into three dorsal digital branches, one of which supplies the medial side of the great toe; the other, the adjacent sides of the second and third toes.

The intermediate dorsal cutaneous nerve divides into four dorsal digital branches, which supply the medial and lateral sides of the third, fourth, and fifth toes.

Nerves—Plantar

Three common digital nerves stemming from the medial plantar nerve pass between the divisions of the plantar aponeurosis, and each splits into two proper digital nerves. Those from the first common digital nerve supply the adjacent sides of the great and second toes; those from the second, the adjacent sides of the second and third toes; and those of the third, the adjacent sides of the third and fourth toes.

Inter Metatarsal—Technique

Palpate the metatarsal interspaces proximal to the MPJ, and inject at 90° to skin. Aspirate and raise a wheal. Proceed from dorsal to plantar, injecting as you go, being careful not to pierce through the plantar aspect of the foot (Figure 8).

Mayo Block

This block is used to anesthetize the medial column of the foot at the level of the first met base distally. Its use includes hallux valgus procedures, hallux varus procedures, hallux limitus/rigidus procedures, Keller arthoplasties, and first MPJ fusions.

Disadvantages include close proximity to the dorsalis pedis (DP) both dorsally and in the interspace, and the chance for hematoma formation if the DP is not spared.

Mayo Block—Nerves

Dorsally

The medial dorsal cutaneous nerve, which comes off the superficial peroneal nerve, divides into two common branches which further subdivide into dorsal digital branches, one of which supplies the medial side of the great toe dorsally.

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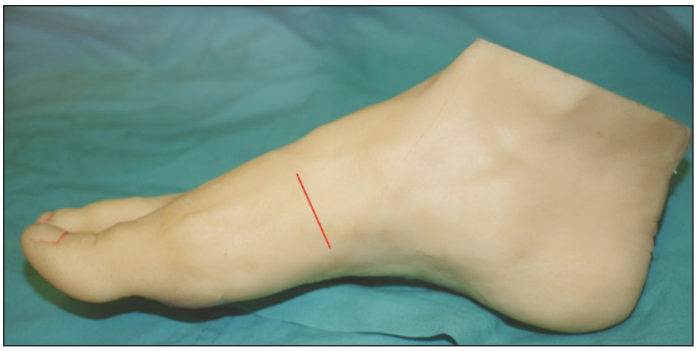

Figure 9: Mayo Block Technique—Palpate dorsally, slightly distal to the flare of the first metatarsal base and create a wheal. Inject, proceeding from dorsal to plantar.

Figure 8: Intermetatarsal Technique—Palpate the metatarsal interspaces proximal to the MPJ. Proceed from dorsal to plantar.

Figure 10: Mayo Block Technique—Palpate dorsally, slightly distal to the flare of the first metatarsal base. Inject, proceeding dorsally from medial to lateral, staying subcutaneous and being careful to avoid the deep branch of the dorsal pedis.

Figure 11: Mayo Block Technique—Palpate the first interspace, proximally. Insert the needle immediately lateral to the extensor hallucis longus tendon, but medial to the dorsalis pedis artery and its deep branch. Inject dorsal to plantar.

Figure 12: Mayo Block Technique—Palpate plantarly, slightly distal to the flare of the first metatarsal base, plantarly going from medial to lateral, being careful to stay in the subcutaneous tissue.

Figure 13: Reverse Mayo Technique—Palpate dorsally, slightly distal to the flare of the first metatarsal base and inject, proceeding dorsal to plantar.

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Plantarly

The common digital nerve, which stems from the medial plantar nerve, divides into the proper digital nerve of the great toe and supplies the skin on the medial side of the great toe.

First Interspace

The medial terminal branch of the deep peroneal nerve divides into two dorsal digital nerves which supply the adjacent sides of the great and second toes. Before it divides, it goes to the first space as an interosseous branch, which supplies the metatarsophalangeal joint of the great toe.

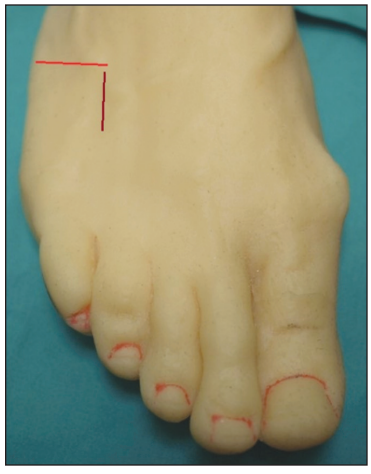

Figure 14: Reverse Mayo Technique—Palpate dorsally, distal to the flare of the fifth metatarsal base. Inject dorsally from medial to lateral, being careful to stay in the subcutaneous tissue. Then palpate the fourth interspace proximally and insert the needle immediately lateral to the extensor digitorum longus tendon/peronues tertius. Inject dorsal to plantar.

Figure 15: Reverse Mayo Technique—Palpate plantarly, distal to flare of the fifth metatarsal base. Inject plantarly going from lateral to medial, being careful to stay in the subcutaneous tissue.

Mayo Block Technique

Palpate dorsally, slightly distal to the flare of the first metatarsal base. Aspirate and raise a wheal. Inject, proceeding from dorsal to plantar (Figure 9). Palpate dorsally, slightly distal to the flare of the first metatarsal base. Aspirate and raise a wheal. Inject, proceeding dorsally from medial to

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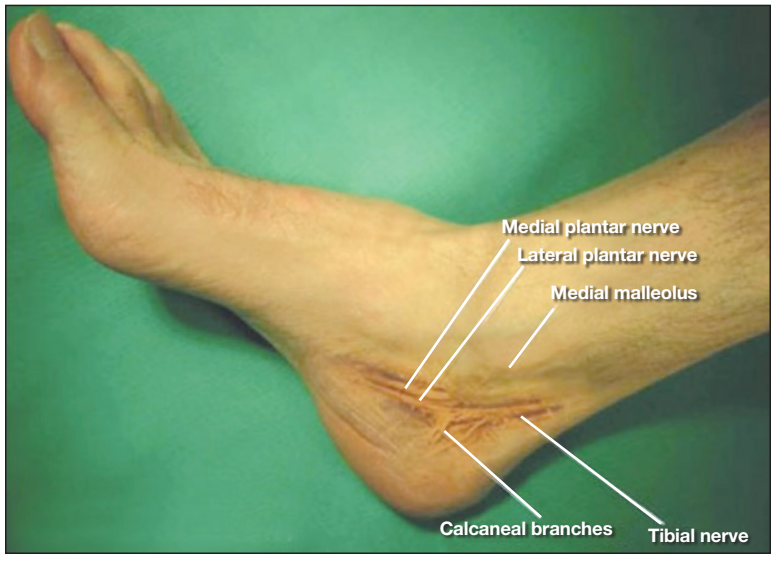

Figure 16: Posterior tibial nerve. This is a main branch off the sciatic nerve. It is sensory to the heel, medial sole, and part of the lateral aspect of the foot. *Pictures courtesy of Admir Hadzic, MD.*

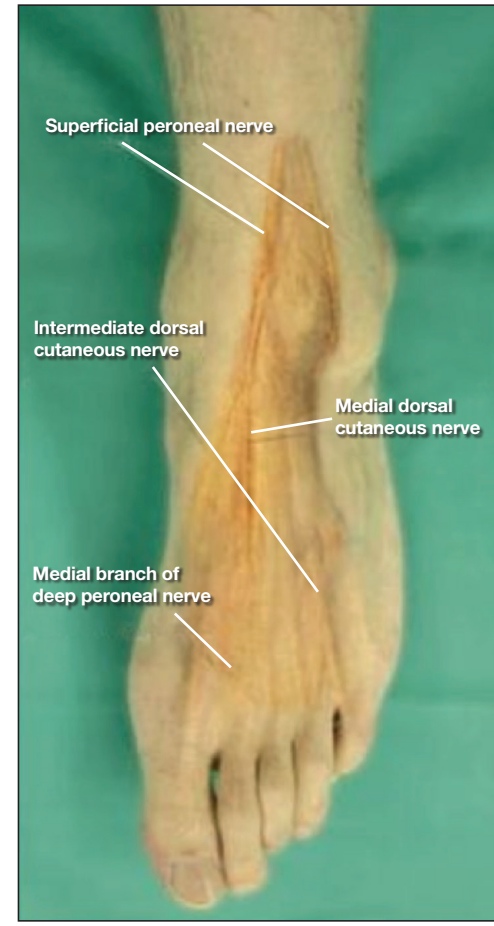

Figure 17: The superficial peroneal nerve is a branch of the common peroneal nerve. It provides sensation to the dorsum of the foot and the toes. It is located at the level of the lateral malleolus, lateral to the extensor digitorum longus. *Pictures courtesy of Admir Hadzic, MD*

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lateral, staying subcutaneously while being careful to avoid the deep branch of the dorsal pedis (Figure 10).

Next, palpate the first interspace proximally and insert the needle immediately lateral to the extensor hallucis longus tendon, but medial to the dorsalis pedis artery and its deep branch. Aspirate and raise a wheal. Inject dorsally to plantarly (Figure 11).

Next palpate plantarly, slightly distal to the flare of the 1st metatarsal base. Aspirate and raise a wheal. Inject plantarly going from medial to lateral while being careful to stay in the subcutaneous tissue (Figure 12).

Does the Mayo Block Work?

Worrell JB, Barbour G., in *AANA J.* 1996, The Mayo block: an efficacious block for hallux and first metatarsal surgery. The Mayo block technique was used on more than 275 patients. The failure rate of the block was less than 1%.

All superficial (cutaneous) nerves of the foot should be thought of as neuronal networks.

Reverse Mayo Block

A reverse Mayo block is used to anesthetize the lateral column of the foot at the level of the fifth metatarsal base. Its uses include fifth met osteotomies and 5th toe contracture corrections. A reverse Mayo blocks the following nerves dorsally:

1) The sural nerve, which is formed by the cutaneous branches of the posterior and common peroneal nerve.

2) The lateral dorsal cutaneous nerve which comes from the sural nerve and turns into a dorsal digital nerve that supplies the lateral side of the fifth toe.

3) The intermediate dorsal cutaneous nerve divides into four dorsal digital branches, which supply the medial and lateral sides of the third, fourth, and fifth toes.

4) The plantar proper digital branches from the common digital which branch off the lateral plantar nerve and supply the lateral aspect for fourth and both aspects of fifth toe plantarly.

Reverse Mayo technique starts with palpating dorsally, slightly distal to flare of the fifth metatarsal base. Aspirate and raise a wheal. Inject, proceeding dorsally to plantarly (Figure 13). Next, palpate dorsally, distal to the flare of the fifth metatarsal base. Aspirate

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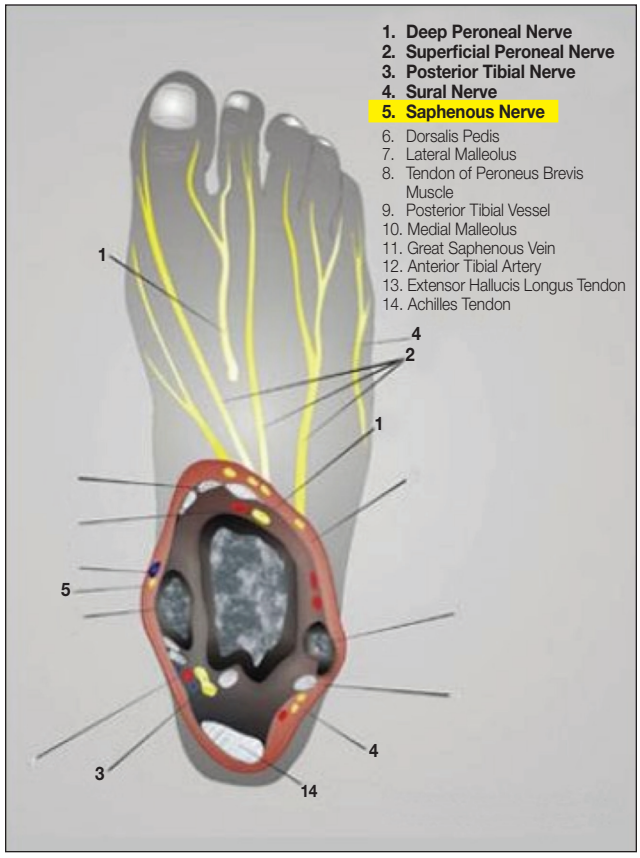

Figure 18: The saphenous nerve is a cutaneous branch of the femoral nerve. It provides sensation to the anteromedial foot. It is located just anterior to the medial malleolus. *Pictures courtesy of Admir Hadzic, MD*

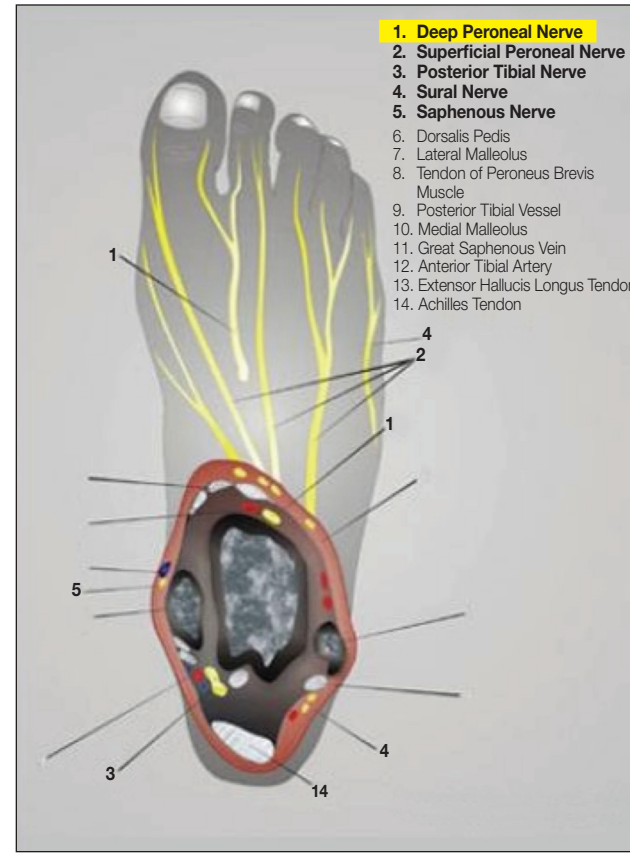

Figure 19: The deep peroneal nerve is a branch of the common peroneal nerve. It provides sensation to the first interspace. It is located lateral to the tendon of the extensor hallucis longus at the level of the intermalleolar line, medial to the dorsalis pedis artery. *Pictures courtesy of Admir Hadzic, MD*

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and raise a wheal. Inject dorsally from medial to lateral, being careful to stay in the subcutaneous tissue (Figure 14).

Palpate the fourth interspace proximally and insert the needle immediately lateral to the extensor digitorum longus tendon/peroneus tertius. Aspirate and raise a wheal. Inject dorsally to plantarly (Figure 14).

Palpate plantarly, distal to the flare of the fifth metatarsal base. Aspirate and raise a wheal. Inject plantarly going from lateral to medial, being careful to stay in the subcutaneous tissue (Figure 15).

Ankle Blocks

Ankle blocks are used for any forefoot work, closed reduction of foot fractures, and major debridement work. Disadvantages include a higher chance to infiltrate medication getting into a blood vessel.

Ankle Block—Nerves that need to be discussed are as follows:

The posterior tibial nerve is a main branch off the sciatic nerve. It is sensory to the heel, medial sole, and part of the lateral aspect of the foot. It is located posterior to the medial malleolus behind the posterior tibial artery (Figure 16).

The posterior tibial nerve is located posterior to the medial malleolus, posterior to the posterior tibial artery.

The sural nerve is formed by cutaneous branches of the posterior and common peroneal nerves. It provides sensation to the lateral aspect of the foot and supplies the lateral heel via the lateral calcaneal branches. It is located between the lateral malleolus and the Achilles tendon.

The superficial peroneal nerve is a branch of the common peroneal nerve and provides sensation to the dorsum of the foot and the toes. It is located at the level of the lateral malleolus, lateral to the extensor digitorum longus (Figure 17).

The saphenous nerve is a cutaneous branch of the femoral nerve which provides sensation to the anteromedial foot. It is located just anterior to the medial malleolus (Figure 18).

The deep peroneal nerve is a branch of the common peroneal nerve which provides sensation to the first interspace. It is located lateral to the tendon of the extensor hallucis longus at the level of the intermalleolar line, medial to the dorsalis pedis artery (Figure 19).

Ankle Block Technique

Starting with the posterior tibial nerve, palpate the medial malleolus and advance posteroinferiorly toward the Achilles tendon until the pulsation of the posterior tibial artery is felt. The nerve is just posterior to the artery (one thumb breadth away from medial malleolus).

Raise a wheal and advance the needle toward the tibia at a 45° angle in a mediolateral plane, just posterior to the artery (Figure 20).

If paresthesia is induced, aspirate to make sure the needle is not in a vessel, wait for the paresthesia to resolve, and inject. If paresthesia is not elicited, advance the needle at a 45-degree angle until it meets the posterior tibia. Withdraw 1 cm and aspirate. If negative for blood, then inject. Calor and rubor of the foot due to loss of sympathetic tone may initially be noted.

Next, focus on the sural nerve, which is located at the posterior border of the lateral malleolus and the Achilles tendon. Aspirate and raise a wheal. Advance the needle through the skin wheal, angling toward the lateral malleolus (Figure 21).

For the superficial peroneal nerve, aspirate and raise a wheal anterior to the distal lateral malleo-

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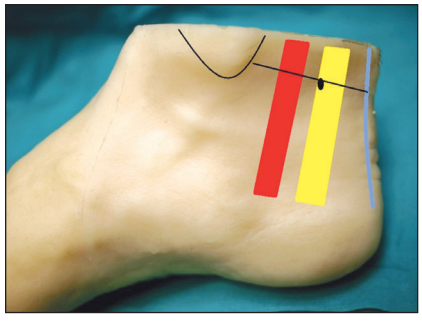

Figure 20: Ankle Block Technique- posterior tibial nerve—Palpate the medial malleolus and advance posteroinferiorly toward the Achilles tendon until the pulsation of the posterior tibial artery is felt. The nerve is just posterior to the artery.

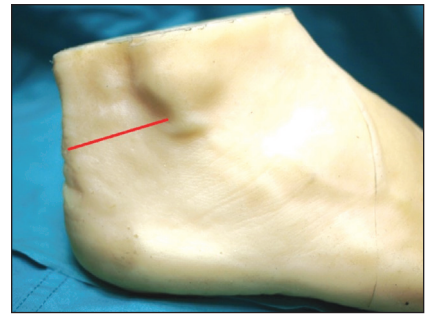

Figure 21: Ankle Block Technique, sural nerve—Locate the posterior border of the lateral malleolus and the Achilles tendon. Advance the needle through the skin wheal, angling toward the lateral malleolus.

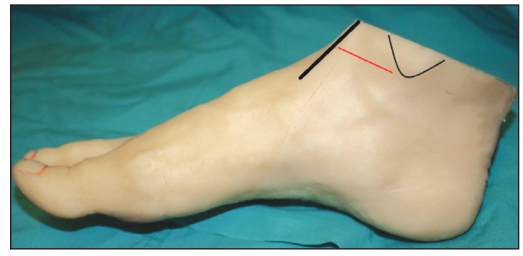

Figure 23: Ankle Block Technique—saphenous nerve. Start medial to anterior. The tibial tendon is at the level of the ankle on the anterosuperior border of the medial malleolus. Proceed in a superficial transverse line towards the medial malleolus, without injecting the tendon itself.

Figure 22: Ankle Block Technique, superficial peroneal nerve. Start anterior to the distal lateral malleolus. Continue in a transverse fashion, medially across the dorsal aspect of the ankle, remembering to stay subcutaneous until the medial malleolus is reached.

Anesthesia (from page 158)

lus. Continue in a transverse fashion, medially across the dorsal aspect of the ankle, remembering to stay subcutaneous until the medial malleolus is reached (Figure 22).

For the saphenous nerve, start medial to the anterior tibial tendon (near the great saphenous vein) at the level of the ankle on the anterosuperior border of the medial malleolus (MM). Aspirate and raise a wheal medial to the anterior tibial tendon and proceed in a superficial transverse line towards the medial malleoli, without injecting the tendon itself (Figure 23).

The deep peroneal nerve lies lateral to the dorsalis pedis artery and medial to the tendon of the extensor digitorum longus. The needle entry site is about ~2 cm distal to the intermalleolar line. Raise a wheal and advance in a perpendicular manner until bone is encountered (usually within 2-3 cm). Withdraw the needle slightly to prevent periosteal injection.

If paresthesia occurs in the first web space, withdraw the needle slightly until the paresthesia disappears. Aspirate and if negative for blood, inject the anesthetic. The needle may be redirected 30° medially and laterally and additional anesthetic injected, but be sure to aspirate with every movement of the needle.

Conclusion

With proper technique, local anesthesia can be obtained with minimal side-effects and maximum comfort to the patient. **PM**

References

Gray's Anatomy, 40th Edition, The Anatomical Basis of Clinical Practice, Expert Consult edited by Susan Standring, PhD, DSc.

BM Ribotsky, KD Berkowitz and JR Montague, Local anesthetics. Is there an advantage to mixing solutions? J Am Podiatr Med Assoc. 1996 Oct;86(10):487-91.

S. Oka, C. Shimamoto, N. Kyoda, and T. Misaki, Comparison of lidocaine with and without bupivacaine for local dental anesthesia. Anesth Prog. 1997 Summer; 44(3): 83-86.

EC Reis, R Holubkov. Vapocoolant Spray Is Equally Effective as EMLA Cream in Reducing Immunization Pain in School-aged Children. PEDIATRICS Vol. 100 No. 6 December 1997, p.5.

de Waard van der Spek FB., et al. J Am Acad Dermatol 1990; 23:685-88.

Ruetsch YA, Böni T, Borgeat A. From cocaine to ropivacaine: the history of local anesthetic drugs. Curr Top Med Chem. 2001 Aug;1(3):175-82.

McGlamry's Comprehensive Textbook of Foot and Ankle Surgery (2-Volume Set) Editors: Alan S. Banks, Michael S. Downey, Dennis E. Martin, Stephen J. Miller Publisher: Lippincott, Williams & Wilkins; 3rd edition (June 15, 2001.

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CME EXAMINATION

SEE ANSWER SHEET ON PAGE 161.

1) Which of the following is true regarding local anesthetics used in combination with epinephrine? They:

- **A) Increase the expiration date.**
- **B) Allow the anesthetic effect to last longer.**
- **C) Cause vasodilation.**
- **D) Should be injected at 1:1 ratio.**

2) The following is considered a long-acting anesthetic:

- **A) Lidocaine**
- **B) Marcaine**
- **C) Prilocaine**
- **D) Procaine**

3) The following is considered a short-acting anesthetic:

- **A) Lidocaine**
- **B) Marcaine**
- **C) Prilocaine**
- **D) Procaine**

4) The Mayo block can be used for which of the following procedures?

- **A) Hallux valgus procedure**
- **B) Keller arthoplasty**
- **C) First MPJ fusion**
- **D) All of the above**

5) All superficial (cutaneous) nerves of the foot should be thought of as which of the following?

- **A) Neuronal networks**
- **B) Single strings of nerves**
- **C) Well-defined**
- **D) Have consistent anatomic positions**

Continued on page 160

6) The posterior tibial nerve is located:
A) posterior to the medial malleolus, anterior to the posterior tibial artery.
B) posterior to the medial malleolus, anterior to the posterior tibial vein.
C) posterior to the medial malleolus, anterior to the posterior tibial tendon.
D) posterior to the medial malleolus, posterior to the posterior tibial artery.

7) Calor and rubor of the foot may initially be noted upon injection of the posterior tibial nerve…
A) due to the loss of sympathetic tone.
B) due to the loss of the Na/K channels in the muscle.
C) due to the loss of calcium channels.
D) due to the loss of serotonin.

8) If EMLA cream is used, remember it needs to be applied under occlusion for at least:
A) 5 minutes.
B) one hour.
C) 4 hours.
D) 8 hours.

9) Which of the following is true regarding procaine?
A) It is metabolized in plasma.
B) Its use is confined with infiltration anesthesia and diagnostic nerve block.
C) It is a short duration local anesthetic.
D) All of the above

10) Which of the following is true regarding bupivacaine?
A) It provides sensory and motor dissociation.
B) It is an ester.
C) It is metabolized in plasma.
D) It has a short duration of action.

SEE ANSWER SHEET ON PAGE 161.

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(Khan)

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2.	A	B	C	D	7.	A	B	C	D
3.	A	B	C	D	8.	A	B	C	D
4.	A	B	C	D	9.	A	B	C	D
5.	A	B	C	D	10.	A	B	C	D

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