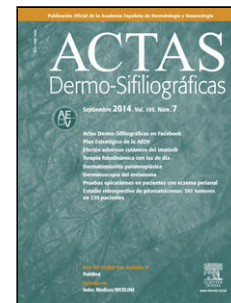


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Videos de cirugía dermatológica

Tratamiento de la hiperhidrosis plantar con toxina botulínica mediante bloqueo de los nervios periféricos al nivel del tobillo

[[Translated article]] Botulinum Toxin Treatment for Plantar Hyperhidrosis Via Peripheral Nerve Blockade at Ankle Level

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Infiltration with botulinum toxin (BT) is considered an effective and widely used technique for treating plantar¹ and palmar^{1,2} hyperhidrosis. Due to the high degree of sensory innervation—which depends on the posterior tibial, superficial peroneal, deep peroneal, saphenous, and sural nerves—pain is the main limiting factor. Therefore, performing a peripheral ankle block is essential, and it may also be used in other procedures, such as in tumor, dermatological, or other surgical conditions.

Description of the technique

Prior to the anesthetic block, antiseptic should be applied at the level of the ankle. For the blockade of the nerves described below, we use 2% lidocaine with a 21G intramuscular needle. Although the anesthetic block of the ankle can be performed under ultrasound guidance³, a thorough knowledge of the anatomy may be sufficient to perform this technique safely and effectively.

The posterior tibial nerve originates from the terminal branches of the sciatic nerve as they pass through the popliteal fossa. It runs deep along the midline of the posterior aspect of the leg, becoming superficial in the posterior region of the medial malleolus. It collects sensory afferents from the heel and the sole, except for 2 small medial and lateral areas^{3,4} (Fig. 1, Fig. 1B). First, the posterior tibial artery is located at the upper end of the medial malleolus. Puncture is performed at the midpoint between the posterior edge of the upper malleolus and the medial border of the Achilles tendon. The injection is administered posterolateral to the artery until it reaches the periosteum (1–3 cm). The needle is withdrawn 4–5 mm, aspirated thoroughly, and 5–10 mL of anesthetic solution is injected⁴ (Fig. 2, Fig. 2D). As this nerve innervates most of the foot plantar surface, blocking this nerve alone may be sufficient for BT infiltration.

The deep peroneal nerve originates from the common peroneal nerve. It emerges at the level of the fibular neck and travels deep to the extensor hallucis longus muscle. At the interosseous membrane, it becomes superficial, where it is lateral to the anterior tibial artery. It collects sensory afferents from the region between the first and second toe, the lateral side of the first toe, and the medial side of the second toe^{3,4} (Fig. 1A). By dorsiflexing the foot, the long extensor tendons of the toes and the great toe can be identified. The injection is administered at the inter-malleolar line, inserting the needle lateral to the dorsal artery of the foot and perpendicular to the skin. Once the bone has been reached, the needle is withdrawn a few millimeters, aspirated, and 5 mL of anesthetic is injected⁴ (Fig. 2B).

The superficial peroneal nerve arises from the bifurcation of the common peroneal nerve, at fibular neck level, and descends along the lateral region of the leg. It provides sensation to the dorsum of the foot and the toes, except for a small area between the first and second toes^{3,4} (Fig. 1A). Starting from the injection point of the deep peroneal nerve, the needle is directed laterally toward the medial part of the lateral malleolus, and 5 mL of anesthetic is injected in a fan shape⁴ (Fig. 2C).

The saphenous nerve originates from the terminal fibers of the femoral nerve. It is situated next to the great saphenous vein up to the medial malleolus. It provides sensation to the medial aspect of the leg, ankle, and heel^{3,4} (Fig. 1C). Starting from the injection point of the deep peroneal nerve, the needle is directed medially toward the upper and anterior area of the medial malleolus, and 3–5 mL of anesthetic is injected⁴ (Fig. 2A).

The sural nerve arises from branches of the tibial and common peroneal nerves in the upper third of the calf. At the ankle, it is located in the posterolateral region, in contact with the small saphenous vein and lateral to the Achilles tendon. It collects sensory afferents from the lateral aspect of the heel, the proximal lateral third of the foot, and the lateral aspect of the fifth toe^{3,4} (Fig. 1D). The injection point is located between the upper end of the lateral malleolus and the Achilles tendon, posterior to the small saphenous vein. The needle is introduced from the outer border of the tendon and 5 mL of local anesthetic is infiltrated subcutaneously up to the posterior aspect of the lateral malleolus⁴ (Fig. 2A). The duration of the anesthetic block depends on the anesthetic used. When using 2% lidocaine, the effect lasts from 45 to 60 minutes. In general, after blocking the sensory afferents, it is advisable to use a cane to support ambulation for 2 to 6 hours after the block, due to the inability to adjust motor strength to sensory feedback⁴.

Technique for botulinum toxin infiltration

The Minor's test can be used to detect the areas most affected by hyperhidrosis. To prepare the BT dilution, for each vial of 100 units of type A BT (Botox, Allergan, Irvine, CA, USA), 5 mL of 0.9% physiological saline is added. Between 100–200 units are injected per sole, depending on the extent and size. The injection is administered at the dermis/subcutaneous junction, using a sterile 30G needle, spacing the points 1–2 cm apart, for a total of 15–50 points (Fig. 3). At each point, 0.1 cm³ (2 units) is injected. The anticholinergic effect begins in 7–10 days and lasts for a maximum of 6–10 months⁵.

The indications, contraindications, and complications of the technique are similar to those for the palmar region².

In summary, infiltration with BT using a peripheral ankle block is a safe and effective procedure, especially when an ultrasound device is not available.

Conflicts of interest

None declared.

Supplementary data

Supplementary data associated with this article can be found in the online version available at doi:10.1016/j.ad.2024.10.072.

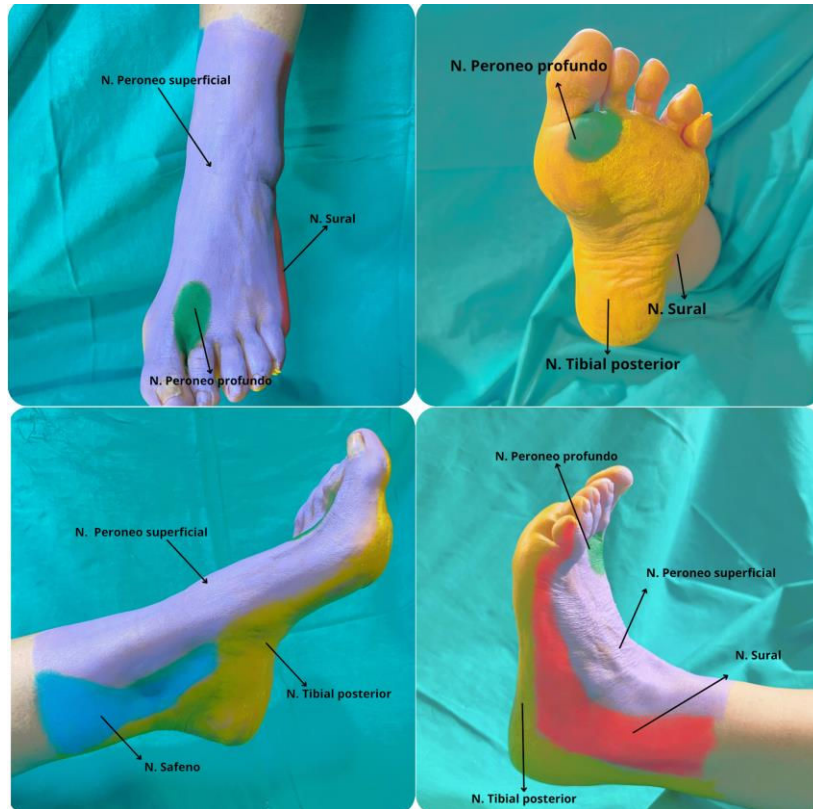


Figure 1. Sensory innervation of the posterior tibial (yellow), deep peroneal (green), superficial peroneal (magenta), saphenous (blue), and sural (red) nerves. **A:** Dorsal aspect of the left foot. **B:** Plantar aspect of the left foot. **C:** Internal lateral aspect of the left foot. **D:** External lateral aspect of the left foot.

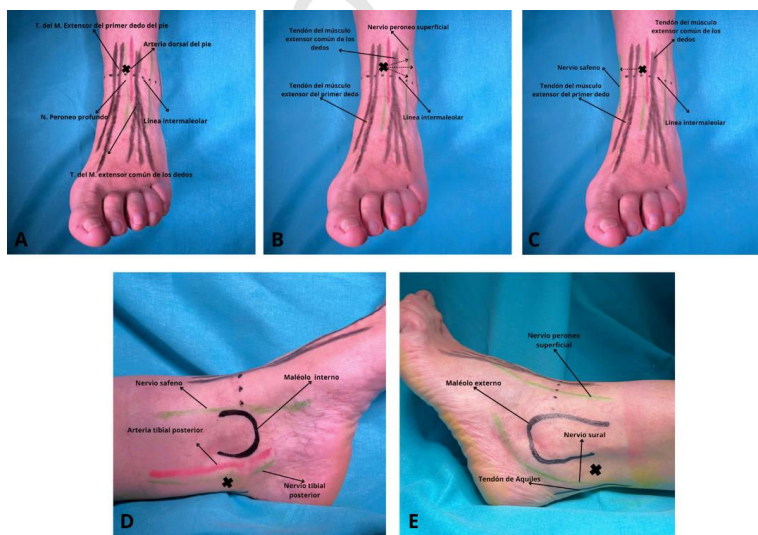


Figure 2. Injection points. **A:** Deep peroneal nerve. **B:** Superficial peroneal nerve. **C:** Saphenous nerve. **D:** Posterior tibial nerve. **E:** Sural nerve.



Figure 3. Diagram of botulinum toxin injection points.

References

<BIBL>

<BIB>

1

S Tsiogka F A.

S Agiasofitou F E.

S Tsimpidakis F A.

S Kontochristopoulos F G.

S Stratigos F A.

S Gregoriou F S.

AT Management of primary plantar hyperhidrosis with botulinum toxin type A: A retrospective case series of 129 patients

JT Australas J Dermatol.

V 65

D 2024

P 49-L 54

DOI 10.1111/ajd.14188

<original_ref>[1] Tsiogka, A., Agiasofitou, E., Tsimpidakis, A., Kontochristopoulos, G., Stratigos, A., Gregoriou, S. Management of primary plantar hyperhidrosis with botulinum toxin type A: A retrospective case series of 129 patients. Australasian Journal of Dermatology, 2024; 65<I>(1)</I>: 49-54.

<DOI>10.1111/ajd.14188.</DOI></original_ref>

</BIB>

<BIB>

2

S De Quintana-Sancho F A.

S Conde Calvo F M.T.

AT Tratamiento de la hiperhidrosis palmar con toxina botulínica mediante bloqueo de los nervios periféricos al nivel de la muñeca

JT Actas Dermosifiliogr.

V 108

D 2017

P 947-L 949

DOI 10.1016/j.ad.2017.05.013

<original_ref>[2] De Quintana-Sancho A, Conde Calvo MT. Tratamiento de la hiperhidrosis palmar con toxina botulínica mediante bloqueo de los nervios periféricos al nivel de la muñeca. Actas Dermosifiliogr. 2017;108:947-949. <DOI>10.1016/j.ad.2017.05.013</DOI>.</original_ref>

</BIB>

<BIB>

3

S Girón-Arango F L.

S Vásquez-Sadder F M.I.

S González-Obregón F M.P.

S Gamero-Fajardo F C.E.

AT Bloqueo de tobillo guiado por ultrasonido: una técnica anestésica atractiva para cirugía de pie

JT Rev Colomb Anesthesiol.

V 43

D 2015

P 283-L 289

DOI 10.1016/j.rca.2015.07.002

<original_ref>[3] Girón-Arango L, Vásquez-Sadder MI, González-Obregón MP, Gamero-Fajardo CE. Bloqueo de tobillo guiado por ultrasonido: una técnica anestésica atractiva para cirugía de pie. Rev Colomb Anesthesiol. 2015;43<I>(4)</I>:283-9. <DOI>10.1016/j.rca.2015.07.002</DOI>.</original_ref>

4

S Suárez Valladares F M.J.

S Espasandín Arias F M.

S Rodríguez Prieto F M.Á.

CT Cirugía de las extremidades

BT Atlas de cirugía dermatológica. 1.^a ed.

PL España

PN El Sevier

D 2023

P 261-L 290

<original_ref>[4] Suárez Valladares MJ, Espasandin Arias M, Rodríguez Prieto MÁ. Cirugía de las extremidades. En: Atlas de cirugía dermatológica. 1 ra ed. España: El Sevier; 2023. 261-290. ISBN 9788413822730.</original_ref>

5

S Grunfeld F A.

S Murray F C.A.

S Solish F N.

AT Botulinum toxin for hyperhidrosis

JT Am J Clin Dermatol.

V 10

D 2009

P 87-L 102

DOI 10.2165/00128071-200910020-00002

<original_ref>[5] Grunfeld A, Murray CA, Solish N. Botulinum toxin for hyperhidrosis. Am J Clin Dermatol. 2009;10:87-102. <DOI>10.2165/00128071-200910020-00002.</DOI></original_ref>

TRADUCCIÓN DE FIGURAS

Figura 1

N. peroneo superficial

N. peroneo profundo

N. Sural

N. tibial posterior

N. safeno

Superficial peroneal nerve

Deep peroneal nerve

Sural nerve

Posterior tibial nerve

Saphenous nerve

Figura 2

T. del M. extensor del primer dedo del pie

Arteria dorsal del pie

N. Peroneo profundo

Línea intermaleolar

T. del M. extensor común de los dedos

Nervio peroneo superficial

Tendón del músculo extensor común de los dedos

Tendón del músculo extensor del primer dedo

Nervio safeno

Nervio sural

Maléolo interno

Maléolo externo

Arteria tibial posterior

Nervio tibial posterior

Tendón de Aquiles

Tendon of the extensor hallucis longus muscle

Dorsalis pedis artery
Deep peroneal nerve
Intermalleolar line
Tendon of the extensor digitorum longus muscle
Superficial peroneal nerve
Tendon of the extensor digitorum longus muscle
Tendon of the extensor hallucis longus muscle
Saphenous nerve
Sural nerve
Medial malleolus
Lateral malleolus
Posterior tibial artery
Posterior tibial nerve
Achilles tendon

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