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Commentary

A deeper understanding of acupoints: Are superficial landmarks enough?

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Acupoints are specific locations that are stimulated when an acupuncture needle is inserted. Acupuncture needles can be inserted at traditional sites, such as acupuncture points based on conventional or empirical knowledge[1]; locations determined by neuroanatomical structures, such as sensory nerves bundles or nerve ending, with or without taking into consideration conventional acupuncture points[2]; or palpable tender sites (e.g., trigger points).[3,4] Conventional acupoints are either located around peripheral nerves directly affected by non-pharmacological neuromodulation[5] or on hyperirritable myofascial trigger points within taut bands of skeletal muscles.[4] The depth of needle insertion plays a crucial role in acupuncture treatment because it determines which neuroanatomical structures are stimulated. The stimulation can influence the local area and the central nervous system, leading to various clinical effects.[6] Considering that the target acupuncture depth is beneath the skin, it is essential to consider the underlying anatomical features when inserting an acupuncture needle. Since each patient has a unique body shape and amount of subcutaneous fat, the depth of the acupoint should vary as well. Further research on this topic is needed.

Although acupoints are not located on the body surface, their location is typically determined by the surface anatomy—rather than underlying anatomical features. For example, the World Health Organization proposed that PC6 is located "on the anterior aspect of the forearm, between the tendons of the palmaris longus and the flexor carpi radialis, 2 B-cun proximal to the palmar wrist crease". However, the needle depth has not been specified.[7] Acupuncture stimulation of the PC6 on the forearm inevitably stimulates the median nerve, effectively controlling pain and high blood pressure.[8,9] While the target depth of the median nerve varies among individuals, particularly at the wrist, it is typically shallow with a mean needle depth of 1.2 cm below the skin surface, making it readily accessible with an acupuncture needle.[5] The appropriate depth of needling depends on the body part where acupoints are located (e.g., hand, abdomen, back, and scalp). Therefore, each acupoint within the same channel has a unique target depth.[10] As a result, it is essential to consider the depth of needling when locating the acupoints.

The appropriate depth of insertion of acupuncture needles is based on three-dimensional anatomical features of acupoints. For instance, stimulation at ST36, which might be associated with the deep peroneal nerve, requires needle insertion to 2.6–3.3 cm below the surface.[2] LI4 overlies the superficial branches of the radial nerve,[11] and its acupuncture can inadvertently puncture the radial metacarpal artery, present along the palmar aspect of the second metacarpal bone.[12] To prevent unnecessary deep insertions or adverse effects, it is crucial to ensure that acupuncture is administered at the appropriate depth and insertion angle.

The integration of traditional medicine with science and technology, particularly magnetic resonance imaging, computed tomography, and ultrasound guidance, is useful for identifying the target depth for needling, thereby contributing to the safety of acupuncture.[13-16] Even ultrasonography guided trigger point injection resulted in cardiac tamponade.[17] Therefore, while using ultrasound guidance for acupuncture, practitioners should still use caution. Among these modalities, ultrasound offers several advantages such as ease of measurement and the ability to visualize deep structures from various angles in individuals, in different positions.[18] As a result, it has been used to verify the insertion depth for the major acupoints.[19,20] Furthermore, it can also be used to assess the anatomical characteristics beneath acupoints located in the abdomen.[21] The use of ultrasound guidance to confirm the target depth might enhance the safety of needling at high-risk acupoints.[19]

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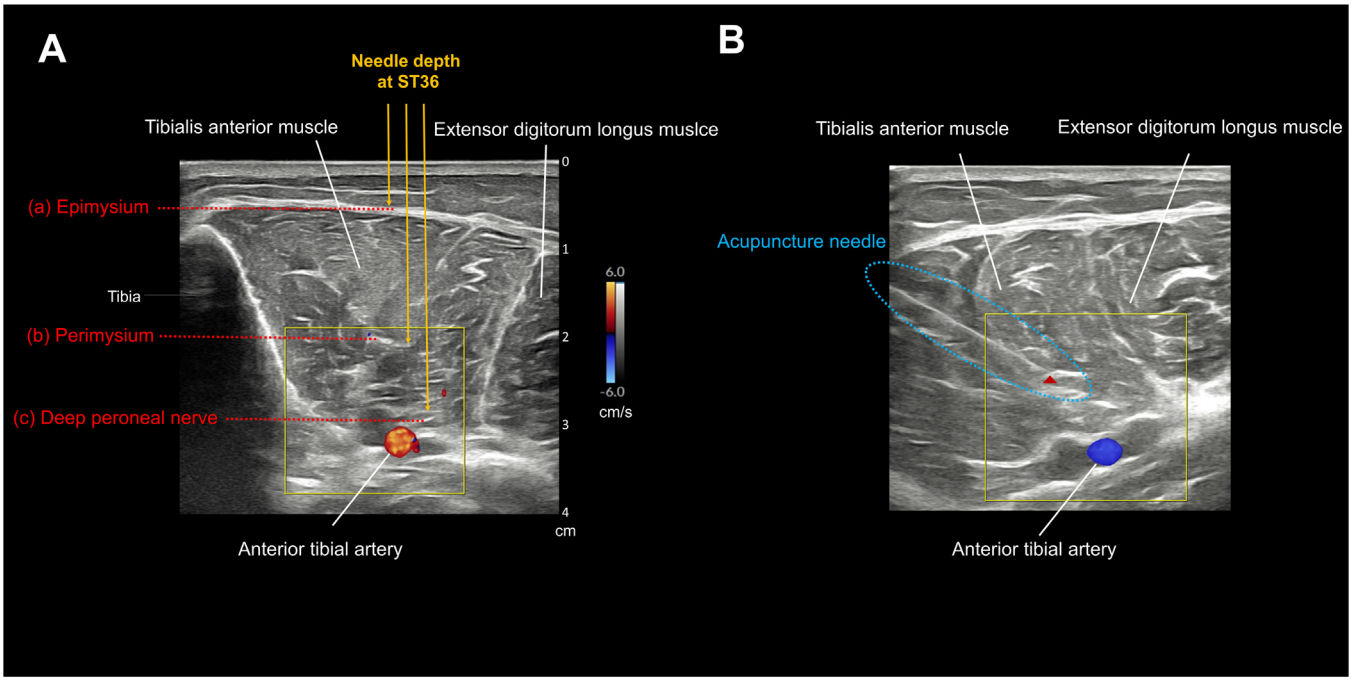

Fig. 1. Representative ultrasound-guided acupuncture. A: Anatomical structures beneath acupoint ST36. Ultrasonography was used to visualize the structures located at the targeted depth beneath acupoint ST36: (a) epimysium and (b) perimysium of the tibialis anterior muscle; and (c) deep peroneal nerve (marked with red lines). B: Ultrasound-guided acupuncture. The acupuncture needle tip can be tracked using ultrasonography (blue dotted eclipse and red arrow).

Meanwhile, the issue with ultrasonography-guided needling is that the ultrasonography probe is held by the practitioner's hand, which prevents them from feeling the anatomical structures of the patient. More practice is required for practitioners.

Ultrasound-guided acupuncture has been used to target myofascial trigger points in the thoracic region, observing precise needle placement and preventing unintentional pleural perforation.[22] The GB21 acupoint depth has also been confirmed using ultrasound.[23] Tissue depth and needle rotation, on ultrasound, are strongly associated with the acupuncture sensation.[24] Moreover, during acupuncture classes, the use of ultrasound is associated with improvements in operation time, safety, and measurement accuracy.[25] The optimal needling depth should be tailored for each patient based on sex, body mass index, and posture.[18] Therefore, the use of ultrasonography to determine needling depth might enhance the therapeutic effects of acupuncture (Fig. 1). Further study should be conducted.

In conclusion, the anatomical aspects of acupoints should be considered when inserting acupuncture needles. Ultrasonography can visualize the anatomical structures located beneath the skin to facilitate safe and effective needling.

Authors' contribution

Conceptualization: ISL and YC. Writing - Original Draft: ISL, SL, and YC. Writing - Review and Editing: ISL, SL, HM, DEY, and YC. All authors read and approved the final manuscript.

Declaration of competing interest

The authors declare that they have no competing interests.

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Ethical statement

Not applicable.

Data availability

The authors can provide upon reasonable request.

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