Ultrasound Image Quality and its Importance in Clinical Practice

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Introduction

Since the first description of ultrasound utilization for nerve block in regional anesthesia in 1994, improvements in portability, cost, and acceptance have all steadily occurred.1 End-user familiarity with the imaging modality has also increased as it has become ingrained, to varying degrees, in many training programs across the world. At the same time, significant gains in ultrasound technology have led to vast improvements in image resolution, an overall increase in potential scanning depths, and dramatically enhanced needle visibility. As a result of all these advancements, the use of ultrasound in regional anesthesia has increased significantly since its inception.1

Implications/Importance

The importance of image quality in regional anesthesia cannot be understated. The ability to differentiate neural structures from fascial components, tendons, and other echogenic structures is highly important for block success, as misidentification can lead to improper local anesthetic deposition. In addition, appropriately identifying nerves, vascular structures, organs, and relevant anatomic structures, such as the pleura or peritoneum, is critical in avoiding the unintended complications that can occur when these structures are inadvertently contacted by the needle. Equally important is consistent and accurate needle tip visualization throughout procedures, even when steep needle angles are required.

Konica Minolta Healthcare's ultrasound machines produce exceptionally high-quality images. One reason for this is the numerous engineering advancements that have been incorporated into their ultrasound systems, including proprietary processing algorithms and unique technological features, such as Dual Sonic and Triad Tissue Harmonic Imaging (T2HI). The result is outstanding tissue differentiation, high contrast resolution , and improved penetration for visualization of deep structures.

Similarly, these systems excel at needle visualization. Proprietary software, such as Simple Needle Visualization (SNV®), helps improve needle tip and shaft visualization during both in-plane or out-of-plane approaches and is especially helpful during blocks that require a steep needle angle.

Advancements in ultrasound probe technology also warrant mentioning. In clinical practice, a single probe that performs equally well when imaging both superficial and deep structures means it can be utilized to perform the majority of blocks, thus improving efficiency and potentially reducing costs.

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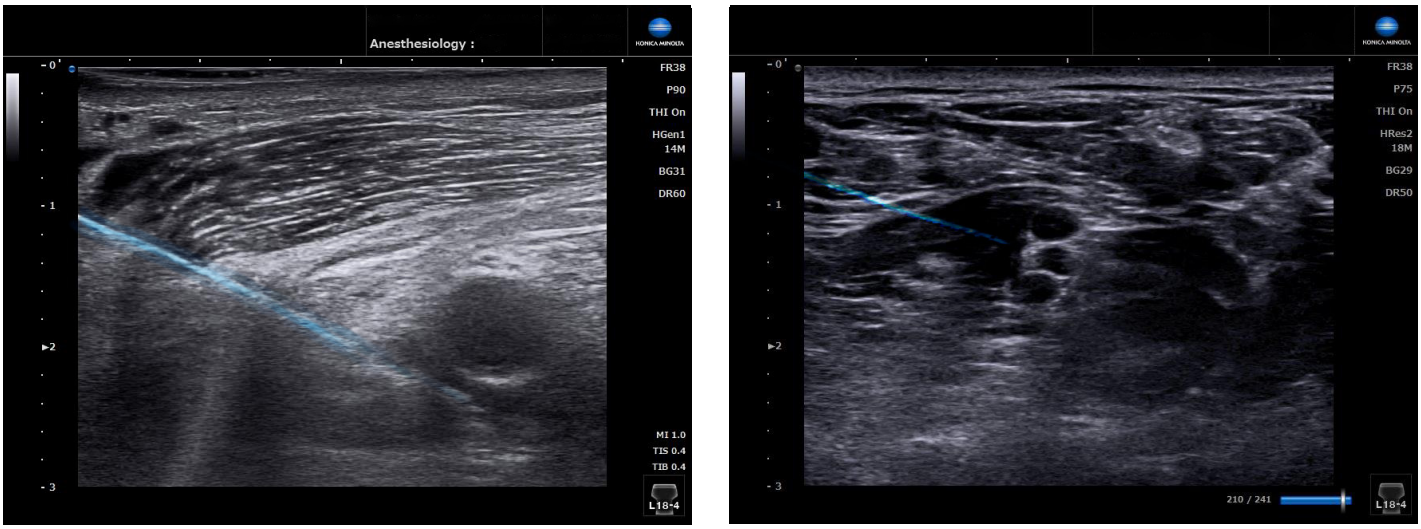

Konica Minolta Ultrasound SONIMAGE HS2 (Probe: L 18-4) . Note the enhanced visualization of the needle (blue) with SNV.

Konica Minolta's broad frequency L18-4 linear transducer does just that. In clinical practice it produces images with exceptional clarity and resolution when targeting superficial structures given its high frequency capabilities, while also allowing for visualization at greater depths given its low frequency potential.

Although many clinicians likely aren't aware of the underlying engineering advancements that have led to the vast improvements in ultrasound technology, they absolutely recognize and appreciate ultrasound systems that consistently produce high-quality images with detailed resolution, allow for easy scanning of deep targets, and provide consistent needle visualization throughout even the toughest procedures.

While ease of use and functionality are also important features, image quality and needle visualization are often the main reasons why many clinicians choose a particular ultrasound machine. It is also one of the main reasons that Konica Minolta's ultrasound systems have become invaluable clinical tools for many clinicians who routinely perform regional anesthesia.

Personal Use and Impact

Because the Konica Minolta`s SONIMAGE® HS2 and SONIMAGE® MX1 Platinum Portable Ultrasound Systems allow for reliable visualization of deep, often subtle, anatomic structures that aren't always easily identified with other conventional ultrasound systems, I use it routinely when performing lumbar plexus, quadratus lumborum, pericapsular nerve group block (PENG), and paravertebral blocks. Additionally, given the superior image quality , my colleagues and I commonly utilize these systems for more superficial procedures, such as interscalene, supraclavicular, adductor canal, and TAP blocks, where accurate visualization of neural structures and/or fascial planes are critically important for both safety and block success.

Personally, the Konica Minolta`s ultrasound systems have been of tremendous benefit to my clinical practice. The quality of the images and the ability to reliably visualize the block needle throughout procedures has contributed to clinical efficiency, patient satisfaction, and a reduced rate of complications, such as vascular punctures.

Reference

1. Marhofer P, Harrop-Griffiths W, Kettner SC, Kirchmair L. Fifteen years of ultrasound guidance in regional anaesthesia: part 1. Br J Anaesths. 2010 May;104(5):538-46.

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