Images in Anesthesiology: Shear Wave Elastography

Novel Technology for Ultrasound-guided Regional Anesthesia

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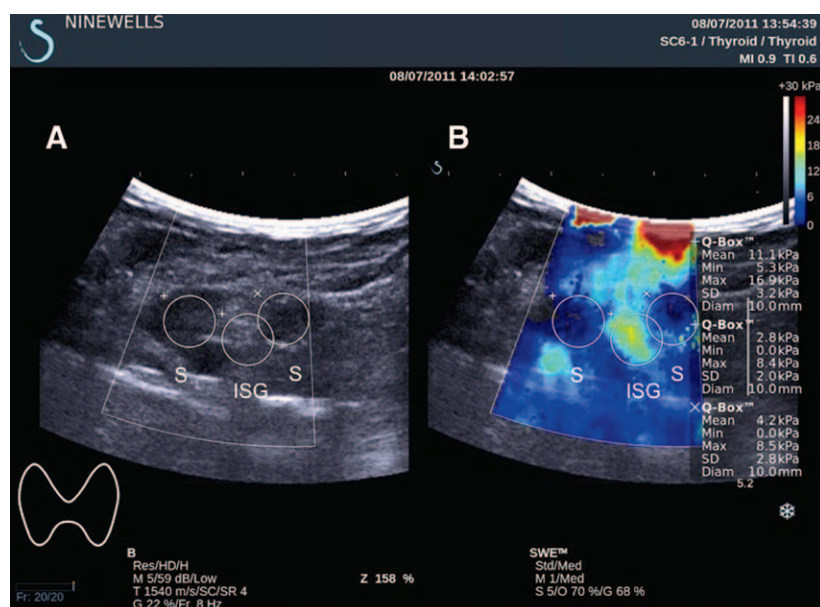
DESPITE the introduction of B-mode ultrasound into regional anesthesia, no evidence suggests any reduction in the incidence of unintentional intraneural injection.[1] B-Mode ultrasound has several limitations: structures with similar scattering characteristics are difficult to differentiate; image quality is inconsistent among patients and deteriorates with age; and block needle tips are difficult to see. There is a need to quantify and characterize tissue properties and, in doing so, differentiate between intraneural and extraneural anatomy to make regional anesthesia safer.[2] One property of human tissue is elasticity—the ability of tissue, once stretched, to revert back to its original shape. Elasticity is characterized as Young elastic modulus (E), the ratio of stress to strain. Shear wave elastography is an ultrasound-based modality that is being investigated as a tool for the noninvasive diagnosis of breast cancer.[3] Young modulus is displayed as a color map superimposed on a B-mode image and quantified within regions of interest.

We wish to demonstrate for the first time (fig.) the utility of shear wave elastography in differentiating between normal anatomical structures for regional anesthesia. A volunteer was scanned using B-mode and shear wave elastography (Supersonic Imagine, Aix-en-Provence, France). The B-mode image (fig. A) shows a distinct interscalene groove with hypoechoic scalene muscles (S). The shear wave image (fig. B) shows a yellow band within the interscalene groove and Young modulus of 11.1 kPa, indicating stiffer neural tissue, compared with the blue/black scalene muscles (2.8–4.2 kPa). In conclusion, different tissues can be identified by measurement of their elastic properties.

References

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