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Can Ultrasound Impact the Risk–Benefit Ratio for Nerve Blocks?

To the Editor:—Dr. Hebl's editorial[1] is thought provoking. The real potential of ultrasound lies in the opportunity to approach nerve blocks in entirely new ways. Regional anesthesia for hand surgery provides an example. Many anesthesiologists consider it axiomatic that one should avoid performing nerve blocks close to the tourniquet. This is partially defensive because "when the site of the block is close to the tourniquet, electromyographic and conduction nerve studies cannot allow such differentiation and by default, the anesthesiologist is usually blamed."[2] Despite this caveat, the most commonly used regional technique for hand surgery with an upper arm tourniquet is the axillary block. If one subscribes to the theory that serious nerve damage from axillary block is often the result of vascular trauma and a medial brachial fascial compartment syndrome,[3] rather than direct needle–nerve trauma, it is even more imperative to avoid axillary block with an upper arm tourniquet.

Ultrasound should permit the near total abandonment of the axillary block. With ultrasound, peripheral nerve blocks in the mid forearm become straightforward.[4,5] These blocks should replace the axillary block for minor hand surgery (*e.g.*, carpal tunnel, digit fractures).[6] Before ultrasound, many anesthesiologists avoided supraclavicular and infraclavicular blocks for fear of pneumothorax. With ultrasound, the lung and major vessels are directly visualized, so the proceduralist avoids them as a matter of course. For major hand, wrist, and elbow surgery, ultrasound-guided supraclavicular or infraclavicular blocks should be the first choice whenever an upper arm tourniquet is used.

The gist of Hebl's editorial and Koff *et al.*'s case report[7] seems to be that this patient had an unfavorable risk–benefit ratio due to preexisting neurologic disease. But, where was the benefit in the first place? For total shoulder replacement, the requirement for significant pain control will far outlast any single-shot nerve block. The "tip-of-the iceberg" reports of permanent diaphragmatic paralysis[8] after uneventful interscalene blocks offer another reason to demure the use of single-shot interscalene blocks for shoulder surgery. Ultrasound may allow more use of suprascapular blocks, either single shot or continuous.[9] The ultrasound-guided suprascapular block may not be quite as effective, but it avoids the interscalene's dreaded complications. For major shoulder surgery without evidence of preexisting brachial plexopathy, continuous brachial plexus blocks are still encouraged. The risk of a continuous block can be justified to the patient because it provides prolonged analgesia matched to the requirements of major surgery.

Ultrasound allows the abandonment of some, but not all, traditional practices associated with nerve blocks. Many ultrasonographers no longer aspirate before injection, because ultrasound is a far more sensitive detector of intravascular injection than any aspiration test. The same cannot be said for potential intrafascicular injection. As Dr. Hebl notes, the precise position of the tip and the nerve is not always apparent until one has injected 2–3 ml of local anesthetic. In the unlikely situation where one has actually placed the needle tip into a nerve fascicle, the damage may already be done before anything shows up on ultrasound. Therefore, ultrasound may not obviate the need for injection pressure monitoring during nerve blocks. Injection pressure can be monitored with an inexpensive proprietary device (BSmart; Concert Medical, Norwell, MA) or by assessing the compression of an air bubble above the local anesthetic in the syringe.[10]

Only when we thoroughly rethink our approach to surgical nerve blocks will ultrasound fulfill its potential for improved safety.

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