

Ultrasound *versus* Fluoroscopy in Image-guided Pain Treatment

Use Caution

THE use of ultrasound to guide placement of peripheral nerve blocks has dramatically changed the practice of regional anesthesia, but the use of this imaging modality to facilitate interventional pain treatment has been slow to be embraced. There are many reasons for the slow penetration of the use of ultrasound in to the pain clinic, but foremost among them are the widespread availability and well-established role of fluoroscopy in performing image-guided pain treatment and the difficulties in performing most neuraxial techniques using ultrasound. Nonetheless, the superiority of ultrasound guidance has become apparent for some common pain treatments, the clearest example being stellate ganglion block. When stellate ganglion block is performed using the classic paratracheal technique, the anterior tubercle of the transverse process of C6 (Chassaignac tubercle) is palpated and a needle is seated against this bony prominence. The carotid artery must be retracted laterally, and the vertebral artery lies in close proximity, thus intravascular injection is a very real concern. Use of fluoroscopy is an improvement, but described techniques¹ do not reliably keep the needle from traversing critical structures such as the thyroid gland and the carotid artery. With the use of ultrasound, the great vessels of the neck and the thyroid gland can be directly visualized, and a needle trajectory that avoids these structures can be selected from the start.² Any practitioner who has made the transition from blind or fluoroscopically guided stellate ganglion block to ultrasound guidance will attest that the technique has been tremendously simplified and the safety of the technique made more certain. In this issue of ANESTHESIOLOGY, Siegenthaler *et al.*³ extend our understanding of the usefulness of ultrasound guidance for treatment of chronic pain by rigorously testing the accuracy of ultrasound-guided diagnostic



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C6. The rate of success at the C7 level was markedly less (41%), and the investigators described the difficulties in clearly visualizing the landmarks at this level. On face value, this new study appears to demonstrate the usefulness of ultrasound for cervical zygapophysial joint medial branch nerve blocks. But we must use caution in extrapolating the results of this study to patients with facet-related pain who present for diagnostic medial branch blocks. Indeed, painful facet arthropathy is often accompanied by formation of large, bony osteophytes that distort the usual anatomy.

Previously Eichenberger *et al.*⁴ demonstrated that ultrasound-guided block of the third occipital nerve had similar accuracy (82%) to that using fluoroscopy in 14 healthy volunteers. A more recent study compared cervical medial branch blocks using ultrasound with fluoroscopy in 50 patients.⁵ Radiographic contrast was injected with the aid of ultrasound and the final position of the contrast was then documented using fluoroscopy. The injectate was at the appropriate level in 94.5% of cases and no complications were

medial branch nerve blocks of the cervical facets. We urge caution to practitioners eager to begin using ultrasound guidance immediately to perform cervical facet blocks in clinical practice.

Extending data derived from healthy volunteers to patients with the often complex anatomy of advanced spondylosis associated with facet-related pain must be done with caution. In the current study, Siegenthaler *et al.*³ placed healthy, thin volunteers in the lateral position and, with the aid of ultrasound guidance, seated needles on the bony target corresponding to the position of the medial branch nerve to the cervical zygapophysial joints. They then injected radiographic contrast and confirmed the position of the injectate using fluoroscopy. Their results demonstrated high accuracy (88–94%) for cervical levels between C2 and

Image: J. P. Rathmell.

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reported. However, the authors miscounted (with ultrasound) the vertebral level in two patients, a mistake that is entirely avoidable with fluoroscopic guidance. Avoidable errors such as these that stem from the use of ultrasound can lead to false-negative results based on misplacement of the local anesthetic agent, potentially depriving some patients from effective pain treatment. Similarly, ultrasound-guided lumbar medial branch blocks have been described and initially performed in cadavers⁶ and then in humans, demonstrating high accuracy. However, when ultrasound-guided lumbar medial branch blocks were performed and compared with fluoroscopy in obese patients the success rates were low,⁷ demonstrating that in real clinical situations the utility of ultrasound may be limited. During cervical medial branch blocks, vascular uptake is common, with reported incidences ranging from 3.9 to 7.0%⁸ and can lead to catastrophic complications. It is unclear if ultrasound is sensitive enough to detect needle penetration in these small vessels; thus, detection of vascular uptake may be problematic. Finally, most of the clinical studies published in ultrasound-guided interventional chronic pain are carried out by experienced sonographers, and how rapidly new practitioners can gain proficiency is unclear.

Ultrasound has proven invaluable as a diagnostic modality and has shown great promise in improving the reliability of peripheral nerve blocks. There are early hints by active researchers that suggest that ultrasound will gain a prominent role in image-guided pain treatment,⁹ and the authors of this new study should be commended in taking the first step toward defining a new application by rigorously testing their technique in healthy volunteers. Understanding the safety and effectiveness of performing cervical zygapophysial joint medial branch nerve blocks with ultrasound compared with fluoroscopy is clearly in need of well-controlled studies, before the method is adopted into routine clinical practice.

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