

# Ultrasound: Is there a place for it in pediatric anesthesia?

## NOT NECESSARILY

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Ultrasound use in regional anesthesia has become the poster child of what most would consider "cutting edge anesthesia." The first reported case, however, was performed by La Grange in 1978 (albeit with Doppler ultrasound). While I must admit I am very much a proponent of its use in regional anesthesia (as my colleagues can attest), I have been asked to describe the disadvantages of using ultrasound for this indication. I believe that these disadvantages can be broken into three broad groups: the learner, the equipment, and outcomes data.

There is no standardized teaching program in place. While there are a multitude of workshops, CME programs, and PBLD's available for interested learners, the best method(s) for instituting and teaching this technique remain unknown. Firstly, our operating rooms are leanly staffed so that it is difficult for the beginner to get the hands-on mentoring needed to acquire ultrasound skills. A learning curve definitely exists. Positioning the probe and interpreting the ultrasound scans are learned skills. Because of this, inexperienced ultrasonographers inevitably take more time to perform a peripheral nerve block, our surgical colleagues bemoan the performance of the blocks and/or find reasons why such blocks are inappropriate for a given patient. I believe that this surgical pushback has the potential to drive surgeons away from our learning institutions or to erode the social capital between surgeons and anesthesiologists in the operating room.

Equipment is also an issue. The cost of the equipment associated with implementing this method can be prohibitive and there are definite limitations to its use. Image degradation occurs with increasing depth of penetration, making ultrasound-guided blocks more challenging for deep blocks or for performing blocks in obese patients. Tracking the needle in the out of plane approach is also difficult, such that the needle position must usually be inferred by local tissue movement and local anesthetic spread. Other equipment limitations relate to ultrasound's inability to penetrate bone, making neuraxial imaging particularly difficult. Acoustic artifacts, invariably present to some degree, may make interpretation more difficult for novices, and may result in inappropriate injection of local anesthesia. Nerves, too, may differ in appearance based on their size and surrounding structures, as well as the angle of the ultrasound beam.

The largest conundrum in advocating ultrasound's use in regional anesthesia is the current lack of data regarding its benefits.

Marhofer et al recently reported in *Anesthesia and Analgesia* that few studies have demonstrated overall improved block success rate using ultrasound guidance. The argument for ultrasound in rendering less pain by avoiding muscle contraction is rendered moot in pediatric anesthesia since the overwhelming majority of blocks placed in children are performed under general anesthesia (up to 89% per Giaufre et al).<sup>(2)</sup> Given the low complication rate of peripheral nerve blocks in children reported by Auroy, it is important to realize that the safety profile has not been demonstrated to be better with ultrasound guidance.<sup>(1)</sup> The French Language Society of Pediatric Anesthesiologists' (ADARPEF) multi-institutional, prospective study on outcomes of pediatric anesthesia, similarly reported a remarkably low rate of complications. There are a growing number of case reports reporting nerve injury and vascular puncture, even with ultrasound guidance; these reports likely represent just the tip of the iceberg, since many practitioners are reluctant to report their complications.<sup>(3, 4)</sup>

Even with the limitations stated above, I remain a firm believer in the utility of ultrasound guidance in the practice of anesthesia. Ultrasound equipment continues to evolve with improved resolution and portability. Manufacturers are ensuring a supply of echogenic needles. Workshops covering ultrasound guidance remain ever popular. As more of us become comfortable with its use, I feel the use of ultrasound in regional anesthesia will be as commonplace as the incorporation of TEE in cardiac anesthesia.

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4. Bigeleisen PE. Nerve puncture and apparent intraneural injection during ultrasound guided axillary block does not invariably result in neurological injury. *Anesthesiology* 2006;105:779-83
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