Bringing Ultrasound-guided Regional Anesthesia to Emergency Medicine

Andrew A. Herring, MD

Emergency physicians are expected to expertly treat an incredible variety of pain every day. Increasingly, emergency physicians are additionally tasked with successfully treating pain while also limiting the overuse of opioids. For many conditions there are pharmacologic alternatives to opioids that work quite well. However, for many very painful conditions and procedures, such as long bone fractures, the most effective way to treat pain while reducing utilization of opioid medications is to use a peripheral nerve block.[1] Ultrasound guidance has made these procedures easier to perform, safer, and more reliable. As a result, there is an evolving renaissance throughout medicine in ultrasound-guided regional anesthesia (UGRA).[2] However, despite its well-recognized benefits, relatively few emergency departments (EDs) have fully embraced UGRA in their daily practice.

In this issue of *AEM Education and Training*, there is an important study with valuable insights into why certain centers have been more successful than others at bringing UGRA to their emergency clinical practice and residency education programs. Wilson et al.[3] surveyed emergency ultrasound directors and emergency medicine residency program directors in the United States, receiving responses from 138 programs from across the country, representing a wide variety of university-based and community-based emergency medicine programs. Importantly, they found that 93% of emergency ultrasound program leaders believed that UGRA is an important skill for residents to acquire. Thus, clearly this once fairly esoteric procedure, first described in the ED by Liebmann et al. in 2009,[4] has evolved into what most leaders in emergency medical education believe is a core skill competency. This finding is supported the numerous articles describing the various applications of UGRA in emergency practice. The ever-growing literature includes some applications not previously described, such as the use of a superficial cervical plexus block for clavicle fracture analgesia.[5]

Emergency physicians are avid early adopters of new technologies that assist them to meet the challenges of emergency practice. We need to look no further than our early and enthusiastic embrace of point-of-care ultrasound and free open-access medical education (FOAMed) as examples. However, Wilson et al.[3] found that despite the clear recognition that UGRA is an important skill, nearly 30% of programs offer no training in UGRA to their residents or fellows. Among osteopathic programs only 50% offer training in UGRA. Their survey did not provide specific details on the extent and breadth of UGRA training and we can safely assume that there is also likely a large variance in the degree to which programs teach ultrasound-guided anesthesia beyond the basic entry-level blocks.[6] While the 91% of programs with ultrasound fellowships reported teaching UGRA, the number of programs where residents and fellows feel comfortable independently performing more advanced procedures, such as ultrasound-guided brachial plexus blocks, is likely much lower.

If the interest high and clinical consensus for the benefits of UGRA is clear, what is holding back the development of UGRA in emergency medicine resident

From the [1]Department of Emergency Medicine, Highland Hospital—Alameda Health System, Oakland, CA; and the [2]Department of Emergency Medicine, University of California, San Francisco, CA.
Received January 20, 2017; accepted January 31, 2017.
The author has no relevant financial information or potential conflicts to disclose.
Supervising Editor: Susan B. Promes, MD.
Address for correspondence and reprints: Andrew A Herring, MD; e-mail: aherring@alamedahealthsystem.org.
AEM EDUCATION AND TRAINING 2017;1:165–168.

doi: 10.1002/aet2.10027

education? The authors propose that the single most significant barrier to incorporating UGRA into the educational curriculum is lack of training on the part of ED attending physicians. Only 45% of the ED ultrasound directors surveyed reported feeling satisfied with their current level of knowledge. Given this finding among the vanguard of ultrasound in emergency medicine, it is likely safe to say that most nonultrasound emergency medicine faculty members do not feel comfortable with their knowledge of UGRA.

Why do faculty have such a low level of satisfaction with their UGRA knowledge? Lack of formal training may be the likely answer. Wilson et al.[3] found that only 43% of the surveyed faculty have received formal training themselves and the cite the work of Amini et al.[6] that found that only 7% of EDs had credentialing pathways in place for UGRA. UGRA is a complex skill that requires formal training followed by dedicated on-the-job practice to master. It certainly follows that if you do not know how to do something yourself, it is not reasonable to attempt to teach someone else how to do it.

The authors astutely point out a second explanation for the slow adoption of UGRA—interdepartmental politics and lack of interdisciplinary collaboration. Importantly, less than one-third of the surveyed programs had any type of interdepartmental collaboration around UGRA. The few programs that did report multidisciplinary collaborations are working with anesthesia, orthopedic surgery, and trauma surgery. The authors data suggest that relatively few (20%) emergency ultrasound directors have reached out to develop relationships with their anesthesia departments. The scope of their data does not allow us to learn more about why interdepartmental collaborations have failed to develop at most programs or understand what specific obstacles or contentious issues have arisen.

The work of Wilson et al.[3] has important implications for the development of UGRA education and the larger issue of incorporating UGRA into emergency medicine practice.

ESTABLISHED FACULTY NEED TO COMMIT TO LEARNING UGRA

Emergency medicine cannot solely rely on new graduates to bring UGRA into our practice. William Osler (1849–1919) wrote that "[Medical education] is a life course, for which the work of a few years under teachers is but a preparation." The axiom that a career in medicine is a career of lifelong learning is nowhere more true than in regards to UGRA. It may be heartening to some midcareer emergency physicians intimidated by the prospect of acquiring a new skill that most anesthesiologists did not learn UGRA during their residency training. In fact, in 2000 the ACGME reported that 40% of graduating anesthesiologists had not performed the 40 peripheral nerve blocks suggested by the anesthesia residency review committee as a requirement for graduation. As a result, the majority of anesthesiologists are in the same situation as most emergency medicine faculty—trying to figure out how to incorporate a complex new set of skills while on the job. Thankfully, a quick Web search will reveal that there are a multitude of excellent training courses available to emergency physicians, within both emergency medicine and anesthesia. UGRA is sufficiently complex that a "see one, do one, teach one" approach to learning often does not lead to the degree of confidence and competency that is needed to successfully integrate UGRA into an educational program or a busy ED practice.[7]

IF YOU BUILD IT, THEY WILL COME

Emergency physicians are incredibly resourceful and treating all sorts of pain under at times challenging circumstances. From the perspective of an experienced emergency physician, new skills such as UGRA can, at first glance, appear unnecessary. Schöll et al.[8] report a fascinating and instructive experience at a single ED, with 50,000 annual visits, where three of the primary faculty became trained in UGRA. In the first few months after receiving a training, they performed relatively few blocks (less than five per month). One year later, they were performing nearly 30 per month. In addition, the breadth of the blocks expanded from simple entry level blocks (forearm blocks) to more technically advanced blocks such as thoracic paravertebral blocks and supraclavicular brachial plexus blocks. Their report is consistent with the experience of many emergency physicians who find that once they have acquired an intermediate level of competency with UGRA, its myriad applications become more and more apparent in daily practice. Additionally, a small investment in developing a regional anesthesia cart, that is conveniently stocked with the necessary supplies and reference materials, can make daily use of regional anesthesia much more efficient. Thankfully, investment in UGRA materials such as regional block needles is quite inexpensive.

WE URGENTLY NEED EMERGENCY PHYSICIANS TO SPECIALIZE IN PAIN MANAGEMENT (ULTRASOUND-GUIDED "BLOCK JOCKS" ARE NOT NEEDED)

Wilson et al.[3] report that most emergency ultrasound departments have no interdisciplinary collaborations around UGRA. The foundations of any multidisciplinary collaboration begin with a common language. For the most part, that common language is not the language of ultrasound technique, but is the language of multimodal pain management. Emergency physicians are naturally positioned to take a leadership role in developing systemwide collaborative approaches to pain management. The American College of Emergency Physicians recently founded a pain management section to promote the subspecialty of pain management within emergency medicine and the American Board of Pain Medicine has opened fellowship eligibility to emergency physicians. UGRA is best thought of as a component of multimodal analgesia versus a stand-alone ultrasound technique.

Through collaborative multidisciplinary discussions on pain management the need to develop ED capacity to perform UGRA often becomes an obvious systemwide goal. Even the most ED skeptical consultant cannot deny the clear patient benefits of early aggressive multimodal analgesia that incorporates regional anesthesia. By setting the focus on patient care versus potentially conflicting procedural privilege delineations many potential interdepartmental conflicts can be easily diffused.

The practical reality is that bringing the benefits of multimodal UGRA analgesia to patients in a timely manner necessitates early implementation in the ED and prehospital settings. Most anesthesia departments do not have the motivation or capacity to cover the ED at all hours. Collaboration with emergency physicians, it is a promising system strategy to improve the patient experience, improve pain management, and improve outcomes.[9] The American Academy of Pain Medicine recently endorsed the important role of emergency physicians in system of care for acute pain.

Additionally, beyond acute injury, ultrasound-guided injections for chronic pain have many potential applications in the ED, such as the suprascapular nerve block for frozen shoulder syndrome.[10] The development of manual dexterity with ultrasound guidance is not typically procedure specific—skill derived from experience performing any ultrasound-guided needling procedure is additive toward a developing general competency with UGRA. This means that integrating new regional anesthesia procedures can occur quite quickly once a base level of competency with ultrasound guided needling has been obtained. Having a breadth of ultrasound-guided procedures and clinical applications makes daily skill practice more feasible in the unpredictable and diverse ED environment.[7]

DOOR-TO-BLOCK TIME: BUILD MULTIDISCIPLINARY COLLABORATIONS AROUND SPECIFIC PAINFUL CONDITIONS

Wilson et al.[3] suggest a possible role for certification in UGRA. While the American Society of Regional Anesthesia does offer a pathway toward formal certification in UGRA, the vast majority of practicing regional anesthesiologists have no such certification and such certifications do not exist for other ultrasound-guided procedures such as vascular access or arthrocentesis. The workload burden involved to develop and maintain specific credentialing processes for UGRA may outweigh the benefits in most hospitals.

A better strategy may be to promote mutual trust and partnership with collaborating orthopedic and anesthesia departments through the development of pain management protocols for specific conditions that integrate ED UGRA.[11,12] Morrison et al.[13] describe a three-hospital collaboration in New York City where elderly patients with hip fracture receive a single-shot femoral nerve block placed by an emergency physician, which was then followed by placement of a continuous femoral nerve block catheter placed by anesthesia. At Highland Hospital–Alameda Health System, a "door-to-block time" initiative was developed in collaboration with trauma surgery, orthopedics, and emergency medicine to reduce delays to the early initiation of multimodal analgesia for hip fracture patients that includes a goal of ED femoral nerve block placement within 15 minutes of patient arrival.[12]

ULTRASOUND-GUIDED REGIONAL IN ANESTHESIA: IT IS NOT JUST FOR PHYSICIANS

Increasingly, advanced practice providers such as physicians' assistants and nurse practitioners play an important role in providing care. Many of the patients who can potentially benefit from UGRA such as patients with acute fractures, abscesses in need of incision and

drainage, exacerbations of chronic pain, etc., are seen by advanced practice providers. Including them in training and skill development can be an important part of developing broad integration of UGRA into standard ED practice.[14]

In summary, Wilson et al.[3] confirm that there is widespread recognition that UGRA should become a core component of emergency medicine resident education and clinical practice. Their work highlights the fact that the lack of faculty confidence in their own UGRA skills and the lack of interdisciplinary collaborations are major barriers to implementing UGRA educational programs. Their findings should encourage emergency medicine faculty to embrace the need for lifelong learning in our dynamic and rapidly evolving specialty and to actively seek formal instruction in UGRA. With a base of expertise in pain medicine and regional anesthesia among emergency medicine faculty, interdepartmental collaborations and system support for ED UGRA will take root and flourish to the great benefit of our patients.

References

1. American Society of Anesthesiologists Task Force on Acute. Pain Management. Practice guidelines for acute pain management in the perioperative setting: an updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. Anesthesiology 2012;116:248–73.
2. Marhofer P, Willschke H, Kettner S. Current concepts and future trends in ultrasound-guided regional anesthesia. Curr Opin Anaesthesiol 2010;23:632–6.
3. Wilson CL, Chung K, Fong T. Challenges and variations in emergency medicine residency training of ultrasound-guided regional anesthesia techniques. AEM Educ Train 2017;1:158–64.
4. Liebmann O, Price D, Mills C, et al. Feasibility of forearm ultrasonography-guided nerve blocks of the radial, ulnar, and median nerves for hand procedures in the emergency department. Ann Emerg Med 2006;48:558–62.
5. Herring AA, Stone MB, Frenkel O, Chipman A, Nagdev AD. The ultrasound-guided superficial cervical plexus block for anesthesia and analgesia in emergency care settings. Am J Emerg Med 2012;30:1263–7.
6. Amini R, Kartchner JZ, Nagdev A, Adhikari S. Ultrasound-guided nerve blocks in emergency medicine practice. J Ultrasound Med 2016;35:731–6.
7. McCartney CJ, Mariano ER. Education in ultrasound-guided regional anesthesia: lots of learning left to do. Reg Anesth Pain Med 2016;41:663–4.
8. Schöll E, Kolleth D, Krähenbühl G, Nickel CH, Bingisser R. Identification of teaching priorities for ultrasound-guided regional anesthesia as first-line pain management in a Swiss university emergency department. Emerg Med Health Care 2016;4:2.
9. Tighe P, Buckenmaier CC, Boezaart AP, et al. Acute pain medicine in the United States: a status report. Pain Med 2015;16:1806–26.
10. Børglum J, Bartholdy A, Hautopp H, Krogsgaard MR, Jensen K. Ultrasound-guided continuous suprascapular nerve block for adhesive capsulitis: one case and a short topical review. Acta Anaesthesiol Scand 2011;55:242–7.
11. Wroe P, O'Shea R, Johnson B, Hoffman R, Nagdev A. Ultrasound-guided forearm nerve blocks for hand blast injuries: case series and multidisciplinary protocol [letter]. Am J Emerg Med 2016;34:1895–7.
12. Johnson B, Herring A, Shah S, Krosin M, Mantuani D, Nagdev A. Door-to-block time: prioritizing acute pain management for femoral fractures in the ED. Am J Emerg Med 2014;32:801–3.
13. Morrison RS, Dickman E, Hwang U, et al. Regional nerve blocks improve pain and functional outcomes in hip fracture: a randomized controlled trial. J Am Geriatr Soc 2016;64:2433–9.
14. Luftig J, Mantuani D, Herring AA, Nagdev A. Ultrasound-guided retroclavicular approach infraclavicular brachial plexus block for upper extremity emergency procedures. Am J Emerg Med 2017 [Epub ahead of print].