DARING DISCOURSE

Beyond Ultrasound Guidance for Regional Anesthesiology

De Q. Tran, MD, FRCPC, André P. Boezaart, MD, PhD,† and Joseph M. Neal, MD‡*

Abstract: Despite its popularity, ultrasound (US)–guided regional anesthesiology is associated with significant limitations. The latter can be attributed to either the US machine (ie, decreased ability to insonate deep neural structures, as well as the thoracic spine) or the operator. Shortcomings associated with the operator can be explained by errors in perception (ie, ambiguous criteria for needle/catheter tip–to–nerve proximity and subparaneural local anesthetic injection) or interpretation. Perhaps the greatest confusion afflicting US-guided regional anesthesiology originates from an intellectual misconception pertaining to its application. Increasingly, authors are using US to identify interfascial planes where local anesthetic can be injected thereby "discovering" new truncal blocks. Often these novel blocks suffer from a lack of proper randomized, comparative validation.

Fortunately, solutions have been proposed to remedy many shortcomings associated with US guidance. The inability of US to reliably insonate deep neural structures can be circumvented with adjunctive neurostimulation. Fluoroscopy and waveform analysis have been proven to increase the success rate of thoracic epidural blocks. For continuous nerve blocks, combined US-neurostimulation may provide an objective end point (ie, an evoked motor response) for neural proximity and subparaneural positioning of the catheter tip. Finally, the solution to the plethora of nonvalidated US-guided blocks is both elegant and simple. New nerve blocks should answer a specific clinical need, and their first descriptions should take the form of an adequately powered, observer-blinded, randomized comparison against the established standard of care or, at the very least, a large case series (eg, a Brief Technical Report).

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The first randomized trial to formally investigate ultrasonography (US) for peripheral nerve blocks can be traced back to 1994.[1] However, US guidance only found its place in the anesthesiologist's armamentarium after the dawn of the new millennium.[2] Despite the slow start, the clinical pendulum has indisputably shifted toward the camp of US,[3] which has emerged as the dominant adjunct for nerve blocks.[4] In fact, US currently plays such a central role within the specialty that US-guided regional anesthesiology now benefits from its own, unique acronym (UGRA).[5] This has even prompted some experts to advocate abandoning traditional nerve localization modalities altogether.[6,7] Furthermore, the recent introduction of point-of-care ultrasonography (POCUS) into operating room settings suggests that adoption of US technology will gain even more momentum in years to come.[8]

As clinicians, teachers, researchers, and editorial board members, we believe that the time has come to ask ourselves (as well as the community of regional anesthesiologists) the following questions: (1) Has the pendulum swung too far? (2) What are the shortcomings (if any) of US? (3) What lies beyond UGRA? To rationally answer these questions, one must carefully dissect 3 interconnected elements: the documented benefits of US, its limitations, and possible solutions to these shortcomings.

DOCUMENTED BENEFITS OF ULTRASOUND GUIDANCE

Ultrasound guidance allows the operator to visualize the needle, nerve, unwanted targets (eg, blood vessel and pleura), and spread of local anesthetic agents (LAs).[4] In turn, this has facilitated resident training and led to shorter performance and onset times as well as fewer needle passes for single-injection upper-extremity blocks. Furthermore, US has been shown to decrease the incidence of hemidiaphragmatic paralysis and pneumothorax for interscalene and supraclavicular blocks, respectively.[9] Compared with conventional nerve localization techniques, not only does US increase the success rate of single-injection lower-limb blocks while decreasing LA requirement,[4] but it also improves the success of truncal blocks such as rectus sheath[10] and ilioinguinal/iliohypogastric nerve blocks.[11,12] Moreover, randomized trials have demonstrated that, compared to conventional palpation of landmarks, US assistance (ie, preprocedural scanning) results in fewer needle passes/insertions and skin punctures for neuraxial blocks in obstetric and surgical patients. These findings seem most pronounced when expert operators carry out the sonographic examinations and for patients displaying difficult spinal anatomy.[13]

Despite the benefits associated with US guidance, proponents of traditional nerve localization techniques could argue that most of these advantages, although statistically significant, may not be clinically relevant in a real-world setting. For instance, for brachial plexus blockade, a decreased onset time may or may not be important, depending on the presence of an induction room. The shorter onset seen with lower extremity blocks becomes trivial if patients also undergo general or neuraxial anesthesia intraoperatively. Furthermore, although US guidance indisputably results in fewer needle passes for single-injection blocks, this does not translate into a decreased risk of neural injury or increased patient satisfaction. Despite all these arguments, even skeptics cannot overlook or deny the most significant benefit conferred by US guidance: the ability to visualize blood vessels and LA spread decreases the risk of local anesthetic systemic toxicity (LAST). This provides significant advantages for blocks performed by inexperienced operators. In a large observational study spanning more than 5 years (2007–2012) and encompassing 20,021 patients undergoing 25,336 peripheral nerve blocks, Barrington and Kluger[14] unequivocally demonstrated a lower incidence of LAST with US compared to techniques not utilizing US technology (0.059% vs 0.21%; P = 0.004). The range of point estimates for the odds ratio of LAST with the use of US varied between 0.19 and 0.25.[14]

LIMITATIONS OF ULTRASOUND GUIDANCE

In light of the documented benefits derived from US guidance, one could be easily forgiven for overlooking its shortcomings.

From the *Department of Anesthesiology, McGill University, Montreal, Quebec, Canada; †Division of Acute and Perioperative Pain Medicine, University of Florida College of Medicine, Gainesville, FL; and ‡Department of Anesthesiology, Virginia Mason Medical Center, Seattle, WA.
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Address correspondence to: De Q. Tran, MD, FRCPC, Department of Anesthesia, Montreal General Hospital, 1650 Ave Cedar, D10-144 Montreal, Quebec, Canada H3G 1A4 (e-mail: de_tran@hotmail.com).
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However, such drawbacks exist and can be attributed to either the US machine or the operator.[15]

From a technological standpoint, the decreased US visibility associated with deep neural structures constitutes a challenge. For example, Karmakar et al[16] could identify the lumbar plexus in only two-thirds of cases even when using a high-resolution US machine. As a remedy, these authors combined neurostimulation (NS) and US for lumbar plexus blocks. In teaching centers, primary failure of thoracic epidural blocks represents a significant problem (incidence >20%) and can be partly explained by the difficult anatomy of the thoracic spine.[17] Because US assistance confers benefits for lumbar neuraxial blocks,[12] one could hope that it would similarly improve the performance of thoracic epidural blocks. In 70 patients undergoing thoracic or upper abdominal surgery, Auyong et al[18] compared conventional palpation of landmarks to US preprocedural scanning. These authors found no intergroup differences in terms of performance times and failure rates (12%–22%). Thus, the inability of US to navigate complex bony structures may constitute yet another limitation. These shortcomings highlight an interesting paradox inherent to US guidance: the deeper the neural target, ie, the more one needs US guidance, the less the latter is helpful. Conversely, it becomes most beneficial for superficial targets where its assistance may be less crucial. One need only think of the (superficial) brachial plexus versus the (deep) proximal sciatic nerve in a larger patient. However, if history serves as a template, technological limitations may be transient and overcome.[19] In other words, with continued progress, clinicians could imagine a not so distant future where increasingly sophisticated machines and, possibly, 3-dimensional US[20] will permit reliable insonation of deep neural structures (eg, the lumbar and sacral plexi),[16,21] as well as narrow interlaminar vertebral windows.

In contrast, operator-based shortcomings besetting UGRA stem from obstacles related to perception or interpretation. Thus, they may be time-insensitive. Currently, the greatest strength of US guidance, the operator's ability to visualize LA spread in relation to the neural target, also masks a twin liability: the definition of neural proximity and its perception by the human eye. Because LAs work by blocking the sodium channels of axons, they must diffuse across neural membranes down a concentration gradient (Fick's second Law of Diffusion) to reach these target axons. Thus, most anesthesiologists would agree that LA injection should be carried out in close proximity to nerves in an attempt to facilitate transmembrane diffusion.[22] However, the ideal distance between a nerve and the tip of a needle or catheter has not been established. For instance, Spence et al[23] and Palhais et al[24] have achieved successful single-injection interscalene blocks by injecting LA immediately next to and 4 mm away from the brachial plexus, respectively. Furthermore, even if the optimal distance between nerve and needle tip could be elucidated for all peripheral nerve blocks, the perception of such contiguity by the naked eye remains subjective and entirely operator dependent.

The microanatomy and ultra-anatomy of perineural membranes complexify the issue of needle-to-nerve proximity beyond a simple question of physical distance (Fig. 1). The nature of the membrane itself may constitute the key variable. Although descriptions of neural microanatomy have been present in the literature for over a century,[25–29] the anesthesiologist's burgeoning understanding of extraneural tissue layers and the paraneurium (also called the circumneurium) merely dates back to 2012.[22,30–35] Only recently have operators realized that the so-called sweet spot of the nerve, described by masters of yester-year, may in fact be synonymous with the subparaneural (ie, subcircumneural) space.[22] For example, since 2012, multiple trials have observed that, compared to

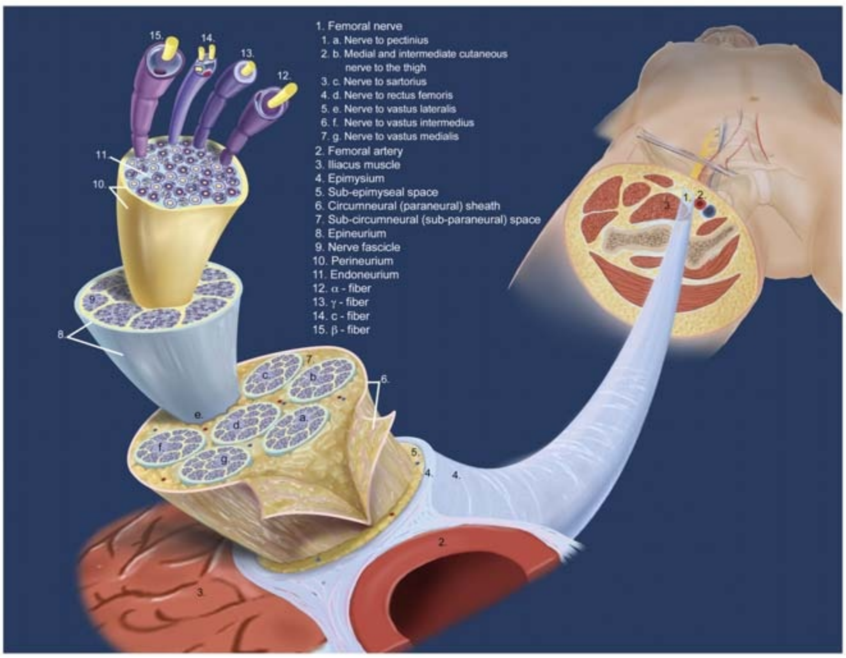

FIGURE 1. Microstructure of the femoral nerve. The femoral nerve is not a single nerve but a bundle of nerves. The branches of the femoral nerve are enclosed in a common circumneural sheath (6; also known as paraneural sheath). Outside the circumneural sheath is the subepimysial space (5), which is surrounded by the epimysium (4)—the fascia that surrounds the nerves, muscles, and blood vessels. Injection into this space forms the so-called doughnut sign on ultrasound. Deep to the circumneural sheath (6) is the subcircumneural space (7), which is thought to be the ideal space for catheter placement for a CNB. The next layer, which encloses each individual nerve, is the epineurium (8). In turn, each fascicle (9) is surrounded by its own perineurium (10). Reproduced with kind permission of Mary K. Bryson from *The Primer of Regional Anesthesia Anatomy*. 2nd ed. Boezaart AP, ed. Kalona, IA: Printer's Workshop; 2017; RAEducation.com.

the conventional supraparaneural technique, subparaneural LA injection results in improved efficacy (ie, increased success) and efficiency (ie, shorter performance and onset times, as well as fewer needle passes) for popliteal sciatic nerve block.[30,36,37] However, in clinical practice, the paraneurium can be difficult to insonate and subparaneural LA injection, a challenge to recognize. These phenomena can be attributed to the current state of "regular," non–high-definition US machines, as well as subjective perception by the human eye. For instance, to detect needle penetration of the paraneurium-like prevertebral fascia, which surrounds neural clusters in the supraclavicular fossa, operators must often rely on surrogate "pulsatility" of the target cluster: the latter expands concentrically with the quick injection of a small bolus (1 mL) of LA and deflates concentrically after said bolus.[38–40] Therefore, although our collective understanding of the paraneurium has yet to reach full maturity, and further investigation is very much required, one cannot help but wonder if perhaps our inability to consistently detect subparaneurial LA injection can result in occasional placement of continuous nerve block (CNB) catheters in the subepimysial (ie, supraparaneural) space instead of the subparaneural space.[22] In turn, this may explain instances of secondary block failure despite the use of US guidance and, possibly, the negative perception of CNBs by some surgeons.[41]

Perhaps the greatest source of confusion currently afflicting UGRA originates from an intellectual (mis)interpretation of its application. With the exception of adductor canal blocks,[42] approaches for brachial plexus, lower limb and common truncal blocks (eg, rectus sheath, ilioinguinal/iliohypogastric and thoracic paravertebral blocks) had been thoroughly described prior to the advent of US.[43,44] Anesthesiologists were thus initially content to use US guidance to improve and refine traditional techniques. For instance, minimalistic efficiency was sought with the US perivascular technique for axillary blocks[45–47] and maximalistic precision, with the targeted intracluster injection technique for supraclavicular blocks.[38–40] In 2008, a quiet but seismic shift was unwittingly set in motion with the first description of US-guided subcostal transversus abdominis plane (TAP) block.[48] The latter was initially conceived as a legitimate solution to a real clinical problem: the abdominal wall sensory block provided by the popular US-guided midaxillary TAP block seemed less extensive than the one conferred by its landmark-based counterpart, performed in the triangle of Petit.[49,50] With the new US-guided subcostal method, the needle insertion began near the xiphoid process, and LA was injected between the rectus and transversus abdominis muscles. The description of US-guided subcostal TAP blocks constitutes a pivotal moment in the evolution of UGRA because it provides the first example where US enabled the identification of a target point that was otherwise inaccessible. In other words, US could now be used to create nerve block techniques de novo. In years that followed, emboldened by the success of subcostal TAP blocks, multiple authors started using US to identify fascial planes as yet undiscovered by anesthesiologists, where LA could be injected. As a result, an increasing number of "new" US-guided blocks appeared in the literature (Table 1). In many instances, these new nerve blocks were developed prematurely, as their authors, relying on knowledge of sonoanatomy, described a block without a clear application. In contrast, high-yield blocks that have stood the test of time have always been developed in response to a real clinical quandary.[78] To further compound the methodological problem, technical validation was usually lacking or confined to anecdotal reports of efficacy (ie, case reports or correspondence) (Table 1). Unfortunately, the latter inherently suffer from selection bias, as reports of inefficacy usually do not get submitted by authors or published by journals. Although some of these new blocks did benefit from cadaveric studies, their authors rarely followed the "proof of concept" dissections with comparative clinical studies or case series large enough to ascertain efficacy, efficiency, and complication rates.

At present, US-guided truncal blocks constitute a wildly heterogeneous mix. Some blocks (such as Pecs and quadratus lumborum blocks) have undergone randomized investigation with trials of variable quality (Jadad scores raging from 2 to 4).[53–55,59–61,64,67,74] Other blocks (such as the pecto-intercostal fascial plane blocks) are still searching for a legitimate application.[65,66] A few, such as US-guided thyroid capsular sheath blocks, may never find a clinical role because of sheer interference with the surgical field.[69] The fundamental shortcoming afflicting most US- or landmark-guided truncal blocks stems from the fact that they do not consistently address visceral pain, which is mediated by sympathetic (and not somatic) nerves and thus requires concomitant opioid administration (as well as multimodal analgesia). In an era where abuse of prescription opioids has become epidemic,[79] patients would perhaps be better served if regional anesthesiology can manage intraoperative and postoperative pain in its entirety, thus avoiding opioid-related adverse effects.[80] Furthermore, because all blocks are associated with potential complications, one should prioritize high(est) yield blocks as the dictum "higher the indications, lower the complications" suggests. Therefore, the applicability of many truncal blocks may be limited to minimally-to-moderately painful surgical procedures of the abdominal wall (eg, epigastric/umbilical/incisional hernia repair) or procedures where the viscera have been completely removed (eg, total abdominal hysterectomy). If significant visceral pain is expected (eg, pancreatic surgery) or early return of bowel function and increased intestinal blood flow are required (eg, colorectal surgery), epidural blockade (and its attendant sympathetic block) constitutes a logical (and superior) option.

Although US guidance has indisputably advanced the technical performance of nerve blocks, the intellectual practice of regional anesthesiology is eerily reminiscent of the one previously encountered with landmark-based techniques. In the days before US, the position of nerves was simply inferred by an appropriate evoked motor response,[81] and the initial puncture site was determined with cutaneous landmarks. Inevitably, different experts would advocate slightly different sets of landmarks; deep blocks, such as infraclavicular and proximal sciatic blocks, became notorious for the geometric permutations of their landmarks.[43,82] Beyond ensuring recognition for their authors, these competing sets of landmarks did not necessarily improve daily practice and, in fact, only fostered confusion for novices. Unfortunately, the past seems to repeat itself with US descriptions of interfascial planes replacing cutaneous landmarks. However, a saturation point may have been reached, as some authors have started to wonder if all the new truncal blocks are really distinct, and if some do not simply constitute variations of the same entity.[83–86]

SOLUTIONS

The limitations associated with UGRA (ie, unreliable insonation of deeper nerves/thoracic interlaminar spaces, ambiguous markers of neural proximity/subparaneural LA injection, and nonvalidated techniques for novel US-guided blocks) may appear daunting. However, careful scrutiny of the literature reveals that most shortcomings have already been addressed, and in many instances, solutions have been proposed.

The inability of US to reliably insonate deep neural structures could be circumvented with adjunctive NS. From a technical standpoint, the concomitant use of US and NS remains controversial, as it does not always improve block performance. Studies pertaining to infraclavicular,[87,88] axillary,[89] and femoral[90] blocks have concluded that, compared with US alone, combined US-NS

TABLE 1. Examples of Novel Ultrasound-Guided Nerve Blocks

Block	First Description (Year/Format)	Validation With RCT (as Indexed in PubMed Database)	Comments
Pecs blocks[51,52]	Pecs 1: 2011/letter to the editor, Pecs 2: 2012/technical description	Yes[53–55]	Pecs blocks exist in 2 permutations (ie, Pecs blocks 1 and 2)
Quadratus lumborum block[56–58]	QLB1: 2007/poster, QLB2: 2013/online correspondence, QLB3: 2013/online correspondence	Yes[59–61]	Quadratus lumborum block exists in 3 permutations (ie, QLB1, QLB2, and QLB3)
Transversalis fascia plane block[62]	2009/Letter to the editor	No	Purportedly anesthetizes the anterior and lateral branches of the T12 and L1 nerves
Serratus plane block[63]	2013/Volunteer study (n = 4)	Yes[64]	Purportedly blocks the thoracic intercostal nerves and provides complete analgesia to the lateral part of the thorax
Pectointercostal fascial plane block[65,66]	2014/Case report	No	Purportedly anesthetizes the anterior and lateral branches of the intercostal nerves
Serratus-intercostal fascial plane block[65]	2014/Case report	Yes[67]	Purportedly anesthetizes the anterior and lateral branches of the intercostal nerves
Thoracolumbar interfascial plane block[68]	2015/Volunteer study (n = 10)	No	Purportedly anesthetizes the dorsal rami of the thoracolumbar nerves for spinal surgery
Thyroid capsule sheath block combined with anterior cutaneous nerve blocks[69]	2015/Volunteer study (n = 5), case series (n = 78)	No	Purportedly provides surgical anesthesia for thyroidectomy
Parasternal Pecs block[70]	2016/Case report	No	Purportedly anesthetizes anterior branches of the T2–T6 intercostal nerves
Parasternal intercostal nerve block[71]	2016/Letter to the editor	No	Purportedly anesthetizes "multiple anterior branches of the intercostal nerves"
Erector spinae plane block[72]	2016/Brief technical report (case reports and cadaveric study)	No	Purportedly anesthetizes the dorsal and ventral rami of the thoracic spinal nerves
Transversus thoracic muscle plane block[73]	2015/Letter to the editor	Yes[74]	Anesthetizes the anterior branches of the T2–T6 intercostal nerves
Deep serratus plane block[75]	2017/Retrospective study (n = 4)	No	Purportedly anesthetizes "many components of the thoracic nerves traversing the region"
Multifidus cervicis plane block[76]	2017/Letter to the editor	No	Purportedly provides analgesia for cervical spinal surgery
Extrathoracic subparaspinal block[77]	2017/Cadaveric study and pilot study	No	Purportedly provides analgesia after Nuss procedure (ie, correction of pectus excavatum) in children

QLB indicates quadratus lumborum block; RCT, randomized controlled trial.

unnecessarily lengthens the procedural time without increasing success rate. However, the sonographic targets for infraclavicular blocks (6-o'clock position of the axillary artery), the terminal nerves in the axilla, and the femoral nerve are easy to visualize: consequently, the addition of NS to US provides no significant advantage for single-injection nerve blocks. In contrast, the lumbar and sacral plexi, and the sciatic nerve in some subjects, constitute deeper structures that may benefit from adjunctive NS to confirm the position of the needle/catheter tip.

The high failure rate associated with thoracic epidural blocks in teaching centers cannot be remedied with US preprocedural scanning.[17] However, 2 randomized trials have successfully proposed non-US solutions to the problem. When an epidural needle (or catheter) is correctly positioned inside the epidural space, pressure measurement at its tip results in a pulsatile waveform synchronized with arterial pulsations.[91] In a 2-center trial (n = 100), Arnuntasupakul et al[92] randomized patients requiring thoracic epidural blocks to a traditional loss-of-resistance (LOR) technique or LOR confirmed with epidural waveform analysis (EWA). These authors found that the latter led to a substantial decrease in the primary failure rate (2% vs 24%; $P = 0.002$).[92] Similarly, Parra et al[93] enrolled 100 patients undergoing thoracic epidural blockade and randomized them to a palpation- or fluoroscopy-guided technique. Parra et al also observed that fluoroscopy resulted in a lower failure rate (2% vs 26%; $P = 0.01$). Therefore, the additional equipment required by EWA and radiation exposure associated with fluoroscopy may be offset by the attendant 10-fold decrease in primary failure rate. Furthermore, besides improving the success of preoperative thoracic epidural blocks, EWA and fluoroscopy/epidurogram also provide diagnostic versatility, as they can be used in the recovery room to manage nonfunctioning epidural catheters.[94,95] Interestingly, adjunctive NS can also be used to confirm correct placement of epidural catheters.[96] Although it seems to provide high sensitivity and specificity,[97] further investigation is required to compare conventional and NS-confirmed LOR.

Neural proximity and subparaneural LA injection require objective sonographic signs to ensure interobserver reproducibility. For example, LA injection deep to the paraneural (circumneural) sheath of the sciatic nerve at the neural bifurcation in the popliteal fossa results in a distinctive concentric expansion of the sheath with peripheral sequestration of the tibial and common peroneal nerves.[36,98] Similarly, LA injection dorsal to the axillary artery should result in a "double bubble sign" and a "silhouette sign" for single-injection paracoracoid infraclavicular and axillary blocks, respectively.[99,100] In some anatomical locations, such as the costoclavicular space,[101] it may be feasible to position a CNB catheter where all 3 cords of the brachial plexus are bundled together inside the same plexic sheath.[102] Unfortunately, no such US markers of proximity (or subparaneural LA injection) exist for many nerve blocks. For instance, for femoral and proximal (parasacral/transgluteal) sciatic blocks, the anesthesiologist is often left to decide when the needle/catheter tip is sufficiently close to the nerve, ie, in the subparaneural (subcircumneural) space. Such a discretionary end point may result in different success rates between strict and lax operators, especially for perineural catheters (where LA concentrations are typically dilute, and infusion rates are low). Whereas strict operators would endeavor to place the catheter tip in a subparaneural (subcircumneural) location, their lax counterparts may be satisfied with a simple subepimysial location.[22] To prevent such a possibility, the combined use of US-NS (the so-called dual technique) could ensure an objective and homogeneous end point (ie, the presence of an evoked motor response).[103] However, in light of an increasingly cost-conscious climate, the authors recommend that each center conduct an internal audit to quantify the secondary failure rate of its US-guided CNB catheters. Knowledge of this crucial variable will help determine if operators should systematically use stimulating catheters or if the latter should be reserved for specific scenarios (eg, inexperienced operators or deep neural structures such as the lumbar plexus). During these cost projections, anesthesiologists and administrators should not forget that the expense incurred by stimulating catheter kits is generally dwarfed by the time and cost associated with redoing nonfunctional blocks or readmitting outpatients with suboptimal CNBs. It is also the authors' personal belief that infrastructure, more so than knowledge or technical skills, explains the difference between strict and lax operators: anesthesiologists who work in centers with mature acute pain services or who are provided sufficient time to follow their patients postoperatively are usually more inclined to become strict operators.

The solution to nonvalidated US-guided blocks flooding the literature is elegantly simple. In an ideal world, a new nerve block should answer a specific clinical need, and its first description should take the form of an adequately powered, observer-blinded, randomized comparison against the established standard of care or, at the very least, a large case series. To indiscriminately publish every new block technique would promote a recipe-like "this is how I do it" mentality, which constitutes the antithesis of evidence-based practice. Yet reporting new innovations only after they have been vetted by clinical trials may delay the anesthesiologist's desire to remain on the cutting edge.[104] However, case reports and letters to the editor can no longer be the answer. This explains why a journal such as *Regional Anesthesia and Pain Medicine* christened the section "Brief Technical Report" in 2003 in an attempt to bridge the gap between anecdotal innovation and randomized trial.[104] Therefore, the collective responsibility to produce science rests not only with investigators but also with peer reviewers and editors alike. More importantly, researchers should not pass up opportunities to validate promising US-guided techniques even if the latter originated from another center. This collaborative process is best exemplified with the recent investigation of the novel method for US-guided infraclavicular blockade, the costoclavicular block. The latter was first described in 2015 in a letter to the editor by Karmakar et al.[105] The following year, these authors published a Brief Technical Report detailing its anatomical foundations in cadaveric specimens.[101] Subsequently, they carried out a clinical case series in 30 patients (also published as a Brief Technical Report).[102] Their preliminary works allowed another group of authors to conduct a randomized trial comparing costoclavicular and conventional (paracoracoid) US-guided infraclavicular block,[106] as well as a dose-finding trial.[107] A quick survey of trial registries reveals that another randomized trial (NCT02657291) is currently underway.

THE FUTURE

By enabling the operator to visualize in real time the needle, nerve, and spread of LA, US has revolutionized the practice of peripheral, neuraxial, and truncal nerve blocks. Going forward, one should ensure that US guidance remains a tool and not a school of regional anesthesiology. In other words, US must not be blindly embraced at the detriment of other valuable modalities such as NS, fluoroscopy, epidurogram, and waveform analysis. The art and the science lie in knowing which tool to use in which setting. Even simple techniques such as the "double pop" fascia iliaca block[108] and the transarterial axillary block[109] can result in significant benefits for patients if judiciously employed in the right context. Although memorable, the mnemonic "UGRA" may have led many operators astray by focusing exclusively on US guidance. New US-guided blocks could and should still be developed as long as scientific reputation does not supersede science, and eponymity remains subservient to evidence, as well as definable clinical needs. The description of the novel blocks made possible by US certainly represents an exciting time in the evolution of anesthesiology, but one need not (and should not) abandon successes of the past simply because a new tool graces the arsenal.

In hindsight, future pundits will likely refer to current times as the *age of innocence*. Perhaps, as a collective of like-minded colleagues, we should now transition to our *age of reason*. An epoch where patient care drives technology (instead of the opposite scenario), where adding value to the perioperative surgical home becomes the common goal,[110] and where new blocks, adequately vetted and compared against the criterion standard (instead of placebo), are developed to fill real-world clinical gaps. Thus, to paraphrase Seattle's favorite adopted son, Lee Jun-Fan (also known as Bruce Lee), the specialty should not consist of a daily increase, but a daily decrease: one should hack away incessantly at the inessentials. Ultimately, to the question, "What lies beyond UGRA?" there can be only one true answer: "what came before UGRA: the patient."

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