## Our Future: Deskilled or Super-Skilled?

# A New Eye for the Needle? Regional Anesthesia as a Case Study in Deskilling

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The goal of postgraduate training is to assimilate as much clinical knowledge and expertise as possible in order to be maximally functional once the mythical day of July 1 comes around, when suddenly residents/fellows are autonomous, newly minted anesthesiology attendings. But what if some aspects of our training were superfluous, obsolete, no longer useful? Is this possible, and if so, how should we react to that unnerving fact?

"Deskilling" has been defined (Webster's online dictionary) as "something making the skills of a worker obsolete." Consider auto mechanics proficient in carburetor repair/maintenance who currently find these talents in minimal demand due to the advent of the fuel injector. Regional anesthesiology provides an illustrative medical example of certain technique(s), previously widespread and seen as essential, that have been placed in danger of extinction by technological advances. Specifically, in an effort to optimize local anesthetic distribution and block efficacy, indirect ("blind") techniques for identification of peripheral nerves have been taught for decades. First, via the use of paresthesia-seeking and later via peripheral nerve stimulation (PNS). Over the past 10-15 years, the rise of ultrasound (U/S) for visually identifying nerves and accompanying vascular structures has challenged the necessity of the aforementioned techniques. Ultrasound-guided blocks are now ubiquitous in anesthesia practice, which begs the question, "do I need to know how to do a block with PNS or, for that matter, with paresthesia?"


I feel confident in responding "No." In residency, I learned regional anesthesia from several renowned experts who taught me to use stimulation to localize target nerves, with the goal of an appropriate motor response at 0.2-0.5 mA. At the same time, I was also taught about the potential usefulness of paresthesias in proper needle placement. Thus, in the course of doing a block, if we encountered such a response, we would "take it" and go ahead and inject the local, regardless of what threshold of nerve stimulation was present, if any. This two-pronged approach worked well; to my recollection, success rates were above 90%, which is none too shabby for a major teaching institution that encompassed dozens of trainees. Despite that background, I have not touched a nerve stimulator in over a decade. Further, I rarely encounter (and never attempt to elicit) paresthesias; when they occur, I deliberately extinguish them via immediate needle re-positioning. I am happy to report that my regional anesthesia practice is highly effective and is decidedly superior in efficacy to what I experienced during my first five years as an attending when I used nerve stimulation exclusively.

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The utility of ultrasound-guided blocks has been well established via a large body of literature. Generally speaking, the simultaneous direct visualization of needles *and* the targeted anatomical structures leads to reduced procedural times, higher block success rates, and higher patient satisfaction. I view the supraclavicular block as particularly emblematic of the U/S-driven shift in practice paradigm. At my training program, for upper-extremity procedures, we sometimes performed the "subclavian perivascular" approach to the brachial plexus. For those unfamiliar with this technique, the needle is advanced while oriented perpendicular to the patient's clavicle, and parallel to the long axis of the body, in what has been called a "plumb-bob" fashion. I found these blocks unsettling to perform; I was constantly concerned about pleural puncture since the needle's path is directly toward the lung itself. In my CA-3 year, a number of

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**Deskilling of Anesthetic Drugs**

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in renal failure patients should be carefully considered (*Anesth Pain Med (Seoul)* 2020;15:259-68). In such cases, traditional neuromuscular reversal is appropriate. However, neostigmine has had its share of drug shortages. In 2012, the price of neostigmine was significantly raised. This, coupled with a decrease in the number of generic manufacturers, led to a shortage of this critical medication. Edrophonium with pre-mixed atropine, which is trademarked Enlon Plus, is one alternative for reversal of neuromuscular blockade in such a scenario. Most anesthesia providers are not familiar with this medication aside from the knowledge that it is often used to diagnose myasthenia gravis. Unlike neostigmine, which forms a covalent bond to the esteratic site of acetylcholinesterase, edrophonium forms an ionic bond to the anionic site (*Br J Anaesth* 2009;103:115-29). Edrophonium has a shorter onset of action than neostigmine. The recommended dose of edrophonium is 0.5-1 mg/kg combined with 0.007-0.014 mg/kg atropine over a minimum of 45-60 seconds (*APSF Newsletter* 2015;30:21-2). Since edrophonium is not as effective as neostigmine at lower doses, at least two to three twitches should be observed prior to reversal. Providers should be cognizant of central anticholinergic syndrome, which is a diagnosis of exclusion and can be confirmed only after resolution of symptoms with 0.03-0.04 mg/kg physostigmine (*Br J Anaesth* 2008;101(s29)). With residual neuromuscular blockade an important patient safety issue (*Curr Anesthesiol Rep* 2020;10:131-6), we must prevent deskilling in our limited armament of reversal medications.

Deskilling in the field of medicine is inevitable due to constant technological innovation. With limited time for residency training as well as maintenance of certification, anesthesiologists have the responsibility to ensure that future providers do not lose critical skills that may become pertinent in times of technological failure (i.e., drug shortage). As we have shown, there is already unfamiliarity among anesthesia providers with older but critical medications. We do not want the same fate as the Luddites; however, in times of need, we must still be able to rely on "traditional" medications to deliver safe and effective care to our patients. To do so, perhaps we, as educators, need a paradigm shift: avoiding deskilling is equally as critical as avoiding incompetency.

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co-residents and I discussed the procedure among ourselves, and we all agreed that "I will never use that block after graduation, it makes me too nervous." However, if we fast-forward five years or so from that moment, ultrasound scanning of the brachial plexus in the supraclavicular fossa has changed the entire landscape! The subclavian artery, the brachial plexus, the first rib, and the pleura can be readily visualized: no guess-work, and nothing need be done blindly. Almost as important, the needle orientation is more proximal/lateral, more parallel to the clavicle, and no longer directed toward the cupola of the lung. With proper attention and patience, the block needle in its entirety (tip included) can be advanced in real-time toward the nerve bundle while easily angled away from the pleura. So, essentially overnight, a block I did not want to touch with the proverbial 10-foot pole became a favored and reliable technique. Similar successes in visualization, safety profile, and predictability of outcomes when using ultrasound for other upper- and lower-extremity blocks led me to abruptly abandon nerve stimulation.

Thus, I essentially voluntarily deskilled myself in the techniques of paresthesia-seeking and nerve stimulation for regional anesthesia and acute pain procedures. I admit this with neither shame nor remorse, as it seemed only logical based on the reliable images and excellent clinical results that U/S provided. In addition, the extreme variability of motor responses I had experienced with the nerve stimulator was discouraging. In the initial phases of my usage of ultrasound for blocks, I used the scanning probe in concert with PNS. While doing so, I (and numerous other colleagues) occasionally witnessed positive motor responses at 0.5 mA or less despite needle tips being entire centimeters away from nerves (an unlikely position for efficacious deposition of local). In addition, at times I and others saw no motor response at all elicited by needles that were in direct contact with nerves. On this basis, I came to view PNS as a distractor and potential time-waster, which did not add appreciably to my practice.

Some may not be as ambivalent as I have been regarding this deskilling process. This question has been raised: "What if the facility that I practice in does not have access to ultrasound?" The concern is hypothetical, is not particularly relevant in 2021, and becomes more irrelevant each passing year. Outside of radiology departments, ultrasound is relied upon everywhere in modern medicine, from ERs to ICUs to labor and delivery suites. Personal ultrasound (e.g., attachments and software for cell phones/tablets that enable these devices for U/S scanning) is already here but does not have widespread penetration (yet). Commercial machines from a variety of manufacturers are certainly widespread in contemporary health care. The vast majority of these machines, even when not directly marketed to nor purposed for anesthesiologists, are able to accommodate the 5-10 MHz flat probes that we most commonly use. I have personally worked in close to 20 facilities in four different states, and every single one of them had an ultrasound machine available in some way or another for everyday perioperative use. This list includes several small surgery centers and a "sleepy" 41-bed community hospital. So, on balance, I do not see hardware or software as a limiting factor in performing U/S-guided blocks.

The argument above contains an inherent and very important caveat: I must acknowledge that I am writing from a "first world" practitioner's perspective. Those who have lived or practiced outside this country, and/or participated in medical/surgical missions, are well aware that not all of the planet enjoys the same societal standard of wealth and technology as the United States, Western Europe, and Scandinavia (to name a few regions). The prospect of deskilling in regional anesthesia becomes a lot more problematic if one practices in more austere environments like, for example, Sub-Saharan Africa. In such places, if there is no ultrasound machine, then the nerve stimulator must be used – and, in the absence of a PNS, we find ourselves by necessity back in the territory of paresthesias, pops, and clicks.

Given the rapid pace of technological advance in modern society and in contemporary medicine, there will surely turn out to be other established aspects of our training and practice that do not stand the test of time/progress (e.g., non-video laryngoscopy, cardiac auscultation?). We should not fear this phenomenon, but rather embrace it. Why? First, because we must remain relevant and cutting-edge in our practices to maintain marketability, credibility, and the crucial role as perioperative leaders who are indispensable to institutions. Second, and in a broader sense, because we are part of a specialty that champions patient safety and positive experiences, we must in turn champion appropriate, validated technological advances that have enormous potential to improve outcomes. I conclude here with the proposition to ASA members that deskilling is not a dirty word, nor anything to be ashamed of and, regardless, is an aspect of medicine that is here to stay. ■



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Moderators:
Jerrold H Levy, MD, FAHA, FCCM
Martin J London, MD, FASE
ANESTHESIOLOGY 2021
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The CoronaVIrus Disease 2019 (COVID-19) pandemic, with its explosive onset early in 2020, and its relentless march across the world with attendant morbidity and mortality, has forced anesthesiologists to adapt rapidly and uniquely to save lives and maintain critical surgical services. The development of a vaccine and innovative management and therapeutic strategies have proceeded at "Warp Speed," and as we move into our second year of the pandemic, predicting the future remains challenging.

Our role as anesthesiologists has received widespread recognition for our expertise in airway management and critically ill patients both in the OR and in the ICU. We have learned much about the pathophysiology of COVID-19 and best practices for treating it, but new information on its physiologic and long-term consequences continues to emerge.

Lectures will be followed by oral presentations of 10 abstracts selected for their relevance to the symposium topic. *Anesthesiology* invites research abstracts and full-length articles related to the theme of its Annual Journal Symposium at ANESTHESIOLOGY® 2021 – "SARS-CoV-2 and COVID19: New Paradigms and Challenges for Anesthesiologists."

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