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EDITORIAL

Ultrasound-guided regional anesthesia: present trends and future directions

"The future depends on what you do today." Mahatma Gandhi

Regional anesthesia is not just the future, it is the present. Presently, we find ourselves amid what may be called as the golden era of regional anesthesia.[1] This era is characterized by its rapid evolution, wherein novel blocks, techniques, and technological advancements are unveiled at a pace that may appear overwhelming to those who have not yet embraced this paradigm or are recently venturing into it. Herein, we explore several facets concerning the imperative dissemination of regional anesthesia, the emerging tools at our disposal for this purpose, and the forthcoming frontiers that beckon in the near future.

As ultrasound technology has advanced, fresh anatomical understanding and the capacity to safely access new targets have sparked an explosion in the description of novel blocks. Today, we have dozens of blocks described, which has inspired a lot of interest in new methods. However, this "enthusiasm-based" approach to medicine, where innovative and under-researched procedures are not validated, may paradoxically make it more difficult for patients to receive regional anesthesia. This might occur because just a small percentage of anesthesiologists will administer these blocks, while the majority will consider them to be too difficult and daunting. This is opposite to what we aim for, which is to have an increasing number of anesthesiologists practicing regional anesthesia; hence, a smaller list of Plan A blocks was proposed by Turbitt et al.[2] This list would include the most common blocks, with the purpose to encourage more anesthesiologists to perform techniques that satisfy most of their daily needs. Obviously, after a period of time and experience, skills are acquired, and this list can be expanded and adapted to suit the requirements of each individual setting.

Now it appears that we face a new obstacle: distributing these skills to every anesthesiologist. Equipping all anesthesiologists with the necessary knowledge is yet to be achieved, and ultrasound-guided regional anesthesia is still underutilized. Many professionals in Brazil are geographically isolated from major educational centers and struggle to gain access to high-quality information. Due to the COVID-19 pandemic of recent years, online teaching has become a part of daily life in all fields. Using online education tools is now one of the most obvious methods to spread this knowledge to a wider audience.

Today, major academic societies, such as the Brazilian Society of Anesthesiology (SBA) and the European and American Societies of Regional Anesthesia (ESRA and ASRA), offer widely accessible webinars and articles. Nevertheless, social media platforms are one of the most popular sources of information today. To name a few, on YouTube, renowned authors such as Ki Jinn Chin,[3] Jeff Gadsden,[4] and others upload block demonstrations, entire lectures, and high-quality educational videos; on X (former Twitter), research authors share their scientific articles and opinions[5] and on Instagram, videos, slides, and interviews are shared regularly.[6] Social media can ultimately provide curated content and direct networking with world experts. There are also widely used apps, such as NYSORA's, and other types of online platforms that provide a diverse range of formats and content. The most important point is to recognize valid sources and use them anywhere and at any time, with no geographical or temporal restrictions.

Regional anesthesia is an area of expertise that also requires manual skills. Anatomical interpretation and image acquisition are essential, yet hand-eye coordination is important as well. Consequently, it is evident that we must establish a theoretical basis, but the ultimate degree of competence is practical. Using increasingly useful and accurate simulators, we can currently circumvent the geographical issue, at least partially, in the present day.[7]

Simulators can be used to practice and develop the necessary competencies with increasing similarity to reality and they are likely to become ubiquitous in the coming years.[8] This is particularly important in remote areas where access to in-person education is challenging.[9]

Another useful tool is the use of handheld ultrasounds, which facilitates the path to learning, as one can view an online video or course and practice the imaging anywhere,

largely independent of hospital resources or even patient access.[10]

Future technologies and artificial intelligence (AI) will facilitate regional anesthesia instruction and daily practice, making the technique simpler. The simpler the technique, the simpler it will be to increase the number of anesthesiologists capable of performing it. Color overlay software, which applies a color overlay to real-time ultrasound that highlights important anatomical structures, will reduce the learning curve for a new technique.[11] Eye-tracking software is an additional AI technology that establishes visual fixation patterns during a regional anesthesia procedure, thereby assessing differences in practitioner expertise. The objective is to measure performance that cannot only distinguish between levels of proficiency but also help identify patterns that may be crucial to the evolution of abilities.[12] Other types of simulators utilizing virtual reality trainer software with high-resolution motion capture and ultrasound imagery to teach cognitive-motor needling skills are being developed, and the trend over the next few years is to make all these tools more accessible.[13]

One could consider if the technology and AI will ultimately replace anesthesiologists. This is not the appropriate prism. The human decision-making process and experience remain irreplaceable.

For instance, a study evaluating the use of a DaVinci robot for robotic-assisted ultrasound-guided regional anesthesia yielded unsatisfactory results in a real-world setting.[14] A second example is the use of certain software that still requires human intervention to determine the optimal settings. AI is only as good as the software behind it, and the software is only as good as the person who is interpreting.

A short list of blocks that are useful in most clinical situations, as opposed to dozens of blocks that only experts will perform; online resources from societies and social media; and current and future technology can help more anesthesiologists have access to regional anesthesia, which will directly translate into improved patient care and safety. These tools do not replace quality training in residencies, but they do help enhance skills, particularly for non-experts. And, most importantly, they enable access to knowledge for those who reside in more remote areas or who lack access to high-quality in-person training.

It is time for all of us to embrace digital learning and technology, as they have come to stay.

Disclosures

Sara Amaral is the co-founder of the online regional anesthesia teaching company Blocker Girl®.

Amit Pawa is the founder of an online teaching channel on YouTube, consulting for Pacira, and honoraria for GE Healthcare for teaching.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Chin KJ, Mariano ER. El-Boghdadly K. Advancing towards the next frontier in regional anaesthesia. Anaesthesia. 2021;76 (S1):3−7.
2. Turbitt LR, Mariano ER, El-Boghdadly K. Future directions in regional anaesthesia: not just for the cognoscenti. Anaesthesia. 2020;75:293−7.
3. YouTube Ki Jinn Chin [Internet]. Available from: https://www.youtube.com/@KiJinnChin.
4. YouTube Duke Regional Anesthesiology [Internet]. Available from: https://www.youtube.com/@regionalanesthesiology.
5. Mariano E. Edward Mariano's Twitter [Internet]. Available from: https://twitter.com/EMARIANOMD.
6. Amaral S. Blocker Girl [Internet]. Available from: https://www.instagram.com/blocker.girl/.
7. Kim TE, Tsui BCH. Simulation-based ultrasound-guided regional anesthesia curriculum for anesthesiology residents. Korean J Anesthesiol. 2019;72:13−23.
8. Fusco P, Petroni G, Tullj S, Arcangeli V, Balestra G, Marinangeli F. 196 Innovative and hi-fidelity simulator for fascial plane blocks. Peripheral nerve blocks. BMJ Publishing Group Ltd; 2021. p. A102.2−A102. [Internet] [cited 2023 Sep 11]. Available from: https://rapm.bmj.com/lookup/doi/10.1136/rapm-2021-ESRA.196.
9. Chen XX, Trivedi V, AlSaflan AA, Todd SC, Tricco AC, McCartney CJL, et al. Ultrasound-Guided Regional Anesthesia Simulation Training: A Systematic Review. Reg Anesth Pain Med. 2017; 42:741−50.
10. Moharir A, Tobias JD. The Role of a Handheld Ultrasound Device to Facilitate Remote Learning for a Point-of-Care Ultrasound Certificate Program. Adv Med Educ Pract. 2021;12:1043−8.
11. Bowness JS, El-Boghdadly K, Woodworth G, Noble JA, Higham H, Burckett-St Laurent D. Exploring the utility of assistive artificial intelligence for ultrasound scanning in regional anesthesia. Reg Anesth Pain Med. 2022;47:375−9.
12. Wright A. Eye-Tracking Technology to Determine Procedural Proficiency in Ultrasound-Guided Regional Anesthesia. J Educ Perioper Med. 2022: 24E684.
13. Chuan A, Qian J, Bogdanovych A, Kumar A, McKendrick M, McLeod G. Design and validation of a virtual reality trainer for ultrasound-guided regional anaesthesia. Anaesthesia. 2023; 78:739−46.
14. Tighe PJ, Badiyan SJ, Luria I, Boezaart AP, Parekattil S. Robot-Assisted Regional Anesthesia: A Simulated Demonstration. Anesth Analg. 2010;111:813−6.

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