CHALLENGING THE DOGMA: IS A SHORT-DURATION PNB BETTER THAN A LONG-LASTING ONE?

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The duration of a nerve block depends mainly on the type of local anesthetics used and the amount (volume and concentration, actually total ‘mass’ of local anesthetic) injected around the target nerve. Block duration can be prolonged with the use of a vasoconstrictor such as epinephrine, which decreases the diffusion of the anesthetic away from the nerve or the use of other adjuvants, each with a different mechanism of action and final effect (dexamethasone, clonidine, dexmedetomidine, magnesium).

When deciding, which local anesthetic to use, what concentration, which adjuvant and whether we should place a catheter for continuous infusion, there is no actual dogma to challenge. We just need to know what is our aim. When the aim is to provide a long lasting analgesic effect, long lasting local anesthetics may be used and/or adjuvants may be added and/or a perineural catheter may be placed. Drawbacks of this decision are: the delayed ambulation and risk of falls in case lower limb blocks are performed, the delayed neurological and motor examination, the requirement for specialized equipment and additional skills when catheters are used and the need for prolonged patient monitoring and management from dedicated acute pain teams. In case short lasting effects are required, so that motor and sensory function return as quickly as possible, to achieve early ambulation and neurological examination, short acting local anesthetics may be used and the known drawbacks are: the risk of rebound pain upon resolution of nerve blockade, the need for higher opioid doses, delayed rehabilitation due to opioid side effects and the pain itself and prolonged hospital stay. Additionally, if eventually acute pain is not managed adequately, the risk of patient dissatisfaction and the incidence of cardiovascular and pulmonary complications and persistent postsurgical (chronic) pain are increased.

So, the solution is to balance the risks and benefits of each technique, choose the proper one for each individual and of course not to rely just to the peripheral nerve blockade for postoperative pain management but on to a multimodal regimen including a block but also other agents administered from different routes. In this case drawbacks of short acting blocks will be successfully managed. In case long lasting blocks are used, proper multi-intervention fall-prevention strategies may be applied, so that patients are safely mobilized early and dose adjustments both in continuous and single shot techniques or proper adjuvants (that tend to prolong analgesia) more than they prolong motor block, according to studies can counteract the relevant drawbacks effectively.

REFERENCES

The reason many of us, physicians dedicated ourselves to the medical profession, is patient care. Proper patient care is continuously improved through advancing science and healthcare. Medicine is involved in evidence based practices on one hand, but on the other hand in continuous effort for improvement of these practices and research for new ones. Point-of-care ultrasound (POCUS), seems that is changing medical practice, having entered forcefully in the daily routine of numerous specialties, implementing new diagnostic tools.

POCUS is an ultrasonography examination performed and interpreted by physicians at the bedside, aiming at answering a well-defined clinical question to properly guide patient management with the intention of improving outcomes. Many physicians describe POCUS as the 21st century extension of the physical exam. It allows real time findings that may be correlated with patient’s clinical condition, providing dynamic images. These images, depending on the user, could be repeatable in case patient’s condition changes. Ultrasound scanning is rapidly emerging as an easily accessible, portable and relatively inexpensive tool, that can be proven as an extremely useful diagnostic and monitoring modality in clinical practice.¹⁻⁴

Many anesthesiologists are already acquainted with classical ultrasound applications, scanning techniques and image interpretation. The primary application for perioperative ultrasound in anesthesia was transthoracic echocardiography, mainly used by cardiovascular anesthesiologists that acquired skills comparable to the skills of cardiologists and radiologists. Ultrasound guided insertion of central venous catheters was also one of the first and main ultrasound uses in anesthesia, now recommended by the majority of international guidelines. Last but not least, ultrasonography in the hands of anesthesiologists raised to higher skill levels as a means to guide peripheral nerve blockades and field blocks for surgical anesthesia, analgesia but also in interventional pain medicine.⁵⁻⁹

Following this information, it is more than obvious that anesthesiologists may become and actually should become proficient users of US, in areas beyond vascular access and regional anesthesia. So, as anesthesiologists are increasingly involved in patient management beyond the operating room, they are soon expected to use POCUS more extensively to diagnose cardiopulmonary disorders and optimize hemodynamic condition perioperatively. The proof that POCUS is here to stay for anesthesiologists too, is the fact that it is increasingly involved in decision making for two of the most important anesthesiological activities, the airway examination and the gastric volume evaluation. POCUS for airway evaluation has recently been demonstrated to identify difficult laryngoscopy by indirect measures, i.e. location of the hyoid bone and measurement of the hyomental distance, evaluation of the tongue volume, and the mandibular space for the tongue to be displaced into. Additionally it can be used for appropriate location of the endotracheal tube and facilitation of cricothyrotomy procedures by proper location of the cricothyroid membrane in patients with difficult anatomy, like the morbidly obese. Gastric POCUS is increasingly being suggested to play a vital role in quantifying and quantifying gastric content (fluid or solid), providing valuable information in emergency but also in elective cases. According to recent literature it may be a useful diagnostic addition to standard patient assessment in cases of non-compliance to fasting guidelines. It allows to personalize aspiration risk assessment and to tailor anesthetic management to the individual patient.¹⁰⁻¹⁴

Lung POCUS has proven to be a valuable tool for the detection of pneumothorax, pleural effusion, consolidation and alveolar interstitial syndrome in the critical care setting, searching for signs like: Lung sliding (sliding of visceral and parietal pleura over one another with respiration), that may rule out pneumothorax, A lines (repeated parallel lines below pleura), suggesting that there is no parenchymal disease and B lines (vertical lines) indicating fluid in the lungs or an interstitial syndrome. According to studies it seems to have comparable or even higher sensitivity and specificity than the chest x ray in diagnosing common lung pathologies as alveolar interstitial syndrome, consolidation, pleural effusion and pneumothorax. POCUS lung proven its value in rapid recognition of the major causes of acute respiratory failure in >90% cases studied and for diagnosing circulatory failure while it is even considered an alternative imaging technique to thoracic CT.¹⁻¹⁸

An important POCUS application, highly interesting for anesthesiologists, is the ultrasonographic evaluation of the diaphragm. The diaphragm can be examined as part of the respiratory muscle function assessment, in patients with neuromuscular disorders. Most commonly we evaluate: Diaphragm Thickness, Change in Thickness, Diaphragm Excursion, Side-to-side Variation (greater excursion on the left side) and Diaphragmatic Velocity. These measurements are used for identification of diaphragm paralysis and its etiology (intrinsic or extrinsic pathology), prognosis after diaphragm paralysis (with serial measurements of muscle thickness), assessment of Weaning Failure (decreased diaphragm excursion seems to predict weaning failure). Based on these, diaphragmatic POCUS could be used for assessment of phrenic nerve dysfunction before and after regional anesthetic techniques for example interscalene or cervical plexus blocks.¹⁹

A special POCUS exam is the Focused Cardiac Ultrasound (FOCUS) as a simple, rapid, goal-oriented and repeatable exam used to answer basic ‘yes or no’ clinical questions (Is there a cardiac tamponade? Is there a valvular rupture?), to assist in perioperative management. The most common obvious pathologies that are either diagnosed or ruled out with a FOCUS exam are pericardial effusions, severe ventricular failure, cardiac wall motion abnormalities suggestive of coronary artery disease, gross valvular pathology and a dynamic assessment of the inferior vena cava in the critically ill, patients in shock, the trauma patient, or a patient in cardiac arrest.²⁰