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#### SP41 INDICATORS THAT POCUS IS HERE TO STAY FOR ANAESTHESIOLOGISTS TOO!

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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.<sup>1-4</sup>

Many anesthesiologists are already acquainted with classical ultrasound applications, scanning techniques and image interpretation. The primary application for perioperative ultrasound in anesthesia was transesophageal 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.<sup>5-9</sup>

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.<sup>10-14</sup>

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.<sup>15-18</sup>

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.<sup>19</sup>

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.<sup>20</sup>

Other POCUS applications, easy to learn and of increased anesthesiological interest are: the evaluation of proximal lower extremity venous system for deep vein thrombosis diagnosis, the facilitation of placement of orogastric tubes, the evaluation of a patients with low urine output and the estimation of intracranial pressure.

In conclusion, POCUS is progressively becoming more readily available and indications are continuously increasing. It is the day to consider its addition to the anesthesiologist's toolbox as POCUS is rewriting medical history.

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## REGIONAL ANESTHESIA CHALLENGES IN THE OBESE PATIENTS

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Obesity is a global epidemic according to the World Health Organization, extremely underestimated, as proved by its continuously increasing numbers. This means that most probably, we will increasingly have to deal with obesity and morbid obesity in our daily practice, as well as with all the comorbidities and challenges these patients usually present. It would be expected that the literature would be full of studies dealing with the challenging subject of regional anesthesia administration in the obese. But this is not the case. Textbooks and most reviews are based on already outdated studies and most commonly, the patients with increased body mass index are excluded from studies. Regional anesthesia in the obese may be advantageous because it helps avoid difficult airway manipulations, gastric content regurgitation and is associated with earlier mobilization and shortening of hospital length of stay. On the other hand, studies mainly coming from obstetrics for the obese parturients, suggest difficulties in central nerve blockade, like difficult patient positioning, difficult landmark identification and catheter dislocation. Prescanning with ultrasound could help with landmark identification. Larger needles may be required, dose adjustment is under investigation and senior anesthesiologists should be available for many of these cases. Peripheral nerve blocks in the obese may pose as well challenges, like difficulties in proper patient positioning and landmark identification, need for phrenic nerve sparing in above the clavicle techniques, since there may be respiratory comorbidities that demand avoiding diaphragmatic paralysis. Continuous catheter techniques may pose problems due to dislocations and increased incidence of infection.

Ultrasound guidance may help overcome many difficulties in regional techniques. But as expected, targets are more deeply situated in obese patients and the ultrasound beams are attenuated as they travel a greater distance through tissue layers. Additionally, when crossing a tissue boundary, a portion is reflected back to the transducer creating artifacts like speckling and clutter which are particular problems in the obese patient. The resulting image may be granular therefore obscuring the underlying anatomy.

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