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Editorial

Point-of-Care Ultrasonography: A "Third Eye" for Anesthesiologist

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Editorial

Point-of-care ultrasonography is the ultrasonography performed and interpreted by the clinician at the bedside [1]. Being a safe, easily accessible, portable and relatively inexpensive tool, ltrasound has emerged as a useful diagnostic and monitoring tool in clinical practice [2]. Anesthesiologists have been instrumental in developing perioperative ultrasound [3]. The positive impact of perioperative point-of-care ultrasound performed by anesthesiologist is increasingly been recognized [4].

The potential applications of point-of-care ultrasonography for anesthesiologists are during regional anesthesia, neuraxial and chronic pain procedures, vascular access, focused transthoracic and transesophageal echocardiography, airway assessment, gastric ultrasound, lung ultrasound and neuro-monitoring [2].

Ultrasound guided peripheral nerve blockade is one of the most popular application of ultrasound by anesthesiologists. It allows direct visualization of nerves and surrounding structures. Local anesthetic spread can be directly visualized. Ultrasound guidance improves block characteristics in terms of performance time and success. The events of serious complications are decreased, thus improving patient safety [5,6]. More precise deposition of local anesthetic agents confers improved block quality, faster onset, longer duration of block and dose reduction of local anesthetic [7]. Use of it in pediatric population is increasing, with the benefits similar to that in adults. The benefits were more significant for ilio-inguinal blocks [8]. Use of ultrasound for lumbar neuraxial anesthetic technique improves precision and efficacy. It provides informations about the depth of epidural space and helps to locate interspinous space [9]. Ultrasound guidance has been used for various chronic pain procedures like nerve root block, transforaminal injection and facet joint block with performance similar to fluoroscopy guided techniques [2]. When compared with anatomic guidance, ultrasound guidance is found to improve accuracy for intra-articular injection, with greatest benefits observed for knee and shoulder joints [10].

Ultrasound guidance during central venous cannulation confers the benefit of visualizing the anatomic variation and intravascular thrombi. When compared with traditional landmark techniques, ultrasound guidance for cannulation is safer and less time consuming [11]. The benefits are observed for both internal jugular and subclavian vein catheterization [12,13]. Ultrasound guidance is strongly recommended for central venous access and arterial catheterization (Figure 1) [14]. Use of ultrasound guidance for radial artery cannulation increases first-attempt success [15].

Bedside echocardiography allows rapid, non-invasive point-of-care assessment of ventricular function, valvular integrity, volume status and fluid responsiveness. Focused cardiovascular ultrasonography in the perioperative period, performed by anesthesiologist can accurately detect major cardiac pathology and significantly alter perioperative management [4,16]. Point-of-care echocardiography can play a crucial role in the diagnosis and management of perioperative hemodynamic instability by guiding the anesthesiologist to an explainable diagnosis [17].

Ultrasound guidance can be used to confirm proper endotracheal tube placement, either by directly visualizing trachea and esophagus during intubation or by indirectly observing bilateral lung sliding with ventilation. Ultrasonography has high diagnostic value for identifying esophageal intubation [18]. Use of ultrasound before and during percutaneous dilatational tracheostomy significantly reduces procedure-related complications [19,20]. Point-of-care ultrasonography has been shown to reliably assess gastric content and volume and thus determine aspiration risk [21]. It can be helpful in patients with significant comorbidities in whom recommended fasting guidelines may not reliably ensure empty stomach (eg. diabetic gastroparesis) and in patients undergoing emergency surgery.

Bedside lung ultrasound is helpful for rapid diagnosis and differentiation of cause of acute respiratory failure [22]. Diagnostic yield of lung ultrasound is higher than of chest X-ray for diagnosis of common pathologic conditions like consolidation, interstitial syndrome, pneumothorax and pleural effusion. It may be used as an alternative to thoracic CT scan [23,24]. It is recommended to

Figure 1: Intraoperative ultrasound-guided central venous cannulation being performed by an anesthesiologist using a portable ultrasound machine.

perform ultrasound routinely following central venous cannulation when the pleura could have been damaged [14]. It can be of significant value to rapidly detect intraoperative pneumothorax following central venous cannulation [25].

In the past decades, ultrasound equipment has become more compact, less expensive, yet high quality, which has facilitated the growth of point-of-care ultrasonography [1]. Hand-carried ultrasound devices at bedside have emerged as powerful adjunct to and superior than physical examination [26,27]. It may enhance safety and minimize iatrogenic harm [28]. However, ultrasonography is user-dependent technology. As the usage extends, it is needed to ensure competence, define benefits of appropriate use, and limit unnecessary imaging and its consequences [1,29] Point-of-care ultrasonography is a teachable and readily learnable skill. Simulation and web-based technologies, when available, can be used for standardization of both ultrasound skills training and competency assessment [30].

With the ever-expanding spectrum of use of point-of-care ultrasonography in anesthesiology practice and with increasing availability of compact and portable ultrasound machines, point-of-care ultrasonography can serve as a third-eye for anesthesiologist, bringing transformative effect in the perioperative care of patients [31].

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