

Beyond Tuohy Needles and Emesis Basins: A Case for Focused Cardiac Ultrasound Training in Obstetric Anesthesiology

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An attending once told me that the practice of anesthesia is 90 percent routine and 10 percent sheer terror.

Though I'd heard this adage before, I didn't expect to fully realize it so early in my obstetrical anesthesiology rotation. An emergent post-partum case involving a massive pulmonary embolism challenged my diagnostic acumen. Thanks to a focused cardiac ultrasound (FoCUS) examination, my team likely saved a patient's life. The experience forced me to consider the importance of perioperative ultrasound in anesthesia training.

One morning during routine post-partum rounds, I was set to see a 38-year-old G2P1 patient status-post dilation and evacuation (D&E) for a non-viable fetus. My notes indicated that she had failed terminal induction over the preceding 48 hours and required an urgent D&E after developing a fever concerning for chorioamnionitis.

Entering the patient's room, I discovered a scene of panic. She was seated on the edge of the bed, bent over and trying to catch her breath. Multiple nurses frantically attempted to draw labs while an OB-GYN resident stared at her electrocardiogram. Machines alarmed incessantly. My stomach sank, and I sprang to action.

I assessed the patient. "I'm lightheaded," she gasped, with the nasal cannula half off her face. The oxygen saturation was reading 88 percent; her pulse rate was 140 beats/min; the automated blood pressure cuff wasn't registering.

While formulating a differential diagnosis in my head, I laid her back and reached in my pocket for an emergency phenylephrine syringe, which I always kept handy while on labor and delivery. Was this evolving sepsis, an occult hemorrhage, pulmonary embolism (PE) or heart failure?



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At this point, I couldn't have been sure. I alerted my fellow of the situation, and he arrived quickly with a basic ultrasound machine. Almost immediately, the ultrasound probe was connected and McConnell's sign stared back at us from the apical 4-chamber view (Figure 1). We had just rapidly diagnosed a massive PE using a FoCUS exam.

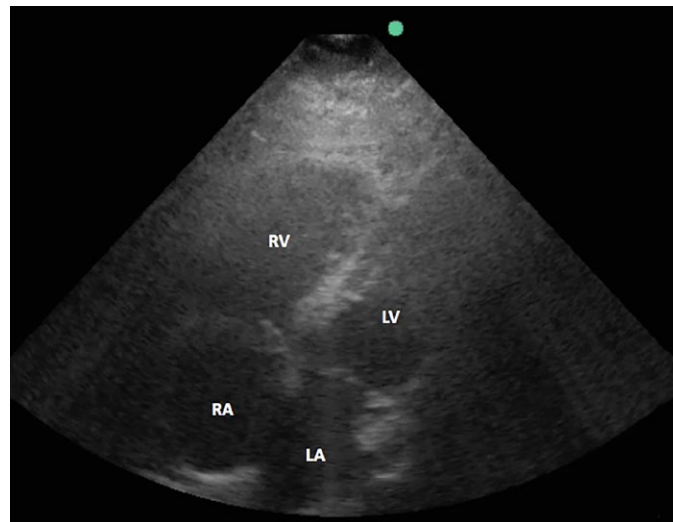


Figure 1: FoCUS apical 4-chamber snapshot demonstrating a severely dilated RV that overtakes the apex of the heart. During systole, the interventricular septum bows into the LV. The RV free wall is largely akinetic while the apex is hypercontractile (McConnell's sign).

The next several minutes unfolded rapidly. I immediately placed an ultrasound-guided large-bore intravenous catheter in order to draw labs. The OB-GYN resident needed little convincing that a massive PE fit the clinical scenario. Out of concern for progressive RV failure, I further advised that the primary service stop administering empiric crystalloid fluid boluses. Within 30 minutes, the patient was transferred to the surgical ICU where she was stabilized and received a therapeutic dose of intravenous enoxaparin. Six hours later, she was in the interventional radiology suite receiving catheter-directed thrombolysis. Now six months out, she's recovered her RV function fully on a prolonged course of anticoagulation.

Having witnessed first-hand the power of FoCUS, I began asking myself questions about the origin and utility of the exam. What was it, exactly? Why wasn't it being used more widely in obstetric anesthesia? Should I be learning this as an anesthesia resident? And do critical care echo rounds on intubated patients constitute formal training?

To start, I needed a formal definition. Per international evidence-based guidelines published in 2014,¹ FoCUS is a limited, point-of-care cardiac ultrasound examination employed with a very specific question in mind. Unlike a comprehensive echocardiographic assessment, FoCUS is intended to yield semiquantitative or qualitative data in a time-sensitive manner to “orient the physician at key clinicotherapeutic algorithms.”¹ Particularly relevant to my patient was using FoCUS to narrow differential diagnoses in a case of undifferentiated shock¹ and even support the use of empiric reperfusion therapy in hemodynamically unstable patients with suspected PE.²

Though not immediately apparent, this case helped me appreciate cardiac ultrasound in a context distinct from the ICU or cardiac O.R.s, where echo machines are commonplace. In the realm of obstetrics, normal physiology is altered and patients are susceptible to acute cardiopulmonary processes, including septic shock, hemorrhage, preeclampsia and venous thromboembolism.³ As anesthesia providers, we are often first responders to obstetric emergencies, and our deep understanding of cardiopulmonary physiology and resuscitation make us well suited for this role. However, in light of increasing pregnancy-related mortality in the United States, the time to take ownership of FoCUS within obstetrics is now.⁴ By proving its utility as a diagnostic modality capable of actively guiding management decisions in critical situations, we strengthen our role as a complete perioperative consultant through the eyes of our obstetric colleagues.

Another reason FoCUS belongs in obstetrical anesthesiology is that peripartum patients constitute a prime environment in which technical ultrasound skills can be honed. A recent review article⁵ on this topic importantly notes that pregnant women are already largely familiar with and welcoming of ultrasound secondary to their routine prenatal scans (my patients were, in fact, quite amenable to me practicing on them during my rotation). Second, compared to X-rays and CT scans, FoCUS has an improved safety profile devoid of radiation exposure to a developing fetus, and neuraxial labor analgesia may actually improve comfort with the exam. Finally, the cephalad displacement of the heart by the gravid uterus in conjunction with left-uterine tilt positioning actually facilitates image capture.⁵ Parturients represent a prime patient population to improve education in ultrasound, particularly FoCUS.

The aforementioned reasons show how valuable FoCUS skills can be for the anesthesia provider, and my formative experience has provided me a framework in which to validate this argument. The intrinsic volatility of obstetric emergencies and this population’s suitability to ultrasound examination

pave the way for our adoption of this tool. Like intensivists and emergency medicine physicians have done, it is our time to culturally embrace FoCUS.⁶

Looking to the future, there are indeed strong arguments that favor early implementation of FoCUS in anesthesiology training. Namely, FoCUS holds educational value as a physical exam adjunct, is relatively easy to learn and may be conducive to simulation platforms.^{6,7} We still, however, need evidence-based data to guide national committees in creating standardized curricula and competency measures that specifically identify FoCUS’ role within both general and subspecialty anesthesia practices.⁸ As the Society of Cardiovascular Anesthesiologists has done in conjunction with the American Society of Echocardiography for TEE practice, we should be advised to adopt FoCUS with proper credentialing processes implemented in order to prioritize patient safety.^{1,8} Mahmood et al. propose that with the support of the American Board of Anesthesiology and in accordance with ACGME milestones, “training in fundamentals of perioperative ultrasound should be a core competency of anesthesia residency programs” with advanced applications integral to fellowship training thereafter.⁸

While the details of the future are unknown, I’m optimistic that by following the lead of my mentors in obstetric, critical care and cardiothoracic anesthesiology, we can take ownership of FoCUS, safely teach it and effectively use it to improve the care of obstetric patients nationwide.

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