

Transforming acute dyspnea management: the role of point-of-care echocardiography in cardiac emergencies: case series

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Background: Acute dyspnea and shock are among the most common and time-sensitive presentations in emergency and critical care settings. Rapid identification of underlying cardiac etiologies is essential to guide appropriate management. Conventional diagnostic tools such as electrocardiography, chest radiography, and cardiac biomarkers often provide indirect or delayed information. Point-of-care echocardiography (POCUS) enables immediate bedside assessment of cardiac structure, function, and hemodynamics, with emerging quantitative Doppler techniques offering enhanced diagnostic precision.

Case Series: We present a case series of three patients presenting with acute dyspnea due to distinct cardiac pathologies, highlighting the diagnostic and therapeutic value of focused echocardiography. The first case involved a patient with ischemic cardiomyopathy complicated by left ventricular thrombus and cardiogenic shock, where POCUS identified severe biventricular dysfunction and guided early initiation of inotropes and anticoagulation. The second case demonstrated heart failure with preserved ejection fraction and pulmonary edema due to a mitral valve fibroelastoma, where echocardiographic findings enabled guided targeted decongestive therapy. The third case illustrated the role of quantitative echocardiography in cardiogenic shock, where Doppler-based measurement of left ventricular outflow tract velocity–time integral (LVOT VTI) and estimation of right ventricular systolic pressure (RVSP) confirmed severely reduced cardiac output and informed hemodynamically tailored management.

Discussion: Integration of qualitative and quantitative POCUS parameters—including ventricular function, LVOT VTI, RVSP, inferior vena cava dynamics, and lung ultrasound provides a comprehensive hemodynamic profile. This approach facilitates differentiation of cardiac causes of dyspnea, supports physiology-based resuscitation, and allows dynamic monitoring of treatment response at the bedside.

Conclusion: Focused echocardiography is an indispensable tool in the evaluation of acute dyspnea and shock. Incorporation of quantitative Doppler measurements enhances diagnostic accuracy, guides targeted therapy, and represents a paradigm shift toward data-driven bedside management of critically ill patients.

Keywords: Point of care ultrasound, emergency medicine, dyspnea, echocardiography, case report, case series, acute dyspnea, cardiogenic shock, hemodynamic monitoring.

Conflict of interest

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Consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.