The Use of POCUS in Daily Practice: Are We Really Ready to Use it Efficiently?

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Short Editorial related to the article: Assessment of Interrater Reliability in Point-of-Care Ultrasound for Assessing Congestion in Cardiovascular Intensive Care

Research on congestion in patients with heart failure (HF) is crucial for clinical management and prognosis of the disease. Congestion (i.e., the accumulation of fluids in the body) is the main cause of hospital admission and readmission of patients with HF, and it is associated with increased mortality. Early detection and identification of the extent of congestion are essential for choosing the most appropriate therapy, preventing complications, and improving prognosis.[1] Clinical signs of congestion may be insufficiently sensitive and specific for the diagnosis and management of patients with HF.[2]

The point-of-care ultrasound (POCUS) is a diagnostic tool that allows immediate and dynamic visualization of ultrasound images. This tool can be used at the bedside to obtain additional clinical information for the physical examination of a specific disease or procedure. The practicality and speed with which images are obtained result in their high use at hospitals for critically ill patients. POCUS has been used in various medical specialties, especially in pulmonary and cardiac ultrasound.[3]

The POCUS exam at the bedside of critically ill patients in the intensive care unit or even at the outpatient clinic is becoming increasingly common in medical practice, along with physical examination and other complementary tests. As demonstrated by its excellent sensitivity and specificity, performing the POCUS with a focus on specific clinical questions allows for accurate and rapid diagnosis of the hemodynamics of the patient, as well as systemic volume status and degree of pulmonary congestion, and does not add too much time to its performance.

The steps for performing a complete hemodynamic POCUS are based on assessing the degree of cardiac function impairment (cardiac POCUS), assessing pulmonary congestion (pulmonary US), and assessing systemic congestion (VExUS). The POCUS may be crucial in patients with shock of undetermined cause, cardiac arrest, and sudden dyspnea, but it is increasingly used to optimize therapy in non-critical patients.

Keywords:

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Cardiac POCUS evaluates the function of the left and right ventricles, the presence of pericardial effusion, and the characteristics of the inferior vena cava. These parameters enable the identification of causes of hypotension, such as hypovolemia, ventricular dysfunction (cardiogenic shock), or obstructive processes (PTE or hemodynamically significant pericardial effusion).

In the cardiovascular field, pulmonary ultrasound plays an important role in the search for B-lines (known as "comet tails"), which commonly occur in patients with decompensated left ventricular function, either due to contractility failure or increased left ventricle diastolic pressure in hypertensive crises or volume overload, causing pulmonary congestion. The presence of B-lines precedes the auscultation of pulmonary crackles on physical examination, making it important for early diagnosis and treatment.

The VExUS protocol is based on the evaluation of the inferior vena cava, suprahepatic vein flow, portal vein flow, and renal interlobar veins.[4] The analysis of the inferior vena cava serves as a guideline for the VExUS protocol; if its diameter is less than 2.0 cm, the protocol is interrupted, indicating that the patient has no signs of systemic overload (VExUS Score grade 0). However, an inferior vena cava diameter greater than or equal to 2.0 cm is indicative of systemic volume overload, and the protocol is continued by analyzing the flow of the suprahepatic vein, portal vein, and renal interlobar vein. According to the characteristics of the flow, systemic overload is classified as VExUS grade 1 (mild overload), grade 2 (moderate overload), or grade 3 (severe overload).

Saadi et al.[5] found a low inter-examiner variability in performing the POCUS in real-world patients among the three examiners trained for this purpose, with an inter-examiner correlation of 0.9 for pulmonary assessment and 0.9 for estimating the diameter of the inferior vena cava. For the assessment of visceral vessels, the correlation of hepatic vein flow was 0.8, and portal vein flow was 0.79, with the correlation with the VExUS score showing the highest correlation in the study (0.95). The evaluation of left ventricle diastolic pressure parameters showed the lowest values (E/e' correlation: 0.66; A wave: 0.51; septal e' wave: 0.39), despite the good E/A correlation (0.85).

Saadi demonstrated that the POCUS exam is feasible for professionals who are not experts in the method and that after a standardized training period of four hours (theoretical-practical sessions) and one month of training, performing at least 50 supervised exams, they become able to perform the exam, adding diagnostic and management power to the patients examined. POCUS is not a substitute for a full

specialist assessment; thus, proper training is essential to ensure accurate diagnoses.

The performance of these exams by a fourth examiner, fully trained in the method, could serve as a gold standard, allowing not only the degree of agreement between trained professionals to be assessed but also diagnostic accuracy.

Doppler ultrasound of the renal interlobar vessels, an important part of the VExUS assessment, is a challenge for professionals with little knowledge of the method and even for qualified professionals. The dorsal decubitus position of the patient, obesity, inability to mobilize, and the lack of cooperation of the patient in apnea may hinder the evaluation of the intrarenal flow. In the original study by Beaubien et al.[6] the degree of renal congestion was more closely related to the development of renal failure than any other parameter; thus, this degree is important in determining the VExUS score. Removing this parameter from the analysis could distort the VExUS score, reducing the sensitivity and specificity of the severity of systemic congestion. However, in situations in which it is difficult to obtain intrarenal flow, the simplified VExUS protocol can be used using only the suprahepatic veins and portal vein, as it will give us a better idea of the volemia of the patient than with information from the inferior vena cava alone.

POCUS is a tool that is here to stay in clinical practice. Greater sensitivity and specificity in detecting hemodynamically relevant conditions not only improves diagnosis but also guides more precise therapeutic interventions, even in outpatients. Therefore, POCUS become an indispensable resource in contemporary medical practice.

References

1. Moreira FL, Silva GW. Não Tratamos a Congestão Pulmonar e Sistêmica na Insuficiência Cardíaca Aguda Adequadamente. LAJEC. 2022;1(3):e21020. doi: 10.54143/jbmede.v1i3.51.
2. Rohde LEP, Montera MW, Bocchi EA, Clausell NO, Albuquerque DC, Rassi S, et al. Diretriz Brasileira de Insuficiência Cardíaca Crônica e Aguda. Arq Bras Cardiol. 2018;111(3):436-539. doi: 10.5935/abc.20180190.
3. Knust L, Danzmann LC, Cuchinski KK, Zimmer JRC. POCUS na Insuficiência Cardíaca Aguda: Conceitos Básicos para a Prática Clínica. ABC Heart Fail Cardiomyop. 2023;3(2):20230073. doi: 10.36660/abcimg.20240026.
4. Salgado AA, Bernardo MPL, Melo F Netto. Como Faço Avaliação da Congestão Venosa Sistêmica: Protocolo VExUS. Arq Bras Cardiol: Imagem Cardiovasc. 2024;37(2):e20240026. doi: 10.36660/abcimg.20240026.
5. Saadi MP, Machado GP, Silvano GP, Barbato JPR, Almeida RF, Scolari FL et al. Avaliação da Concordância Interobservadores do Ultrassom à Beira do Leito na Análise da Congestão em Unidade de Terapia Intensiva Cardiovascular. Arq Bras Cardiol: Imagem cardiovasc. 2025;38(2):e20250022. DOI: https://doi.org/10.36660/abcimg.20250022
6. Beaubien-Souligny W, Rola P, Haycock K, Bouchard J, Lamarche Y, Spiegel R, et al. Quantifying Systemic Congestion with Point-Of-Care Ultrasound: Development of the Venous Excess Ultrasound Grading System. Ultrasound J. 2020;12(1):16. doi: 10.1186/s13089-020-00163-w.