

Echoes and Shadows: Predicting Hepatorenal Syndrome Outcomes with Lung Ultrasound and X-rays

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Keywords: Acute on chronic liver failure, Albumin, Cirrhosis of liver, Cirrhotic cardiomyopathy hepatorenal syndrome, Lung ultrasound score, Point-of-care ultrasound, Radiographic assessment of lung edema score, Terlipressin.

Indian Journal of Critical Care Medicine (2024); 10.5005/jp-journals-10071-24836

Hepatorenal syndrome-acute kidney injury (HRS-AKI) is a functional renal dysfunction that occurs in patients with cirrhosis and ascites. It results from reduced renal perfusion due to hemodynamic alterations in arterial circulation, particularly splanchnic vasodilation and the overactivity of endogenous vasoactive systems.^{1,2,3} Hepatorenal syndrome predicts poor survival and has an even worse prognosis than many metastatic cancers.⁴

Volume expansion with human albumin combined with terlipressin to counteract splanchnic vasodilation is the cornerstone of treatment for HRS-AKI.⁵ This therapy has been shown to improve renal function but carries the risk of respiratory failure and death, particularly in patients with acute-on-chronic liver failure (ACLF).⁶ Proposed mechanisms include circulatory overload due to albumin and mobilization of fluid from the portal and splanchnic circulations. Additionally, terlipressin reduces the cardiac index (CI) due to an increase in afterload in the absence of inotropic effect, compounded by the presence of cirrhotic cardiomyopathy (CCM) in this patient population.⁷ These factors highlight the importance of monitoring patients with HRS undergoing combined albumin and terlipressin therapy for treatment response and the risk of pulmonary oedema. Traditionally, chest X-rays have been used to diagnose pulmonary edema. However, with the availability of portable ultrasound machines, point-of-care ultrasound (POCUS) is increasingly used for cardiac and pulmonary evaluation.

In this issue of *IJCCM*, Gupta et al. present the results of a single-center observational study investigating the utility of POCUS lung ultrasound (LUS) scores and chest radiography-based radiographic assessment of lung edema (RALE) scores for assessing outcomes in patients with HRS-AKI treated with terlipressin plus albumin.⁸

This study included 102 patients with HRS-AKI receiving terlipressin and albumin. Nearly two thirds of the patients had ACLF while the remaining third had decompensated cirrhosis. The researchers observed a significant worsening of the day 3 LUS score in terlipressin nonresponders. Similarly, non-survivors had no improvement in the LUS score on day 3 along with a worsening in the RALE score. Worsening of both the LUS score and RALE scores were independently associated with mortality. Nearly one fourth of the patients in the study were terlipressin nonresponders, and these patients had a lower survival rate compared to responders (26.9% vs 63.2%).

Interestingly, nonresponders received a higher dose of terlipressin compared to responders (6.2 mg/day vs 2.47 mg/day) but there was no difference in the dose between survivors and non survivors.

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How to cite this article: Kotheekar AT, Shah KB. Echoes and Shadows: Predicting Hepatorenal Syndrome Outcomes with Lung Ultrasound and X-rays. *Indian J Crit Care Med* 2024;28(11):993–994.

Source of support: Nil

Conflict of interest: None

One of the key limitations of the study, as rightly pointed out by the authors, is the lack of cardiac POCUS and inferior vena cava (IVC) ultrasound data. In a recent study involving a similar patient population, Premkumar et al. evaluated predictors of non-response to terlipressin and mortality.⁹ They observed that CCM defined as the presence of systolic or diastolic dysfunction in patients with cirrhosis in the absence of alternative cardiac pathology, was independently associated with poor terlipressin response and unfavourable survival outcomes. Responders showed more than a 20% increase in CI at 72 hours, while nonresponders experienced a similar decrease in CI. Additionally, significantly higher LUS scores were observed in nonresponders at 48 and 72 hours.⁹

While POCUS LUS can detect lung injury and help predict poor survival, incorporating cardiac systolic and diastolic function data along with IVC ultrasound measurements could help predict which patients are at risk of developing pulmonary edema earlier, allowing clinicians to provide individualized care. Venous excess ultrasound (VExUS) can help quantify venous congestion and guide volume expansion with albumin. Intrarenal Doppler is preferred in the presence of cirrhosis, as hepatic and portal vein Doppler measurements can be unreliable.¹⁰

In conclusion, the use of POCUS LUS and quantitative radiology through the RALE score can help identify patients with poor responses to terlipressin and predict poor survival outcomes. Further incorporation of echocardiography and VExUS

in the management of these patients may help provide more individualized care.

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