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LETTER

In Order to Evaluate Right Atrial Pressure More Accurately with Transthoracic Echocardiography, Inferior Vena Cava Collapse and Diameter Should Be Taken into Consideration [Letter]

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Dear editor

I read an article in your esteemed journal titled "Pulmonary Hypertension and Its Determinants in Hemodialysis Patients: A Hospital-Based Cross-Sectional Study".[1] In this cross-sectional study the researchers investigated pulmonary hypertension (PH) frequency and associated factors in patients undergoing maintenance hemodialysis.

Pulmonary hypertension is an important cause of mortality and morbidity worldwide. It is defined as invasively measured mean pulmonary artery pressure (mPAP) >20 mmHg at rest. Chronic renal failure/hemodialysis-associated PH is a subtype of PH whose exact pathophysiology has not yet been determined (group-5 PH).[2] However, the cause of PH in the setting of chronic renal failure/hemodialysis is often multifactorial and may result from direct effects on the pulmonary vascular bed as well as secondary increased pre- and post-capillary pressure.[2] Although data on pulmonary arterial wedge pressure (PAWP) and pulmonary vascular resistance (PVR) are controversial in the context of distinguishing between pre- and post-capillary causes of PH, this should be taken into account.[2]

In the mentioned article,[1] researchers accepted PH as a systolic pulmonary artery pressure (sPAP) value >35 mmHg measured at rest by transthoracic echocardiography (TTE). The authors calculated systolic pressure of the pulmonary artery based on the modified Bernoulli formula as follows: Bernoulli equation: sPAP = 4 × (tricuspid systolic jet)^2 +10 mmHg (estimated right atrial pressure). In the equation, the authors considered the estimated RAP as a constant of 10 mmHg for each patient. However, RAP is estimated on an individual basis based on inferior vena cava (IVC) diameter and collapse (change in IVC diameter during the respiratory cycle) (Table 1).[3] In other words, RAP is not a fixed value; each patient's RAP varies according to the variables mentioned. Thus, especially in the case of chronic kidney disease/hemodialysis, which is an entity where fluid balance is very sensitive, it is important to pay special attention to the VCI diameter and collapse in order to measure RAP more accurately.

For example, a patient with an IVC of 3 cm and an IVC collapse of 35% has an estimated RAP of 15 mmHg, or a patient with an IVC of 1.5 cm and an IVC collapse of 70% has an estimated RAP of 3 mmHg.

In addition, PVR can be estimated by TTE to further define PH in HD patients. "estimated-PVR=10*(TVR/RVOT TVI)+0.16".[4]

In conclusion, in order to evaluate right atrial pressure more accurately with transthoracic echocardiography, inferior vena cava collapse and diameter should be taken into consideration.

Disclosure

The author reports no conflict of interest in this communication.

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Table 1 Estimation of RA Pressure Based on IVC Diameter and Collapse

Estimated RAP	IVC Diameter	IVC Collapse
Normal RAP, (0–5(3) mm-Hg)	≤2.1 cm	>50%
Intermediate RAP, (5–10 (8) mm-Hg)	≤2.1 cm	<50%
	>2.1 cm	>50%
Elevated RAP, 15 mm-Hg	>2.1 cm	<50%

Abbreviations: IVC, inferior vena cava; RAP, right atrial pressure.

References

1. Yu Q, Zhang Q. Pulmonary hypertension in hemodialysis patients and its determinants: a hospital based cross-sectional study. *Int J Gen Med*. 2024;17:3919–3926. doi:10.2147/IJGM.S471779
2. Humbert M, Kovacs G, Hoeper MM, et al. ESC/ERS scientific document group. 2022 ESC/ERS guidelines for the diagnosis and treatment of pulmonary hypertension. *Eur Heart J*. 2022;43(38):3618–3731. PMID: 36017548. doi:10.1093/eurheartj/ehac237
3. Rudski LG, Lai WW, Afilalo J, et al. Guidelines for the echocardiographic assessment of the right heart in adults: a report from the American society of echocardiography. *J Am Soc Echocardiogr*. 2010;23(7):685–713. doi:10.1016/j.echo.2010.05.010
4. Aduen JF, Castello R, Lozano MM, et al. An alternative echocardiographic method to estimate mean pulmonary artery pressure: diagnostic and clinical implications. *J Am Soc Echocardiogr*. 2009;22(7):814–819. PMID: 19505794. doi:10.1016/j.echo.2009.04.007

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