Examining the Jugular Vein Is Never in Vain

Carl V. Leier, MD

In this issue of Circulation: Heart Failure, Drazner et al report the findings of their study on the relationship of right and left ventricular (LV) filling pressures in patients with heart failure and preserved LV ejection fraction (HFPEF) (also referred to as heart failure with preserved systolic function, diastolic heart failure). They noted good concordance (79%) in this patient population between right atrial pressure (RAP), indicative of right ventricular filling pressure, and pulmonary artery occlusive pressure (pulmonary capillary wedge pressure [PCWP]), indicative of LV filling pressure. These pressures, modulated by various loading and unloading maneuvers, ranged from low to normal to high. Nonconcordance was noted in only 21% of the measurements, and, in these, the PCWP did not match the elevation of RAP.

The weaknesses and limitations of this study are overshadowed by its strengths. PCWP is not a direct measurement of left atrial pressure, and RAP and PCWP are not direct measurements of right and LV filling pressures, respectively. But their relationships (RAP to right ventricular filling pressure; PCWP to left atrial pressure and LV filling pressure) are closely linked, and correlations are generally quite high, such that RAP and PCWP are routinely used in clinical medicine as respective indicators of right and LV filling pressures. Only 11 patients with HFPEF were studied by Drazner et al. However, the study was performed in an experienced laboratory by seasoned investigators of human heart failure, using the standard techniques to generate a spectrum of ventricular-loading conditions. The lead author has a noteworthy record of studying fundamental hemodynamic questions in human heart failure.

The question itself, namely the relationship between right and left heart filling pressures, had not been adequately examined in HFPEF. The favorable concordance of right and left heart filling pressures in HFPEF reported herein complements the same relationship of filling pressures (concordance of 80%) in patients with heart failure, LV systolic dysfunction, and depressed ejection fraction. The fact that >40% of patients with heart failure are primarily afflicted with HFPEF adds particular importance and relevance to this study. The fluid-loading protocol brought only 8 PCWP data points (in 5 patients) >22 mm Hg; this less than impressive response in HFPEF is attributable to a varied baseline (prestudy) state of ventricular loading in their patients and to a maximal pressure limit set at 25 mm Hg (presumably for safety and to reduce risk of symptoms for the patient-volunteers of the study). Of course, it is possible that the pressure concordance during acute or short-term changes in ventricular loading, as studied herein, may not apply to a more extended (chronic) period of nonmodulated filling pressures in the day-to-day evaluation and management of patients with HFPEF; however, it is likely that the concordance would even be better if examined in a large number of patients residing in a more equilibrated chronic state of HFPEF.

But is that all there is—concordance of right and left heart filling pressures in HFPEF? The results of this study go well beyond this basic finding. It addresses the very role and function of the physician, especially the cardiologist, as a bedside clinician. The jugular vein (specifically the internal jugular) with its level of pressure and wave contour provides useful, often critically important, information about cardiac rhythm, pericardial disease, integrity of the tricuspid valve, right heart diastolic properties, intravascular volume status (crucial in hypoperfused and hypotensive conditions), and left heart filling pressures with or (and now also) without LV systolic dysfunction.

Examination of the neck veins (internal jugular) is essential in the initial and subsequent long-term day-to-day evaluation and competent management of the patient with heart failure. The inability to properly assess the pressure level and wave contour of the internal jugular veins should encourage the cardiologist interested in heart failure to either learn and develop skill in this component of the physical examination or move to another area of cardiovascular medicine.

Proper examination of the internal jugular veins has the advantage of providing valuable, applicable hemodynamic information, which can be frequently repeated as needed over an extended period of time (weeks, months, and years) and done so, inexpensively and at low risk; characteristics not achievable with the flow-directed pulmonary artery (Swan-Ganz) catheter, echocardiography, and even the now venerable brain natriuretic peptide. The adjustment of medications and the overall management plan can then be as responsive and flexible as the clinician’s schedule and ability to examine the jugular veins as a major component of the evaluation of the patient with heart failure. Indwelling pressure recording devices, currently under development and study, can also provide frequent determinations of intracardiac pressures, but the techniques remain invasive at implantation and require basic staffing and technology for signal transmission and recording. Their cost is unlikely to be negligible and their
longevity and long-term reliability are yet to be determined. Furthermore, these devices are not likely to be implanted in >5 million patients with heart failure in this country. But these devices certainly do have the advantage of allowing some management of the patient with heart failure by the physician from a distance (eg, airport, beach, and golf course), and they may render some sense of security to physicians whose bedside examination skills remain deficient.

As is true for most of medicine, the jugular vein examination and findings can, on occasion, be of limited value or even be misleading. Most good cardiovascular clinicians are familiar with these shortcomings. An elevation of RAP with normal PCWP (left heart filling pressure) was noted in 21% of simultaneous measurements in the Drazner et al report. The potential explanations for this disparity in HFPEF include some tricuspid regurgitation (afterload reduction of right ventricle via right atrium), stiffening of the interventricular septum by fibrosis or hypertrophy, and a degree of right heart diastolic or systolic failure undetectably exceeding that of the LV; all with or without capacitance reserve of the pericardium. Patients with other known causes of this particular disparity, namely acute myocardial infarction involving the right ventricle, right heart valvular disease, pulmonary embolization, and any form of lung disease, were excluded from this study. Parenthetically, this disparity, elevated RAP with normal PCWP (implies normal left heart filling pressures) is not an entirely undesirable or disturbing finding because the right heart is not well served by an elevated filling pressure and, thus, may itself benefit from unloading interventions.

It is somewhat reassuring that none of the pressure measurements in the report by Drazner et al uncovered the opposite disparity in HFPEF, namely an elevated PCWP (left heart filling pressure) with normal or low RAP, a situation that would greatly limit the general clinical application of the jugular vein examination. Nevertheless, this disparity can occur in certain clinical situations, such as angina, transient myocardial ischemia, and acute myocardial infarction and its complications, conditions that are generally appreciated clinically and were excluded from this report.

It can be difficult to find a good jugular vein to examine. Frequently, it is because the pressure is simply not elevated, even with maneuvers to evoke hepatojugular (abdominogu-
lar) reflux. This, of course, is typically regarded as a favorable finding or simply merits correction if the patient is actually intravascularly volume depleted; it is usually not necessary to place the patient in a 0° recumbent position to prove that the jugular veins exist. Prior instrumentation (eg, placement of central venous catheter or pacing lead) can result in the occlusion of a jugular vein, precluding accurate assessment. It is important to look for both internal jugular veins, in particular, when the initial one is not detected or its pressure level or contour does not fit the clinical situation. When examining the patient from his/her right side, assessing both veins will render a perpendicular look at the right and a tangential view on the left (sometimes more revealing). Developing a skill at palpating internal jugular veins can be helpful in patients with short, tissue-laden (eg, obese) necks and, of course, in the placement of central venous and right heart catheters.

Perhaps, the most common limitation of examining the jugular vein is the examiner’s tendency to shift their focus from the frequently misleading, distracting external jugular vein to the internal jugular is often the first hurdle. For the report by Drazner et al to have any widespread clinical impact beyond that of just another hemodynamic study, cardiologists would need to close the gap between their ability to estimate jugular vein pressures on examination (or at least, be able to categorize them as low or normal, moderate, or high elevation) and the actual jugular venous pressure. Then, the bedside analysis of the wave contour of the jugular vein further elevates the diagnostic prowess and sophistication of the examiner.

The report by Drazner et al in this issue should draw clinicians back to the bedside examination, and it provides the supporting data and reasons to do so, regardless of whether the ejection fraction is reduced or preserved.

**Disclosures**

None.

**References**


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